

NATIONAL INSTITUTE FOR FUSION SCIENCE**Bibliography on Electron Transfer Processes in
Ion-ion / Atom / Molecule Collisions
-Updated 1997 -**

H. Tawara

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**RESEARCH REPORT
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BIBLIOGRAPHY ON ELECTRON TRANSFER PROCESSES
IN ION-ION/ATOM/MOLECULE COLLISIONS
-UPDATED 1997-

H.Tawara

National Institute for Fusion Science

Nagoya 464-01, Japan

Abstract

Following our previous compilations [IPPJ-AM-45 (1986), NIFS-DATA-7 (1990), NIFS-DATA-20 (1993)], bibliographic information on experimental and theoretical studies on electron transfer processes in ion-ion/atom/molecule collisions is up-dated. The references published through 1954-1996 are listed in the order of the publication year. For easy finding of the references for a combination of collision partners, a simple list is provided.

[keywords : bibliography, atomic ions, molecular ions,
electron transfer, charge changing]

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- 60P1 Neynaber, R.H.
Advances in Atomic and Molecular Physics 8 57-108 1960
(Academic Press)
Experiments with merging beams
- 68P1 Harrison, M.F.A.
Methods of Experimental Physics 7a 95-115 1968
(Academic Press)
Electron impact ionization and excitation of positive ions.
- 69P1 Dolder, K.T.
Case Studies in Atomic Collision Physics 1 249-334 1969
Experiments with colliding charged-particle beams.
- 75P1 Moseley, J.T., Olson, R.E., Peterson, J.R.
Case Studies in Atomic Physics 1-45 1975
(North-Holland Publishing)
Ion-ion mutual neutralization.
- 76P1 Dolder, K.T., Peart, B.
Reports on Progress in Physics 39 693-749 1976
Collisions between electrons and ions.
- 76P2 Salzborn, E.
IEEE NS-23 947-958 1976
Charge exchange cross sections
- 78P1 Basu, D., Mukherjee, S.C., Surai, D.P.
Phys. Report 42 145-234 1978
Electron capture processes in ion-atom collisions
- 78P2 Presnyakov, L.P.
Electronic and Atomic Collisions 407-430 1978
(ed. G. Watel; North-Holland)
Charge exchange of highly charged ions in neutral atoms
- 78P3 Shevelko, V.P.
Z. Phys. A 287 19-26 1978
One-electron capture in collisions of fast ions with atoms
 $H^+ + Ar, Cd, Cs \rightarrow H(nl); F^{7+} + Ar \rightarrow F^{6+,5+,4+}(nl); O^{2+,3+,4+}(nl); He, N \rightarrow O^{2+,3+,4+}(Born, close-coupling)$
(1-5) $\times 10^4$ keV/amu
- 79P1 Belkic, Dz., Gayet, R., Salin, A.
Phys. Repeort 56 279-369 1979
Electron capture in high energy ion-atom collisions
- 79P2 Shakeshaft, R., Spruch, L.
Rev. Mod. Phys. 51 369-405 1979
Mechanisms for charge transfer (or the capture of any light particle) at asymptotically high impact velocities
- 80P1 Dolder, K.T.
Atomic and Molecular Processes in Controlled
Thermonuclear Fusion (Plenum) 348 1980
Some experimental aspects of inelastic electron-atom collisions and collisions between charged particles.
- 80P2 Dolder, K.T.
Electronic and Atomic Collisions 281-294 1980
(North-Holland Publishing)
Collisions between charged particles.
- 81P1 Delos, J.B.
Rev. Mod. Phys. 53 287-357 1981
Theory of electronic transitions in slow atomic collisions
- 81P2 Janev, R.K., Presnyakov, L.P.
Phys. Report 70 1-107 1981
Collision processes of multiply charged ions with atoms
- 82P3 Barat, M.
Atomic Physics of Highly Ionized Atoms 1982
(ed. Marus, R., Plenum Press)
Charge exchange processes involving multicharged ions: the quasi-molecular approach
- 82P4 Briggs, J.S., Macek, J., Tautbjerg, K.
Comm. At. Mol. Phys. 12 1-17 1982
Theory of asymmetric electron capture collisions
- 82P5 Dolder, K.T.
Comm. At. Mol. Phys. 11 211 1982
Ion-ion collisions.
- 82P6 Gilbody, H.B.
Physics of Electronic and Atomic Collisions 223 1982
(North-Holland Publishing)
Collisions between positive ions.
- 82P7 Greenland, P.T.
Phys. Report 81 131 1982
Electron capture by highly stripped ions

- 92P8 Koyano, I.
Adv. Chem. Phys. 82 (2) 263-307 1992
State-selected charge transfer and chemical reactions by the TESICO technique
- 92P9 McGuire, J.H.
Adv. At. Mol. Opt. Phys. 29 217-323 1992
Multi-electron excitation, ionization and transfer in high velocity atomic and molecular collisions
- 92P10 Mukherjee, S.C. Sural, D.P. McCann, J.F. Shimamura, I.
Comm. At. Mol. Opt. Phys. 28 25-38 1992
Theory of electron capture in ion-atom collisions at high energies
- 92P11 Nakamura, H.
Adv. Chem. Phys. 82 (2) 243-319 1992
Semiclassical approach to charge transfer processes in ion-molecule collisions
- 92P12 Niedner-Schatteburg, Toennies, J.P.
Adv. Chem. Phys. 82 (1) 553-647 1992
Proton energy loss spectroscopy as a state-to-selective probe of molecular dynamics
- 92P13 Sidis, V.
Adv. Chem. Phys. 82(2) 73-134 1992
Diabatic potential energy surfaces for charge transfer processes
- 93P14 Andersen, N.
Review of Fundamental Processes and Applications of Atoms and Ions 213-237 1993
Atomic collisions with laser-excited targets
- 93P1 Andersen, T. Fastrup, B. Folkmann, F. Knudsen, H. Andersen, N.
Physics of Electronic and Atomic Collisions 1993
Invited Talks at International Conference on Physics of Electronic and Atomic Collisions (Aarhus, 1993)
- 93P10 Church, D.A.
Phys. Report 228 253-358 2993
Collision measurements and excited level life time measurements on ions stored in Paul, Penning and Kingdon ion traps
- 93P2 Cocke, C.L.
Review of Fundamental Processes and Applications of Atoms and Ions 111-167 1993
Progress in atomic collisions with multiply charged ions
- 93P3 Crothers, D.S.F. Dube, L.J.
Adv. At. Mol. Opt. Phys. 30 287-337 1993
Continuum distorted wave method in ion-atom collisions
- 93P4 Duggan, J.L. Morgan, L. (ed.)
Nucl. Instr. Meth. B 79 1-988 1993
Proc. 12-th International Conference on Applications of Accelerators in Research and Industry (Denton, 1992)
- 93P5 Fritsch, W.
Review of Fundamental Processes and Applications of Atoms and Ions 239-281 1993
Progress in atomic collisions theory: the semiclassical close-coupling model and the physics it describes
- 93P6 Hippler, R.
J. Phys. B 26 1-42 1993
Coherent excitation in few-electron atomic systems
- 93P7 Janev, R.K. Phanuef, R.A. Tawara, H.
At. Data & Nucl. Data Tables 55 201-232 1993
Recommended Cross sections for state-selective electron capture in collisions of C^{6+} and O^{8+} ions with atomic hydrogen
- 93P8 Janev, R.K. Smith, J.J.
Suppl. Nucl. Fusion 4 1993
Cross sections for collision processes of hydrogen atoms with electron, protons and multiply charged ions
- 93P9 Latimer, C.J.
Adv. At. Mol. Phys. 30 105-140 1993
The dissociative ionization of simple molecules by fast ions
- 94P1 Dewangan, D.P. Eichler, J.
Phys. Report 247 59-219 1994
Charge exchange in energetic ion-atom collisions
- 94P2 Errea, L.F. Harel, C. Jouin, H. Mendez, L. Pons, B. Riera, A.
J. Phys. B 27 3603-3634 1994
Common translation factor method
- 94P3 Gayet, R. Hanssen, J. Martinez, A. Rivarola, R.
Comm. At. Mol. Opt. Phys. 30 231-248 1994
Status of two-electron processes in ion-atom collisions at intermediate and high impact energies

- 90P2 Dalgarno, A., Freund, R.S., Koch, P.M., Lubell, M.S., Lucatorto, T.B. (ed.)
American Institute of Physics-Conference 205 1990
Proc. Physics of Electronic and Atomic Collisions (New York, 1989)
- 90P3 Eichler, J.
Phys. Report 193 165-277 1990
Theory of relativistic ion-atom collisions
- 90P4 Kimura, M., Lane, N.F.
Adv. At. Mol. Opt. Phys. 26 79-160 1990
The low-energy, heavy particle collisions : a close-coupling treatment
- 90P5 Niehaus, A.
Phys. Report 186 149-214 1990
Spontaneous electron emission from slow atomic collisions
- 91P1 Berenyi, D., Hock, G. (ed.)
High Energy Ion-Atom Collisions (Springer) 1991
Proc. 4-th Workshop on High Energy Ion-Atom Collision Processes (Debrecen, 1990)
- 91P2 Cocke, C.L., Olson, R.E.
Phys. Report 205 153-219 1991
Recoil ions
- 91P3 Duggan, J.L., Morgan, J.L. (ed.)
Nucl. Instr. Meth. B 56/57 1991
Proc. 7-th International Conference on the Applications of Accelerators in Research and Industry (Denton, 1990)
- 91P4 Fritsch, W., Lin, C.D.
Phys. Report 202 1-97 1991
The semiclassical close-coupling description of atomic collisions : recent developments and results
- 91P5 MacAdam, K.B.
Atomic Phys. 12 310-324 1991
Electron capture by ions in a Rydberg atom target
- 91P6 Reading, J. (ed.)
Nucl. Instr. Meth. B 53 363-546 1991
Proc. Joint US-Japan Seminar on Dynamical Excitation by Exotic and Highly Charged Ions (Anchorage, 1990)
- 91P7 Sakabe, S., Izawa, Y.
At. Data & Nucl. Data Tables 49 257-314 1991
Cross sections for resonant charge transfer between atoms and their positive ions : collision velocity <math>< 1 \text{ au}</math>
- 91P8 Salzborn, E., Mokler, P.H., Muller, A.
Z. Phys. D 21 S1-365 1991
Proc. 5-th International Conference on Physics of Highly Charged Ions (Giessen 1990)
- 91P9 Stolterfoht, N.
Nucl. Instr. Meth. B 53 477-492 1991
Dielectronic processes and electron correlation in energetic ion-atom collisions
- 91P10 Winter, H.
Comm. At. Mol. Phys. 27 91-113 1991
Two-electron transition in single electron capture from atoms by slow doubly charged ions
- 92P1 Baer, M.
Adv. Chem. Phys. 82 (2) 187-241 1992
- 92P2 Barat, M., Roncin, P.
J. Phys. B 25 2205-2243 1992
Multiple electron capture by highly charged ions at keV energies
- 92P3 Gianturco, F.A., Schneider, F.
Adv. Chem. Phys. 82 (2) 135-186 1992
Model potential energy surfaces for inelastic and charge-transfer processes in ion-molecule collisions
- 92P4 Gilbody, H.B.
Suppl. Nucl. Fusion 3 55-62 1992
Review of experimental data on electron capture and ionization for collisions of protons and multiply charged ions with helium atoms and ions
- 92P5 Gislason, E.A., Parlant, G., Sizun, M.
Adv. Chem. Phys. 82 (2) 321-421 1992
The semiclassical time-dependent approach to charge-transfer processes
- 92P6 Hippler, R., Lutz, H.O.
Comm. At. Mol. Opt. Phys. 28 39-57 1992
A case study of coherence in few-electron ion-atom collisions
- 92P7 Knudsen, H., Reading, J.F.
Phys. Report 212 107-222 1992
Ionization of atoms by particle and antiparticle impact

- 86P3 Pollack, E. Hahn, Y.
Adv. At. Mol. Phys. 22 243-314 1986
Electron capture by simple ions
- 87P1 Duggan, J.L. Morgan, J.L.
Nucl. Instr. Meth. B 24/25 1987
Proc. 9-th International Conference on Applications of Accelerators in Research and Industry (Denton, 1986)
- 87P2 Lagarde, P. Wulleumier, F.J. Brinad, J.P. (ed.)
J. de Phys. 48, No.C-9 1 1987
Proc. 14-th International Conference on X-ray and Inner-shell Processes
- 87P3 McCarroll, R.
Recent Studies in Atomic and Molecular Processes (Plenum)
Heavy particle collisions : recent advances in the theory of charge transfer by low energy multiply charged ions
- 87P4 Morgenstern, R. Niehous, A. de Heer, F.J. Drentje, A.G. (ed.)
Nucl. Instr. Meth. B 23 1987
Proc. Conference on Physics of Multiply charged Ions (Groningen, 1986)
- 87P5 Reading, J.F. (ed.)
Nucl. Instr. Meth. B 27 (4) 1987
Proc. Third International Workshop on Cross Sections for Fusion and Other Applications (College Station, TX, 1986)
- 87P6 Watanabe, T. Watson, R.L. (ed.)
Nucl. Instr. Meth. A 262 1-162 1987
Proc. 2nd US-Japan Seminar on the Physics of Highly Charged Ions Produced in Heavy Ion Collisions (Kobe, 1987)
- 88P1 Andersen, N. Gallagher, J. Hertel, I.V.
Phys. Report 165 1-188 1988
Collision alignment and orientation of atomic outer shells I. direct excitation by electron and atom impact
- 88P2 Berry, H.G. Dunford, R. Young, L.
Nucl. Instr. Meth. B 31 (1/2) 1988
Proc. Symposium on Atomic Spectroscopy and Highly Ionized Atoms
- 88P3 Chibisov, M.I. Janev, R.K.
Phys. Report 166 1-87 1988
Asymptotic exchange interactions in ion-atom systems
- 88P4 Gilbody, H.B. Newell, W.R. Read, F.H. Smith, A.C.H. (ed.)
Electronic and Atomic Collisions 1988 (North-Holland)
- 88P5 Janev, R.K. Phaneuf, R.A. Hunter, H.T.
At. Data & Nucl. Data Tables 40 249-282 1988
Recommended cross sections for electron capture and ionization in collisions of C³⁺ with H, He and H₂.
- 88P6 Wu, W.K. Huber, B.A. Wiesemann, K.
At. Data & Nucl. Data Tables 40 57-200 1988
Cross sections for electron capture by neutral and charged particles in collisions with He
- 89P1 Bliman, S. (ed.)
J. de Phys. C1 (1) 1989
Proc. The Physics of Multiply Charged Ions and ECR Ion Sources
- 89P2 Duggan, J.L. Morgan, J.L.
Nucl. Instr. Meth. B 40/41 1989
Proc. 10-th International Conference on the Applications of Accelerators in Research and Industry (Denton, 1988)
- 89P3 Janev, R.K. (ed.)
Phys. Scripta T28 1-112 1989
Carbon and oxygen collision data for fusion plasma research
- 89P4 Moisewitsch, B.L.
Adv. At. Mol. Op. Phys. 26 51-77 1989
Electron capture at relativistic energies
- 89P5 Solovév, E.A.
Sov. Phys.-Usp. 32 228-270 1989
Nonadiabatic transitions in atom collisions
- 89P6 Wu, W.K. Huber, B.A. Wiesemann, K.
At. Data & Nucl. Data Tables 42 157-186 1989
Cross sections for electron capture by neutral and charged particles in collisions with He
- 90P1 Briggs, J. Macek, J.H.
Adv. At. Mol. Opt. Phys. 28 1-74 1990
The theory of fast ion-atom collisions

82P8	Macis,A. Riera,A. Phys. Report 90 299-376 1982 Ab initio quantum chemistry in the molecular model of atomic collisions	82P3	Macek,J. Electronic and Atomic Collisions 317-330 1984 (ed. J.Eichler et al., North-Holland) Review of electron capture in ion-atom collisions
82P9	Winter,H. Comm. At. Mol. Phys. 12 165-195 1982 Excitation of multiply charged ions by electron capture from lithium and applications for plasma impurity ion transport studies	84P4	Nikitin,E.E. Umanski,S.Ya. Theory of Slow Atomic Collisions (Springer) 1984
83P2	Brouillard,F. (ed.) Physics of Ion-Ion and Electron-Ion 1983 Collisions (Plenum Press)	85P5	Barat,M. Nucl. Instr. Meth. B 9 364-368 1985 Electron capture by low energy multicharged ions
83P3	de Heer,F.J. Atomic and Molecular Physics of Controlled Thermonuclear Fusion (Plenum) 1983 Experiment on electron capture and ionization by multiply charged ions	85P6	Briggs,J.S. Semiclassical Description of Atomic and Nuclear Collisions (Elsevier) 183-204 1985 The theory of electron capture
83P4	Gallagher,J.W. Bransden,B.H. Janev,R.K. J. Phys. Chem. Ref. Data 12 873-890 1983 Evaluated theoretical cross section data for charge exchange of multiply charged ions with atoms II : hydrogen atom-partially stripped ion systems	85P7	Cocke,C.L. Semiclassical Description of Atomic and Nuclear Collisions (Elsevier) 205-225 1985 Electron capture from the K-shell : experimental
83P5	Janev,R.K. Comm. At. Mol. Phys. 12 277-300 1983 Electron capture into excited states in collisions of highly charged ions with atoms : a theoretical approach and experimental challenge	85P8	Janev,R.K. Presnyakov,L.P. Shevelko,V.P. Physics of Highly Charged Ions (Springer) 1985
83P6	Janev,R.K. Bransden,B.H. Gallagher,J.W. J. Phys. Chem. Ref. Data 12 829-872 1983 Evaluated theoretical cross section data for charge exchange of multiply charged ions with atoms I : hydrogen atom-fully stripped ion systems	85P9	Janev,R.K. Winter,H. Phys. Scripta 117 265-387 1985 State-selected electron capture in atom-highly charged ion collisions
83P7	Liljeby,L. (ed.) Phys. Scripta T3 1-256 1983 Proc. Conference on Production and Physics of Highly Charged Ions	85P10	Moisewitsch,B.L. Phys. Report 118 133-177 1985 Scattering of atomic particles at relativistic energies
84P1	Fritsch,W. Lin,C.D. Electronic and Atomic Collisions 331-342 1984 (ed. J. Eichler et al., North-Holland) Description of electronic processes in ion-atom collisions with two-center atomic orbital	85P11	Morgan,T.J. Olson,R.E. Shlachter,A.S. Gallagher,J.W. J. Phys. Chem. Ref. Data 14 971-1040 1985 Charge transfer of hydrogen ions and atoms in metal vapors
84P2	Janev,R.K. Gallagher,J.W. J. Phys. Chem. Ref. Data 13 1199-1249 1984 Evaluated theoretical cross section data for charge exchange of multiply charged ions with atoms III : non-hydrogenic target atoms	86P1	Brouillard,F. (ed.) Atomic Processes in Electron-Ion and Ion-Ion Collisions (Plenum) 1986
		86P2	Gilbody,H.B. Adv. At. Mol. Phys. 22 143-195 1986 Measurements of charge transfer and ionization in collisions involving hydrogen atoms

- 94P4 Gilbody,H.B.
Adv. At. Mol. Opt. Phys. 32 149168 1994
Studies of state-selective electron capture in atomic hydrogen by translational energy spectroscopy
- 94P5 Hock,G. Berenyi,D.
Nucl. Instr. Meth.B 86 (1/2) 1994
Proc. 5-th Workshop on Fast Ion-Atom Collisions (Debrecen,1993)
- 94P6 Inokuti,M. (ed.)
Adv. At. Mol. Opt. Phys. 33 1994
- 94P7 Moisewitsch,B.L.
Adv. At. Mol. Opt. Phys. 32 279-293 1994
Electron capture to the continuum
- 94P8 Sarkadi,L. Berenyi,D.
Nucl. Instr. Meth. B 87 (1/4) 1994
Proc. 16-th International Conference on X-rays and Inner-shell Processes (Debrecen, 1993)
- 95P1 Aumayr,F. Betz,G. Winter,HP
Nucl. Instr. Meth. B 98 1995
Proc. 7-th International Conference on Physics of Highly Charged Ions (Vienna, 1994)
- 95P2 Datta,S.K. Scheid,W. Grun,N.
Comm. At. Mol. Opt. Phys. 32 1-22 1995
Electron capture processes in the Coulomb-Born approximation
- 95P3 Duggan,J.L. Morgan,I.L.
Nucl. Instr. Meth. B 99 1995
Proc. 13-th International Conference of Applications of Accelerators in Research Industry (Denton, 1994)
- 95P4 Toshima,N. Eichler,J.
Comm. At. Mol. Opt. Phys. 31 109-124 1995
Relativistic generalization of distorted wave capture theories
- 96P1 Bourret, A. Angert,N. Gardin,J.P.
Nucl. Instr. Meth. B 107 (1/4) 1996
Proc. Third International Conference on Swift Heavy Ions in Matters (Caen, France, 1994)

54E1 Bates,D.R. Moiseiwitsch,B.L.
Proc. Phys. Soc. 67 805 - 812 1954 T
Inelastic heavy particle collisions involving the crossing of potential curves I. charge transfer from H atoms to Be²⁺, Si²⁺ and Mg²⁺ ion
Be²⁺, Si²⁺, Mg²⁺ + H -> Be⁺, Si⁺ and Mg⁺
0.01-10 keV/amu

54T2 Dalgarno,A.
Proc. Phys. Soc. A 67 1010-1017 1954 T
Inelastic heavy particle collisions involving the crossing of potential energy curves II. charge transfer from H-atoms to Al³⁺, B²⁺, Li²⁺ and Al²⁺
Al³⁺, B²⁺, Li²⁺, Al²⁺ + H -> Al²⁺, B⁺, Li⁺ and Al⁺
(Landau-Zener)
0.001-10 keV/amu

55T1 Bates,D.R. Lewis,J.T.
Proc. Phys. Soc. A68 173 1955 T
Inelastic heavy particle collisions involving potential energy curves III. charge transfer from negative ions of atomic hydrogen to proton.
H⁻ + H(1s) -> H(2s, 2p, 3s, 3p, 3d) + H(1s)
10⁻¹ - 10⁴ eV ; LZ

57E1 de Heer,F.J. Huizenga,W. Kistemaker,J.
Physica 23 181 1957 E
Some experiments on electron capture, electron loss and ionization.

58E1 Fite,W.L. Brackmann,R.T. Snow,W.M.R.
Phys. Rev. 112 1161 1958 E
Charge exchange in proton-hydrogen atom collisions.

59E1 Sluyters,Th.J.M. de Haas,E. Kistemaker,J
Physica 25 1376 1959 E
Charge exchange, ionization and electron loss cross sections in the energy range 5 to 24 keV

60E1 Allison,S.K. Cuevas,J. Garcia-Munoz,M.
Phys. Rev. 120 1266 1960 E
Experiments on charge-changing collisions of lithium and atomic beams.

60E2 Fite,W.L. Stebbings,R.F. Hummer,D.G. Brackmann,R.T.
Phys. Rev. 119 663 1960 E
Ionization and charge transfer in proton-hydrogen atom collisions.

60E3 Hummer,D.G. Stebbings,R.F. Fite,W.L.
Phys. Rev. 119 668 1960 E
Charge transfer and electron production in H⁻+H collisions.

60E4 Stebbings,R.F. Fite,W.L. Hummer,D.G.
J. Chem. Phys. 33 1226 1960 E
Charge transfer between atomic hydrogen and N⁺ and O⁺.

62E1 Fite,W.L. Smith,A.C. Stebbings,R.F.
Proc. Roy. Soc. A268 527 1962 E
Charge transfer in collisions involving symmetric and asymmetric resonance.

62E2 Lockwood,G.J. Everhart,E.
Phys. Rev. 125 567 1962 E
Resonant electron capture in violent proton-hydrogen atom collisions.

62T2 Bates .D.R. Boyd,A.H.
Proc. Phys. Soc. 79 710 1962 T
Effect of Coulomb repulsion between charged atomic systems on excitation and ionization cross sections.
He²⁺ + He⁺ -> He²⁺ + He⁺ (2s; 2p; 2p.)
(FB)

62T3 Bates,D.R. Boyd,A.H.
Proc. Phys. Soc. 80 1301 1962 T
Effect on symmetrical resonance charge transfer cross sections of change in relative motion during encounter
He²⁺ + He⁺ -> He⁺ + He²⁺
10 eV - 10⁴ eV (rel.) ; FB

62T1	Rapp,D. Francis,W.E. J. Chem. Phys. 37 2631-1645 1962 T Charge exchange between gaseous ions and atoms $A^+ + A \rightarrow A + A^+$ (A = H, He, N, Ne, Ar, Kr, Xe, Hg, K, Ca) (IP) < 5 keV/amu	66E1	Gilbody,H.B. Ryding,G. Proc. Roy. Soc. A 291 438 1966 E An experimental study of charge transfer in proton-atomic hydrogen collisions at impact energies above 40 keV.
63E2	Gilbody,H.B. Ireland,J.V. Proc. Roy. Soc. A 227 137 1963 E Ionization of atomic hydrogen by protons in the energy range 60 to 400 keV.	66E2	McClure,G.W. Phys. Rev. 148 47 1966 E Electron transfer in proton-hydrogen atom collisions : 2-117keV
65E1	Stebbins,R.F. Rutherford,J.A. Turner,B.R. J. Chem. Phys. 39 968-971 1963 E Dissociative charge transfer in $He^+ - O_2$ and $H^+ - N_2$ collisions $He^+ + O_2 \rightarrow He^0 - O_2^+$; $He + O^+ + O$; $He^+ - N_2 \rightarrow He^0 - N_2^+$; $He^0 + N^+ + N$	66E3	Ryding,G. Witkower,A.B. Gilbody,H.B. Proc. Phys. Soc. 89 547 1966 E A study of Lyman- α emission in charge transfer collisions involving 40-200 keV protons.
63T1	Rapp,D. J. Geophys. Res. 37 1773-1775 1963 T Accidentally resonant asymmetric charge transfer in protonosphere $O^+(S) + H \rightarrow O$ < 5 keV/amu	66E4	Witkower,A.B. Ryding,G. Gilbody,H.B. Proc. Phys. Soc. 89 541 1966 E An experimental study of charge transfer in proton-atomic hydrogen collisions using a furnace target method.
65E2	Jorgenson,T. Kayatt,Jr.,C.E. Lang,W.W. Lorentz,D.C. Sautter,C.A. Phys. Rev. 140 A1481 1965 E Measurements on charge-changing collisions involving negative hydrogen, helium and oxygen ions.	67E1	Belyaev,V.A. Brezhnev,B.G. Erastov,E.M. Soviet Phys.-JETP 25 777 1967 E Resonance charge exchange of protons and deuteron at low energies.
65E1	Stebbins,R.F. Smith,A.C.H. Ehrhardt,H. Planet. Space Sci. 13 1125-1129 1965 E Loss of He^+ ions in the upper atmosphere $He^+ + N_2 \rightarrow He + N_2^+$; $He + N^+ + N$; $He^+ + O_2 \rightarrow He + O_2^+$; $He + O^+ + O$ (dissociative charge transfer is dominant at low energies) $2.5 \times 10^{-3} - 2.5 \times 10^{-1}$ keV/amu	67E2	Sinda,T. Manus,C. Guidi,J. Comptes Rendus 264 755 1967 E Etude des interactions inelastiques entre deux faisceaux d'ions. $H_2^+ + N_2^+ \rightarrow H^+ + H_2^0 + H^+$ 50-250 keV
65E3	Stebbins,R.F. Young,R.A. Oxley,C.L. Everhardt,H. Phys. Rev. 138 A1312 1965 E Lyman-alpha production in $H^+ - H(1s)$ collisions.	67E4	Witkower,A.B. Gilbody,H.B. Proc. Phys. Soc. 90 353 1967 E A study of the charge neutralization of fast Ne^+ , Ar^+ and Kr^+ ions during passage through gaseous targets.

- 67E3 Witkower, A.B., Levy, G., Gilbody, H.B.
Proc. Phys. Soc. 91 306 1967 E
An experimental study of electron loss during the passage of fast hydrogen atoms through atomic hydrogen.
- 67T1 Nikolaev, V.S.
Sov. Phys.-JETP 24 847-857 1967 T
Calculation of the effective cross sections for proton charge exchange in collisions with multielectron atoms
modified OBK
- 68E2 Bayfield, J.E.
Phys. Rev. Letters 20 1223 1968 E
Electron capture into the metastable 2s state in collisions of protons with hydrogen atoms.
- 68E1 Belyaev, V.A., Brezhev, B.G., Erastov, E.M.
Sov. Phys.-JETP 27 924-926 1968 E
Resonant charge transfer of low-energy carbon and nitrogen ions
 $C^+ + C \rightarrow C + C^+$; $N^+ + N \rightarrow N + N^+$
(merged beam technique)
0.6 - 8 eV/amu
- 68E3 Keever, W.C., Lockwood, G.J., Helbig, H.F., Everhart, E.
Phys. Rev. 166 69 1968 E
Measurements of close encounters in H-on-H, H-on-H₂ and H⁻-on-H collisions.
- 68E4 McClure, G.W.
Phys. Rev. 166 22 1968 E
Ionization and electron transfer in collisions of two H atoms : 1.25-117 keV.
- 68E5 Young, R.A., Siebbings, R.F., McGowan, J.W.
Phys. Rev. 171 85 1968 E
Lyman- α production and polarization in He⁺ collisions with H and H₂.
- 69E2 Bayfield, J.E.
Phys. Rev. 185 1-5 1969 E
Measurement of the total cross section for charge transfer into the metastable state H (2s) for proton colliders with atomic hydrogen.
- 69E1 Lockwood, G.J.
Phys. Rev. 187 161-166 1969 E
Charge transfer cross sections for H⁺, Li⁺ and Na⁺ on N₂
H⁺, Li⁺, Na⁺ + N₂ \rightarrow H⁰, Li⁰, Na⁰
0.2-100 keV/amu
- 69E3 Rundel, R.D., Aitken, K.L., Harrison, M.F.A.
J. Phys. B 2 954 1969 E
A measurement of the cross section for charge exchange in H⁺ - H collisions.
H⁺ + H⁺ \rightarrow H + H
0.25 - 10 keV (rel.)
- 70E5 Aberth, W.H., Peterson, J.R.
Phys. Rev. A 1 158 1970 E
Ion-ion mutual neutralization cross sections measured by a superimposed beam technique.
N⁺ + O⁻ \rightarrow N + O ; N₂⁺ + D₂⁻ \rightarrow N₂ + D₂ ; O₂⁺ + O₂⁻ \rightarrow O₂ + O₂
0.1 - 98 eV (rel.)
- 70E1 Cobic, B., Vujovic, M., Matic, M.
J. Phys. B 3 660-666 1970 E
A study of charge-changing collisions involving Mg⁺, Fe⁺ and Cu⁺ in the energy range 5-30 keV
A⁺ + Ne, Kr, N₂ \rightarrow A⁺, A, A⁻ (A=Mg, Fe, Cu)
0.08 - 1.25 keV/amu
- 70E6 Datz, S., Lutz, H.O., Bridwell, L.B., Moak, C.D., Betz, H.D., Ellsworth, L.D.
Phys. Rev. A 2 430 1970 E
Electron capture and loss cross sections of fast bromine ions in gases.

- 70E7 Gaily, T.D., Harrison, M.F.A.
 J. Phys. B 3 1098 1970 E
 A measurement of the charge exchange cross section in $\text{He}^+ - \text{H}^+$ collisions.
 $\text{He}^+ + \text{H} \rightarrow \text{He} + \text{H}$
 0.2 - 8.0 keV (rel)
- 70E8 Gaily, T.D., Harrison, M.F.A.
 J. Phys. B 3 L25 1970 E
 A remeasurement of the cross section for charge exchange in $\text{H}^+ - \text{H}^+$ collisions.
 $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}$
 0.6 - 4.0 keV (rel.)
- 70E9 Kaupilla, W.E., Teubner, P.J.O., Fite, W.L., Girnius, R.J.
 Phys. Rev. A 2 1759 1970 E
 Polarization of Lyman- α radiation produced by direct excitation of hydrogen atoms by proton impact.
- 70E2 Lockwood, G.J.
 Phys. Rev. A 2 1406-1410 1970 E
 Total cross sections for charge transfer of noble-gas ions in N_2
 $\text{A}^+ + \text{N}_2 \rightarrow \text{A} \ (\text{A}=\text{He}, \text{Ne}, \text{Ar}, \text{Kr}, \text{Xe})$
 0.07-20 keV/amu
- 70E10 Moseley, J., Aberth, W., Peterson, J.R.
 Phys. Rev. Letters 24 435 1970 E
 $\text{H}^+ - \text{H}^+$ mutual neutralization cross section obtained with superimposed beams.
 $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}$
 0.15 - 300 eV (rel.)
- 70E11 Olson, R.E., Peterson, J.R., Moseley, J.
 J. Chem. Phys. 53 3391 1970 E
 Ion-ion recombination total cross sections-atomic species.
 $\text{O}^+ + \text{O} \rightarrow \text{O} + \text{O}$; $\text{He}^+ + \text{D} \rightarrow \text{He} + \text{D}$; $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}$;
 $\text{N}^+ + \text{O} \rightarrow \text{N} + \text{O}$; $\text{He}^+ + \text{H} \rightarrow \text{He} + \text{H}$
 0.1 - 10,000 eV (rel.)
- 70E12 Ryding, G., Betz, H.D., Wittkower, A.
 Phys. Rev. Letters 24 123 1970 E
 Influence on ionic excitation in heavy-ion charge-changing cross sections.
- 70E3 Winter, G.J.M., Bieman, D.J., van der Weg, W.F.
 Phys. Letters 31A 170-171 1970 E
 Electron capture by multiply charged ions
 $\text{Ne}^{q+} + \text{Ar} \rightarrow \text{Ne}^{(q-1)+}, \text{Ne}^{(q-2)+} \ (q=1-4)$
 3 keV/amu
- 70E4 Zwally, H.J., Koopman, D.W.
 Phys. Rev. A 2 1851-1861 1970 E
 Single-electron capture by C^{4+} in helium, neon and argon below 40 keV
 $\text{C}^{4+} + \text{He}, \text{Ne}, \text{Ar} \rightarrow \text{C}^{3+}$
 0.03-3.3 keV/amu
- 71E2 Betz, H.D., Ryding, G., Wittkower, A.B.
 Phys. Rev. A 3 197 1971 E
 Cross sections for electron capture and loss by fast bromine and iodine ions traversing light gases.
- 71E3 Peterson, J.R., Aberth, W.H., Moseley, J.T.
 Phys. Rev. A 3 1651 1971 E
 Ion-ion mutual neutralization cross sections measured by a superimposed beam technique. II. $\text{O}_2^+ - \text{O}_2$; $\text{O}_2^+ - \text{NO}_2$; and $\text{NO}^+ - \text{NO}_2$.
 $\text{O}_2^+ + \text{O}_2 \rightarrow \text{O}_2 + \text{O}_2$; $\text{O}_2^+ + \text{NO}_2 \rightarrow \text{O}_2 + \text{NO}_2$
 $\text{NO}^+ + \text{NO}_2 \rightarrow \text{NO} + \text{NO}_2$
 0.15 - 200 eV (rel.)
- 71E4 Pivovarov, L.I., Levchenko, Y.Z., Krivosov, G.A.
 Sov. Phys. JETP (Engl. Transl.) 32 11 1971 E
 Ionizing collisions and charge exchange for Li^+ , Li^{2+} and Li^{3+} ions in gases (0.2-2 MeV)

71E5 Weiner, J.M. Peatman, B. Berry, R.S.
 Phys. Rev. A 4 1824 1971 E
 Charge transfer in $\text{Na}^+ - \text{O}^-$ collisions at low relative energy
 $\text{Na}^+ + \text{O}^- \rightarrow \text{Na} (3d \rightarrow 3p; 3p \rightarrow 3s; 4p \rightarrow 3s)$
 0.1 - 7 eV (rel.)

71E6 Wittkower, A.B. Beitz, H.D.
 J. Phys. B 4 1173 1971 E
 Charge changing cross-sections for heavy ions in complex molecules: the failure of an additive rule.

71E1 Zwally, H.J. Cable, P.G.
 Phys. Rev. A 4 2301-2304 1971 E
 Comparison of the Landau-Zener theory with measurements of electron capture in $\text{B}^{3+} + \text{He}$ collisions
 $\text{B}^{3+} + \text{He} \rightarrow \text{B}^{2+}(nl)$
 (energy-gain spectroscopy)
 0.03-0.46 keV/amu

71T1 Olson, R.E. Smith, F.T. Bauer, E.
 Appl. Optics 10 1848-1855 1971 T
 Estimation of the coupling matrix elements for one-electron transfer systems
 Landau-Zener model

72E1 Beitz, H.D. Wittkower, A.B.
 Phys. Rev. A 6 1485 1972 E
 Charge-changing cross sections of 5-25 Mev iodine ions in hydrogen and oxygen.

72E2 Houver, J.Ch. Fayette, J. Abignoli, M. Barat, M.
 Phys. Rev. Letters 28 1433 1972 E
 Measurement of the differential cross section for $\text{H}(n=2)$ direct excitation in H^+ -on-H collisions.

72T1 Olson, R.E.
 J. Chem. Phys. 56 2979 1972 T
 Absorbing-sphere model for calculating ion-ion recombination total cross sections.
 $\text{H}^+ + \text{He} \rightarrow \text{H}^+ + \text{He} + \text{D} \rightarrow \text{He} + \text{D}; \text{H}_2^+ + \text{D} \rightarrow \text{H}_2 + \text{D}; \text{Na}^+ + \text{O}^- \rightarrow \text{Na} + \text{O}; \text{O}^+ + \text{O} \rightarrow \text{O} + \text{O};$
 $\text{N}^+ + \text{O}^- \rightarrow \text{N} + \text{O}; \text{O}_2^+ + \text{O}^- \rightarrow \text{O}_2 + \text{O}; \text{N}_2^+ + \text{O}^- \rightarrow \text{N}_2 + \text{O}; \text{NO}^+ + \text{O}^- \rightarrow \text{NO} + \text{O}$
 $10^2 - 10^3$ eV, rate coefficients ; ASM-LZ

73E1 Kienle, P. Kleber, M. Povh, B. Diamond, R.M. Stejens, f.S. Grosse, E. Maier, M.r. Proetel, D.
 Phys. Rev. Letters 31 1099-1102 1973 E
 Radiative capture and bremsstrahlung of bound electrons induced by heavy ions
 $A^+ + B \rightarrow A^{(q-1)+}(1s) + hv + B^+$ ($A=\text{N, Ne, Ar}$; $B=\text{He, Ne}$)
 (X-ray spectroscopy)
 $7.2 \times 10^3 - 1.8 \times 10^4$ keV/amu

73E2 Lockwood, G.J.
 Phys. Rev. A 7 125-129 1973 E
 Total cross sections for charge transfer and stripping of Al, Cr and Er ions in He and N_2
 $\text{Al}^+, \text{Cr}^+, \text{Er}^+, \text{Er}^{2+} + \text{He}, \text{N}_2 \rightarrow \text{Al}^0, \text{Cr}^0, \text{Er}^0, \text{Er}^{2+}, \text{Er}^+$
 0.12-3.6 keV/amu

73E3 Morgan, T.F. Geddes, J. Gilbody, H.B.
 J. Phys. B 6 2118 1973 E
 Formation of $\text{H}(2p)$ and $\text{H}(2s)$ atoms in collisions of 2-26 keV protons with hydrogen atoms.

73E4 Tonuma, T. Kohno, Y. Miyazawa, J. Yoshida, F. Karasawa, T. Takahashi, T. Konno, S.
 J. Phys. Soc. Japan 34 146 1973 E
 Charge changing of energetic heavy ions in gases.

73T2 Gayet, R. Janev, R.K. Salin, A.
 J. Phys. B 6 993 1973 T
 Electron detachment from negative ions by charged particle collisions I. proton impact.
 $\text{H}^+ + \text{H}^- \rightarrow \text{H} + \text{H}$
 1.56 - 400 keV ; CB

- 73T1 Halpern, A.M. Law, J.
Phys. Rev. Letters 31 4-6 1973 σ
K-vacancy creation by high Z heavy ion impact
 $A^{q+} + Ar \rightarrow A^{(q-1)+} + Ar^+(1s^{-1})$ (A=H,C,N,O,F)
- 73T3 Roy, K. Mukherjee, S.C.
Phys. Rev. A 7 130 1973 T
Charge transfer in $H^+ - H^+$ collisions.
 $H^+ + H^+ \rightarrow H(2s, 2p, 2p_{11})$
0.5 - 8 keV; AE
- 74E3 Bayfield, J.E. Khayrallah, G.A. Koch, P.M.
Phys. Rev. A 9 209 1974 E
Production of fast highly excited atoms in proton collisions with atomic hydrogen and argon.
- 74E4 Houver, J.C. Fayetteon, J. Barat, M.
J. Phys. B 7 1358 1974 E
Elastic and inelastic differential measurements for H^+ on H collisions in the 250 eV-2000 eV energy range.
- 74E5 Kondow, T. Girmius, R.J. Chang, Y.P. Fite, W.L.
Phys. Rev. A 10 1167 1974 E
Production of Lyman- α radiation in collisions of protons and hydrogen atoms.
- 74E6 Lookwood, G.J.
Phys. Rev. A 9 1916 1974 E
Total cross sections for charge transfer for F^+ in H_2, N_2, He, Ne and Ar.
- 74E1 Macdonald, J.R. Cocke, C.L. Eidson, W.W.
Phys. Rev. Letters 32 648-651 1974 E
Capture of argon K-shell electrons by 2.5 to 12 MeV protons
 $H^+ + Ar \rightarrow H^0 + Ar^+(1s^{-1})$
(X-ray-projectile coincidence)
2500-12000 keV/amu
- 74E2 Meyer, F.W. Anderson, L.W.
Phys. Rev. A 9 1909-1915 1974 E
Charge-exchange cross sections for Ne^+ and Ar^+ incident on Cs
 $Ne^+, Ar^+ + Cs \rightarrow Ne^0, Ar^0$
0.09-2.0 keV/amu
- 74E7 Shah, M.B. Gilbody, H.B.
J. Phys. B 7 630 1974 E
Charge transfer in $He^{2+} - H$ collisions in the energy range 6 - 60 keV.
- 74T1 Brigg, J.S. Dettmann, K.
Phys. Rev. Letters 33 1123-1125 1974 T
Radiative charge transfer from H atoms by fast ions
 $H^+ + H(1s) \rightarrow H(1s) + hv + H^+$
- 74T2 Piancetti, R.D. Salin, A.
J. Phys. B 7 1666-1678 1974 T
Molecular treatment of the $He^{2+} + H$ collisions
 $He^{2+} + H \rightarrow He^+ + H^+; He^+(2s)$ (PSS)
0.25-12.5 keV/amu
- 75E1 Afrosimov, V.V. Leiko, G.A. Manev, Yu.A. Panov, M.N.
Sov. Phys.-JETP 40 551-666 1975 E
Elementary processes of variation of particle charge states in $He^{2+} + He$ collisions
 $He^{2+} + He \rightarrow He^0 + He^{2+}; He^+ + He^+; He^{2+} + He^+ + e; He^{2+} + He^{2+} + 2e; He^+ + He^{2+} + e$
0.25-25 keV/amu
- 75E7 Bayfield, J.E. Khayrallah, G.A.
Phys. Rev. A 12 869-875 1975 E
Electron transfer in keV energy He^{2+} collisions. III Experimental tests of the close-coupling calculation for $He^{2+} + H(1s)$ collisions
 $He^{2+} + H(1s) \rightarrow He^+(2s) + H^+$
1.75-36 keV/amu

- 75E3 Chen, Y.H., Johnson, R.E., Humphris, R.R., Siegel, M.W., Boring, J.W.
 J. Phys. B 8 1527-1543 1975 E
 Differential scattering of He²⁺ from He
 He²⁺ + He -> He²⁺ + He ; He⁺ + He⁺
 5x10⁻² - 1.5x10⁻¹ keV/amu
- 75E4 Klinger, H., Muller, A., Salzborn, E.
 J. Phys. B 8 230-238 1975 E
 Electron capture processes of multiply charged argon ions in argon at energies from 10
 to 90 keV
 Ar^{q+} + Ar -> Ar^{(q-1)+} (q=2-7 ; i=1-4)
 0.25-2.25 keV/amu
- 75E8 Koch, P.M., Bayfield, J.E.
 Phys. Rev. Letters 34 448 1975 E
 Electron loss in low energy H⁺ - H (high n) merged beam collisions.
- 75E5 Meyer, F.W., Anderson, L.W.
 Phys. Rev. A 11 586-588 1975 E
 Charge-exchange cross sections for Kr⁺ and Xe⁺ incident on Cs
 Kr⁺, Xe⁺ + Cs -> Kr⁰, Xe⁰
 0.012-0.34 keV/amu
- 75E6 Muller, A., Klinger, H., Salzborn, E.
 Phys. Letters 55 11-12 1975 E
 Multiple-electron transfer to highly charged noble gas ions in single ion-atom
 collisions
 Ar⁶⁺ + Ne, N₂, Ar, Kr, Xe -> Ar²⁺
 0.2-1.8 keV/amu
- 75T1 Halpern, A.M., Law, J.
 Phys. Rev. A 12 1776-1780 1975 T
 Full first Born approximation for inner-shell pickup in heavy ion collisions
 A^{q+} + AR -> A^{(q-1)+} + Ar(1s⁻¹) (A=H, C, N, O, F)
 2.5-12 MeV/amu (H) ; 1.05-1.8 MeV/amu (C, N, O, F)
- 75T2 Kleber, M., Jakubassa, D.H.
 Z. Phys. A 252 152-162 1975 T
 Radiative electron capture in heavy ion collisions
 A^{q+} + B^{(q-1)+} -> A^{(q-1)+} + B^{q+} + hν
 (IA)
- 75T3 McCarroll, R., Valiron, P.
 Astron. & Astrophys. 44 465-467 1975 T
 Electron capture by C²⁺ from interstellar atomic hydrogen
 C²⁺ + H -> C⁺ + H⁺
 model potential method
- .75T4 Omidvar, K.
 Phys. Rev. A 12 911-926 1975 T
 Asymptotic form of the charge-exchange cross section in three-body rearrangement
 collisions
 H⁺ + H -> H(n) + H⁺
 first Born approx.
 Z-scaling
- 75T5 Presnyakov, L.P., Ullantsev, A.D.
 Sov. Phys.- Quantum Electron. 4 1320-1324 1975 T
 Charge exchange between multiply charged ions and atoms
 10⁻³-10² keV/amu
- 76E16 Alvarez, I., Cisneros, C., Barnett, C.F., Ray, J.A.
 Phys. Rev. A 13 1728 1976 E
 Electron capture and stripping cross sections for Tl and K ions and atoms in H₂.
- 76E1 Crandall, D.H., Olson, R.E., Shipsey, E.J., Browne, J.C.
 Phys. Rev. Letters 36 858-860 1976 E
 Single and double charge transfer in C⁴⁺ - He collisions
 C⁴⁺ + He -> C³⁺, C²⁺
 0.21-7.5 keV/amu

- 76E2 Eisele, F.L., Nagy, S.W.
 J. Chem. Phys. 65 752-756 1976 E
 Attenuation and single electron charge exchange cross sections of He⁺ on He in the energy range 500-5000 eV
 He⁺ + He → He⁰
 0.125-1.25 keV/amu
- 76E3 Goldbar, J., Mariella, R., Javan, A.
 Appl. Phys. Letters 29 96-98 1976 E
 Observation of one- and two-electron transfer from noble-gas to highly stripped carbon ions
 C^{q+} + He, Ne, Ar → C^{(q-1)+}, C^{(q-2)+} (q=3-5)
 laser source
- 76E4 Hird, B., Suk, H.C.
 Phys. Rev. A 14 928-936 1976 E
 Single-electron stripping cross sections of N⁺ in Ne, Ar and Kr between 35 -140 keV
 N⁺ + Ne, Ar, Kr → N⁰
 2.5-10 keV/amu
- 76E17 Hopkins, F., Little, A., Cue, N.
 Phys. Rev. A 14 1634 1976 E
 Innershell Coulomb excitation in the collisions of few electron F with H₂ and He.
- 76E5 Hvelplund, P.
 J. Phys. B 9 1555-1565 1976 E
 Electron capture and loss by ground state and metastable Li⁺ in helium and argon targets
 Li⁺(1s⁰) + He, Ar → Li⁰; Li⁺*(1s2s) + He, Ne → Li²⁺, Li^{0*}
 5.7-12.9 keV/amu
- 76E6 Klinger, H., Muller, A., Salzborn, E.
 J. Chem. Phys. 65 3427-2430 1976 E
 Electron capture cross sections for multiply charge argon ions passing through nitrogen and krypton targets at energies from 10 to 110 keV
 Ar^{q+} + N₂, Kr → Ar^{(q-1)+} (q=2-7; i=1-4)
 0.25-2.75 keV/amu
- 76E7 Latypov, Z.Z., Shaporenko, A.A.
 Sov. Phys. - JETP 42 986-988 1976 E
 Ionization and capture of electrons in collisions of Na⁺ ions with Ne atoms
 Na⁺ + Ne → Na⁰ + Ne⁺; Na⁺ + Ne⁺ + e
 < 0.02 keV/amu
- 76E8 Lindskog, J., Phil, J., Sjodin, R., Marelius, A., Sharma, K., Hallin, R.
 Phys. Scripta 14 100-104 1976 E
 Radiative electron capture by multiply ionized chlorine atoms
 Cl^{q+} + C → Cl^{(q-1)+} + hv (q=z,z-1)
 857-1714 keV/amu
- 76E15 Makhadis, Y. Y., Birkinshaw, K., Hasted, J.B.
 J. Phys. B 9 1111-1121 1976 E
 Curve crossing spectroscopy of systems involving Coulomb repulsion of products
 C²⁺ + He, Ne → C⁺; O²⁺ + He → O⁺
 (translational spectroscopy)
 0.1-0.2 keV/amu
- 76E9 Muller, A., Klinger, H., Salzborn, E.
 J. Phys. B 9 291-293 1976 E
 Role of metastable argon ions in Ar^{q+} + Ar charge exchange collisions
 Ar²⁺ + Ar → Ar⁺; Ar⁺ + Ar → Ar²⁺
 0.53, 0.9 keV/amu
- 76E10 Muller, A., Salzborn, E.
 Phys. Letters 59A 19-20 1976 E
 Single and double electron transfer in Ar^{q+} - He collisions
 Ar^{q+} + He → Ar^{(q-1)+} (q=3-8; i=1,2)
 0.075-1.75 keV/amu
- 76E18 Peart, B., Grey, R., Dolder, K.T.
 J. Phys. B 9 3047 1976 E
 Measurements of cross sections for electron detachment from H⁺ ions by proton impact.
 H⁺ + H → H⁺ + H + e
 1.49 - 35.2 keV (rel.)

- 76E20 Peart,B. Grey,R. Dolder,K.T.
 J. Phys. B 9 L373 1976 E
 Measurements of cross sections for the mutual neutralization of He⁺ and H ions.
 He⁺ + H⁺ → He + H
 35 - 4550 eV (rel.)
- 76E19 Peart,B. Grey,R. Dolder,K.T.
 J. Phys. B 9 L369 1976 E
 Measurements of cross sections for the mutual neutralization of H⁺ and H⁺ ions.
 H⁺ + H⁺ → H + H
 20 - 3000 eV (rel.)
- 76E11 Shah,M.B. Gilbody,H.B.
 J. Phys. B 9 1933-1941 1976 E
 Redetermination of cross sections for formation of metastable He⁺(2s) ions in fast collisions using an improved calibration procedure
 He⁺ + B → He⁺(2s) (B=H,H₂,He,N₂,O₂,Ar,Kr,K) ; He⁺(1s) + B → He⁺(2s) (B=H₂,He,N₂,O₂,Ar,Kr)
 2-20 keV/amu
- 76E12 Shah,M.B. Gilbody,H.B.
 J. Phys. B 9 2685-2692 1976 E
 Electron capture, loss and de-excitation in collisions involving fast metastable He⁺(2s) ions
 He⁺(2s) + B → He⁰, He⁺ (B=H₂,He,N₂,O₂,Ar,Kr)
 5-18.3 keV/amu
- 76E13 Sohval,A.R. Delvaillie,J.P. Kalata,K. Kirby-Docken,K. Schnopper,H.W.
 J. Phys. B 9 L25-29 1976 E
 Model for radiative electron capture : an interpretation of the line width
 O⁸⁺ + B → O⁷⁺(1s) + hv (B=H₂,He,N₂,O₂,C₃H₈)
 (X-ray spectroscopy)
 1875-4062 keV/amu
- 76E14 Sohval,A.R. Delvaillie,J.P. Kalata,K. Schnopper,H.W.
 J. Phys. B 9 L47-51 1976 E
 Cross section ratio for radiative electron capture to inner and outer atomic shells
 O⁸⁺ + B → O⁷⁺(1s) + hv (B=H₂,He,N₂,O₂,C₃H₈)
 (X-ray spectroscopy)
 1875-4062 keV/amu
- 76T1 Blint,R.J. Watson,W.D. Christensen,,B.
 Astrophys. J. 205 634-637 1976 T
 Calculation of the cross section for CIV - H charge exchange : significance for interstellar X-rays and cosmic-ray particles
 C³⁺ + H → C²⁺ + H⁺
 (LZ model)
 10⁻⁴-1.75x10⁻³ keV/amu
- 76T2 Chibisov,M.I.
 JETP Letters 24 46-49 1976 T
 Charge exchange and ionization in the collision of atoms and multiply charged ions
- 76T9 Fujiwara,K.
 J. Phys. Soc. Japan 41 1350 1976 T
 Coulomb-Born calculation of charge transfer cross sections of highly-ionized atoms.
 Erratum; J. Phys. Soc. Japan 45, 1053 (1978)
 H⁺ + Cl^{1+ - 3+}; O^{1+ - 7+}; Fe⁷⁺; Fe¹⁶⁺; Fe²³⁺; Mo¹³⁺ → H⁰
 1 keV - 100 MeV; CB
- 76T7 McCarroll,R. Valiron,P.
 Astron. Astrophys. 53 83-88 1976 T
 Charge transfer of Si²⁺ ions with atomic hydrogen in the interstellar medium
 Si²⁺ + H → Si⁺ + H⁺
 (MO)
 3-3x10⁴ K
- 76T3 Olson,R.E. Salop,A.
 Phys. Rev. A 14 579-585 1976 T
 Electron transfer between multicharged ions and neutral species
 Aⁿ⁺ + B → A⁽ⁿ⁻¹⁾⁺ (A=5-50; B=H,H₂,He,Ne,Kr,Xe)
 (absorbing sphere model)
 <0.2 keV/amu
- 76T4 Omidvar,K. Golden,J.E. McGuire,J.H.
 Phys. Rev. A 13 500-503 1976 T
 Single electron Born approximations for charge transfer from multielectron atoms to protons
 H⁺ + He, Ar → H + He⁺(1s⁻¹), Ar⁺(1s⁻¹)
 1-12 MeV/amu

- 76T6 Salop, A.
Phys. Rev. A 13 1312-1320 1976 T
Charge exchange between H(1s) and fully stripped heavy ions at low-keV impact energies
 $A^{z+} + H(1s) \rightarrow A^{(z-1)+}$ (A=C,N,O,Ne,Si,Ar)
- 76T5 Salop, A.
Phys. Rev. A 13 1321-1325 1976 T
Charge exchange between H(2s) and fully stripped carbon and nitrogen ions at low-keV impact energies
 $C^{6+}, N^{7+} + H(2s) \rightarrow C^{5+}, N^{6+}$
(multichannel LZ)
0.014-3.3 keV/amu
- 76T8 Sinha, S. Bardsley, J.N.
Phys. Rev. A 14 104-113 1976 T
Symmetric charge transfer in low-energy ion-atom collisions
 $A^+ + A \rightarrow A^+ + A^+$ (A=Li, Na, K, Ca, Rb, Cs)
 $10^{-2}-10^{-3}$ keV/amu
- 76T10 Zhdanov, V.P.
Sov. J. -Tech. Phys. 21 117 1976 T
Resonance charge exchange in ion-ion collisions
 $H_2^+ + He^+ \rightarrow He^+ + H_2^+$; $Li^{2+} + Li^{2+} \rightarrow Li^{2+} + Li^{2+}$; $Be^{4+} + Be^{4+} \rightarrow Be^{4+} + Be^{4+}$;
 $B^{5+} + B^{5+} \rightarrow B^{5+} + B^{5+}$; $C^{6+} + C^{6+} \rightarrow C^{6+} + C^{6+}$; $N^{7+} + N^{7+} \rightarrow N^{7+} + N^{7+}$
0.01 - 10⁴ eV; IP
- 77E13 Berkner, K.H. Graham, W.G. Pyle, R.V. Schlachter, A.S. Stearns, J.W.
Phys. Letters 62A 407 1977 E
Single electron capture and loss cross sections for highly stripped Fe ions in hydrogen at 3.4 Mev/nucleon.
- 77E14 Burniaux, M. Brouillard, F. Jognaux, A. Govers, T.R. Szucs, S.
J. Phys. B 10 2421 1977 E
Merged-beams study of the charge exchange between He²⁺ ions and highly excited hydrogen atoms.
- 77E15 Chong, Y.P. Fite, W.L.
Phys. Rev. A 16 933 1977 E
Cross section for the metastable H(2s) state in proton collisions with atomic hydrogen.
- 77E1 Cocks, C.L., Gardner, R.K. Curnuttie, B. Bratton, T. Saylor, K.T.
Phys. Rev. A 16 2248-2255 1977 E
K-shell capture by protons from O₂, N₂ and Ne
 $H^+ + B \rightarrow H + B^+(1s^{-1})$ (B=O₂, N₂ and Ne)
750-5000 keV/amu
- 77E2 Crandall, D.H.
Phys. Rev. A 16 958-963 1977 E
Electron transfer between He-like ions and He
 $B^{z+} + He \rightarrow B^{(z-1)+} + He$; $C^{z+} + He \rightarrow C^{(z-1)+} + He$; $N^{z+} + He \rightarrow N^{(z-1)+} + He$;
 $O^{z+} + He \rightarrow O^{(z-1)+} + He$
1.3-7.5 keV/amu
- 77E16 Crandall, D.H. Mallory, M.L. Kocher, D.C.
Phys. Rev. A 15 61 1977 E
Charge exchange between multicharged ions of C, N and O and molecular hydrogen.
- 77E3 Eisele, F.L. Nagy, S.W.
J. Chem. Phys. 66 883-885 1977 E
Attenuation and single electron charge exchange cross sections of He⁺ on Ne and Ar in the 500-5000 eV energy range
 $He^+ + Ne, Ar \rightarrow He^0$
0.125-1.25 keV/amu
- 77E17 Gardner, L.D. Bayfield, J.E. Koch, P.M. Kim, H.J. Stelson, P.H.
Phys. Rev. A 16 1415 1977 E
Experimental study of electron transfer in multiply charged iron ion collisions with atomic hydrogen.

- 77E4 Guffey,J.A. Ellsworth,L.D. Macdonald,J.R.
Phys. Rev. A 15 1863-1870 1977 E
X-ray cross sections in helium for electron capture to excited states by bare nuclei with $5 \leq Z \leq 9$
 $A^+ + He \rightarrow A^{(q-1)+} + x\text{-rays}$ (A=B,C,N,O,F)
250-2300 keV/amu
- 77E12 Harms, M. Falk, R.A. Geballe, R. Risley, J.
Phys. Rev. A 16 2256-2263 1977 E
Excitation of low lying excited states of hydrogen in 1-5 keV collisions of H with He, Ar, Xe and N_2
 $H^+ + He, Ar, Xe, N_2 \rightarrow H(3s, 3d, 4s, 5s)$
1-5 keV/amu
- 77E5 Meyer, F.W. Anderson, C.J. Anderson, L.W.
Phys. Rev. A 15 455-462 1977 E
Total charge transfer cross sections for $H^+, H_2^+, H_3^+, He^+, N^+, N_2^+, Ne^+, Ar^+, Kr^+$, and Xe^+ incident on Cs
 $H^+, H_2^+, H_3^+, He^+, N^+, N_2^+, Ne^+, Ar^+, Kr^+, Xe^+ + Cs \rightarrow H^0, H_2^0, H_3^0, He^0, N^0, N_2^0, Ne^0, Ar^0, Kr^0, Xe^0$
0.23-160 keV/amu
- 77E18 Mitchell, J.B.A. Dunn, K.F. Angel, G.C. Browning, R. Gilbody, H.B.
J. Phys. B 10 2897 1977 E
Ionization and charge transfer in fast $H^+ - He^+$ collisions using an intersecting beam technique.
 $H^+ + He^+ \rightarrow H + He^{2+}$ (coincidence) ; $H^+ + He^{2+} + e$
72 - 402 keV (c.m.)
- 77E6 Muller, A. Salzbom, E.
Phys. Letters 62A 391-394 1977 E
Scaling of cross sections for multiple electron transfer to highly charged ions colliding with atoms and molecules
scaling law
< 25 keV/amu
- 77E19 Park, J.T. Aldag, J.E. George, J.M. Peacher, J.L.
Phys. Rev. A 15 508 1977 E
Differential energy-loss cross sections for ionization of atomic hydrogen by 25-200 keV protons.
- 77E20 Peart, B. Gee, D.M. Dolder, K.T.
J. Phys. B 10 2683 1977 E
Measurements of cross sections for the formation of Mg^{2+} ions by collisions between protons and Mg^+ .
 $H^+ + Mg^+ \rightarrow Mg^{2+}$
0.98 - 44.5 keV (rel.)
- 77E21 Peart, B. Grey, R. Dolder, K.T.
J. Phys. B 10 2675 1977 E
Measurements of cross sections for the formation of He^{2+} ions by collisions between protons and He^+ .
 $H^+ + He^+ \rightarrow He^{2+}$
2.98 - 28.5 keV (rel.)
- 77E22 Phaneuf, R.A. Meyer, F.W. McKnight, R.H. Olson, R.E. Salop, A.
J. Phys. B 10 L425 1977 E
Electron capture and impact ionization cross sections of N^+ in atomic hydrogen.
- 77E23 Schuch, R. Schmidt-Bocking, H. Tseruya, I.
J. Phys. B 10 889-898 1977 E
Radiative electron capture by ^{35}S ions
 $S^{+}(q=15,16) + B \rightarrow S^{(q-1)+} + hv$ (B=Be, C, Ni)
156-3594 keV/amu
- 77E24 Shah, M.B. Goffe, T.V. Gilbody, H.B.
J. Phys. B 10 L723 1977 E
Electron loss by 35 - 1000 keV He^+ ions in collisions with atomic and molecular hydrogen.
- 77E8 Spindler, E. Betz, H.D. Bell, F.
J. Phys. B 10 L561-564 1977 E
Radiative electron capture and momentum distributions of target electrons
 $Cu^{+} + Al \rightarrow Cu^{(q-1)+} + hv$ (q=28, 29 : X-ray spectroscopy)
7031 keV/amu

- 77E9 Suk,H.C. Guilband,A. Hird,B.
Can. J. Phys. 55 1594-1600 1977 E
Single electron capture by Ar²⁺ in Ne,Ar and Kr gases
Ar²⁺ + Ne, Ar, Kr -> Ar⁺
1.27-4.8 keV
- 77E25 Winter,H. Bloemen,E. de Heer,F.J.
J. Phys. B 10 L453-457 1977 E
Electron capture into excited projectile states in collisions of 100 keV Ne⁸⁺ (z=1, 2, 3, 4) with He, H₂ and Ar.
Ne⁸⁺(q=1,2,3,4) + He,H₂,Ar -> Ne^{q-1+}
(photon spectroscopy)
5 keV/amu
- 77E11 Winter,H. Bloemen,R. de Heer,F.J.
J. Phys. B 10 L599-605 1977 E
VUV radiation, slow ions and electrons produced in collisions of multiply charged Ne ions with He and Ar
Ne^{q+} + He,Ar -> Ne^{q-1+} (q=1-4)
(photon spectroscopy)
1.24-39.6 keV/amu
- 77T1 Belkic,Dz.
J. Phys. B 10 3491 1977 T
High-energy behavior of the transition probabilities and total cross sections for charge exchange
H⁺ + H(1s) -> H(nl) + H⁺
(continuum intermediate state approx.)
25-10000 keV/amu
- 77T2 Belkic,Dz. Gayet,R.
J. Phys. B 10 1911-1921 1977 T
Electron capture from atomic hydrogen by fast protons and alpha particles
- 77T3 Belkic,Dz. Gayet,R.
J. Phys. B 10 1923-1932 1977 T
Charge exchange in fast collisions of H⁺ and He²⁺ with helium
H⁺ + He(1s²) -> H(1s,2l,3l,4s) + He⁺
He²⁺ + He(1s²) -> He⁺ + He⁺(1s)
25-10x10³ keV/amu
- 77T4 Belkic,Dz. McCarroll,R.
J. Phys. B 10 1933-1943 1977 T
Projectile charge dependence of electron capture cross sections
A^{z+} + H -> A^{(z-1)+} (A=H,He,Be,C,O,Ne,Ca,Zn) ; F⁹⁺ + H -> F⁸⁺(nl)
(CDW)
500-5x10³ keV/amu
- 77T5 Böttcher,C.
J. Phys. B 10 L213-217 1977 T
Charge transfer to highly stripped ions from hydrogen atoms
A^{z+} + H(1s) -> A^{(z-1)+}(nl) (A=2-18)
<225 keV/amu
- 77T6 Butler,S.E. Guberman,S.L. Dalgarno,A.
Phys. Rev. A 16 500-507 1977 T
Radiative charge transfer between H and C²⁺, C³⁺, and N²⁺
C²⁺, C³⁺, N²⁺ + H -> C⁺, C²⁺, N⁺ + hv
10-10⁴ K
- 77T7 Christensen,R.B. Watson,W.D. Blint,R.J.
Astrophys. J. 213 712-715 1977 T
Calculation of the cross section for N IV - H charge exchange : significance for the intercloud gas
N²⁺ + H -> N²⁺
(OBK,LZ)
10⁻⁶-5x10⁻⁴ keV/amu
- 77T8 Dewangan,D.P.
J. Phys. B 19 1083- 1977 T
Electron capture in high energy approximation
H⁺ + H(1s) -> H(1s,2s,2p) + H⁺
(eikonal approx.)
40-5000 keV/amu
- 77T9 Harel,C. Salin,A.
J. Phys. B 10 3511-3522 1977 T
Charge exchange in collisions of highly ionized ions and atoms
A^{z+} + H -> A^{(z-1)+}(nl) (A=Be, B, O)
(impact parameter)
0.25-25 keV/amu

- 77T10 Koyama, K. Ohisuki, Y.H.
Phys. Rev. B 15 61-63 1977 T
Theory of radiative electron capture by channeled ions
 $O^{8+} + Ag \rightarrow O^{7+}(1s) + hv$
(statistical model)
100-4000 keV/amu
- 77T11 Lapiokki, G. Losonsky, W.
Phys. Rev. A 15 896-905 1977 T
Electron capture from inner shell by fully stripped ions
 $A^{n+} + B \rightarrow A^{(n-1)+} + B^+(1s^1)$
scaling law
- 77T12 Msezane, A.Z.
Phys. Letters 59A 435-437 1977 T
Electron capture by completely stripped positive ions in collisions with atomic hydrogen
 $A^{n+} + H \rightarrow A^{(n-1)+}$
(semiclassical IP)
- 77T13 Olson, R.E. Salop, A.
Phys. Rev. A 16 531-541 1977 T
Charge transfer and impact ionization cross sections for fully and partially stripped positive ions colliding with atomic hydrogen
 $A^{n+} + H \rightarrow A^{(n-1)+} + H^+$; $A^{n+} + H^+ + e$ ($A^{n+} = H^+, He^{2+}, Li^{3+}, Be^{4+}, B^{5+}, C^{6+}, N^{7+}, O^{8+}, Ne^{10+}, Si^{14+}, Ar^{18+}, Fe^{26+}, Kr^{36+}$)
(CTMC)
37.5-200 keV/amu
- 77T14 Olson, R.E. Salop, A. Phaneuf, R.A. Meyer, F.W.
Phys. Rev. A 16 1867 1977 T
Electron loss by atomic and molecular hydrogen in collisions with $^3He^{2+}$ and $^4He^+$.
- 77T15 Salop, A. Olson, R.E.
Phys. Rev. A 16 1811-1816 1977 T
Electron removal from atomic hydrogen by collisions with fully stripped carbon
 $C^{6+} + H \rightarrow C^{5+} + H^+$; $C^{6+} + H^+ + e$ (PSS, CTMC)
0.05-500 keV/amu
- 77T16 Shipsey, E.J. Brown, J.C. Olson, R.E.
Phys. Rev. A 15 2166-2172 1977 T
Theoretical charge exchange total cross sections for $B^{3+} + He$ and $C^{4+} + He$ collisions
 $B^{3+} + He \rightarrow B^{2+} + He^+$; $C^{4+} + He \rightarrow C^{3+} + He^+$
(IP classical-coupled equation)
0.25-25 keV/amu
- 77T17 Vaaben, J. Briggs, J.S.
J. Phys. B 10 L521-526 1977 T
Charge transfer in $C^{6+} - H(1s)$ collisions at low velocity
 $C^{6+} + H(1s) \rightarrow C^{5+} + H^+$
(MC)
0.05-5 keV/amu
- 77T19 Zhdanov, V.P. Chibisov, M.I.
Sov. J. - Plasma Phys. 3 406 1977 T
Charge exchange between protons and singly ionized metal atoms.
 $H^+ + A^+ \rightarrow H(1s) + A^{2+}$ ($A = Mg, Fe, Zn, Mo, Cd, W$)
 $1 - 10^4$ eV; LZ
- 78E1 Afrosimov, V.V. Basalhev, A.A. Panov, M.N. Leiko, G.A.
JETP Letters 26 537-539 1978 E
Electron capture in different electronic states by multiply charged Ar^{n+} ions in He atoms
 $Ar^{n+} + He \rightarrow Ar^{(n-1)+}$ ($q=3-7$); $Ar^{n+} + He \rightarrow Ar^{n+}(nl)$; $Ar^{n+} + He \rightarrow Ar^{n+}(nl)$
(energy gain spectroscopy)
0.1-0.5 keV/amu
- 78E18 Angel, G.C. Dunn, K.F. Sewell, E.C. Gilbody, H.B.
J. Phys. B 11 L49 1978 E
Ionization and charge transfer in fast H^+ - He^+ collisions: further measurements of improved accuracy.
 $H^+ + He^+ \rightarrow He^{2+}$
40 - 386 keV (c.m.)

78E17 Angel, G.C. Sewell, E.C. Dunn, K.F. Gilbody, H.B.
 J. Phys. B 11 L297 1978 E
 Charge transfer and ionization in fast $H^+ - He^+$ collision: further measurements using coincidence technique.
 $H^+ + He^+ \rightarrow H + He^{2+}; H^+ + He^{2+} + e$
 60 - 182 keV (c.m.)

78E19 Berkner, K.H. Graham, W.G. Pyle, R.V. Schlachter, A.S. Stearns, J.W. Olson, R.E.
 J. Phys. B 11 875-885 1978 E
 Electron capture and impact-ionization cross sections for partially stripped iron ions colliding with atomic and molecular hydrogen.
 $Fe^{q+} (q=9-25) + H, H_2 \rightarrow Fe^{(q-1)+}$ (growth, CTMC)
 50-1200 keV/amu

77E2 Berkner, K.H. Graham, W.G. Pyle, R.V. Schlachter, A.S. Stearns, J.W. Olson, R.E.
 J. Phys. B 11 875-885 1978 E
 Electron capture and impact ionization cross sections for partially stripped iron ions colliding with atomic and molecular hydrogen
 $Fe^{q+} (q=9-25) + H, H_2 \rightarrow Fe^{(q-1)+}$ (growth, CTMC)
 50-1200 keV/amu

78E3 Hinds, E.A. Novik, R.
 J. Phys. B 11 2201-2207 1978 E
 Precise resonant charge-transfer cross sections for $He-He^+$ between 2 and 100 keV
 $He^+ + He \rightarrow He + He^+$
 (attenuation method)
 $5 \times 10^{-4} - 2.5 \times 10^{-2}$ keV/amu

78E20 Jognaux, A. Brouillard, F. Szucs, S.
 J. Phys. B 11 L669 1978 E
 Charge exchange on low energy $He^+ - He^{2+}$ collisions.
 $^3He^{2+} + ^4He^+ \rightarrow ^3He^+ + ^4He^{2+}$
 10-1700 eV (rel.)

78E21 Kim, H.J. Hvelplund, P. Meyer, F.W. Phaneuf, R.A. Stelson, P.H. Botcher, C.
 Phys. Rev. Letters 40 1635 1978 E
 Observation of oscillations in the charge dependence of total electron capture cross sections.

78E22 Kim, K.J. Phaneuf, R.A. Meyer, F.W. Stelson, P.H.
 Phys. Rev. A 17 854 1978 E
 Single electron capture by multiply charged Si^{28} ions in atomic and molecular hydrogen.

78E23 Lockwood, G.J. Miller, G.H. Hoffmann, J.M.
 Phys. Rev. A 18 935 1978 E
 Charge transfer of C^+ , N^+ and O^+ in N_2 and H_2 .

78E14 Maier, II, W.B.
 J. Chem. Phys. 69 3077-3092 1978 E
 Electron transfer in collisions between atomic ions and rare gas atoms for primary ion energies below 200 eV II
 $A^+ + B \rightarrow A + B^+$ (A=H, He, Ne, Ar, Kr; B=He, Ne, Ar, Kr, Xe)

78E4 Maier, II, W.B. Stewart, B.
 J. Chem. Phys. 68 4228-4232 1978 E
 Electron transfer in collisions of doubly charged atomic ions with rare gas atoms for primary-ion energies below 100 eV
 $A^{2+} + He \rightarrow A^+ (A=He, N, O, Ne, Ar); Ar^{2+} + He \rightarrow Ar^{2+};$
 $Ne^{2+} + He \rightarrow Ne^+; Ar^{2+} + Ar \rightarrow Ar^+; A^{2+} + Kr \rightarrow Ar^+$
 1×10^{-3} keV/amu

78E16 Moran, T.F. Wilcox, J.B.
 J. Chem. Phys. 68 2855 1978 E
 Charge transfer reactions of ground $C(^3P)$ and excited $C(^1P)$ state ions with neutral molecules
 $C^+(^3P, ^1P) + B \rightarrow C^0 (B=Ar, H_2, N_2, O_2, CO, NO, CO_2)$
 $6 \times 10^{-2} - 2 \times 10^{-1}$ keV/amu

78E15 Moran, T.F. Wilcox, J.B.
 J. Chem. Phys. 69 1397-1405 1978 E
 Charge transfer reactions of ground $O(^4S)$ and excited $O(^2D)$ state ions with neutral molecules
 $O^+(^4S, ^2D) + B \rightarrow O^0 (B=Ar, H_2, N_2, O_2, CO, NO, CO_2)$
 $2 \times 10^{-2} - 2 \times 10^{-1}$ keV/amu

- 78E26 Nutt, W.L., McCullough, R.W., Brady, K., Shah, M.B., Gilbody, H.B.
 J. Phys. B 11 1457-1462 1978 E
 Electron capture by He²⁺ ions in collisions with H and H₂ at impact energies below 10 keV.
 He²⁺ + H, H₂ → He⁺ + H⁺, H₂⁺ (furnace technique)
 0.1-2.5 keV/amu
- 78E27 Pedersen, E.H., Mikkelsen, J.V., Vaaben, J., Taulbjerg, K.
 Phys. Rev. Letters 41 1541-1544 1978 E
 Interference effect in resonant double charge transfer
 Mg⁺ + Mg → Mg²⁺ + Mg → Mg⁺, Mg
 (growth, LZ)
 0.05-42 keV/amu
- 78E28 Poulart, G., Brouillard, F., Claeys, W.
 J. Phys. B 11 L671 1978 E
 H₁ formation in low energy H⁺ - H₂ collisions.
 H⁺ + H₂ → H₂ + e
 0.001 - 3 eV (rel.)
- 78E29 Shah, M.B., Gilbody, H.B.
 J. Phys. B 11 121-131 1978 E
 Electron capture and He⁺(2s) formation in fast He²⁺ - H and He⁺ - H collisions.
 He²⁺ + H, H₂ → He⁺(2s, total) : He⁺ + H → He⁺(2s) + H
 1-100 keV/amu
- 78E30 Shah, M.B., Goffe, T.V., Gilbody, H.B.
 J. Phys. B 11 L233 1978 E
 Electron capture and loss by fast lithium ions in H and H₂.
- 78E9 Suk, H.c., Guilband, A., Hird, B.
 J. Phys. B 11 1463-1474 1978 E
 Cross sections for electron capture by Ne²⁺ in He, Ne, Kr and Xe
 Ne²⁺ + He, Ne, Kr, Xe → Ne⁺
 2-10 keV/amu
- 78E10 Tanis, J.A., Shafroth, S.M.
 Phys. Rev. Letters 40 1174-1177 1978 E
 Target thickness dependence of radiative electron capture in heavy ion collisions
 Cl¹⁶⁺ (q=16, 17) + Cu → Cl<sup>(q-1)+ + hv
 (x-ray spectroscopy)
 2285 keV/amu</sup>
- 78E11 Tawara, H., Richard, P., Gray, T.J., Newcomb, J., Jamison, K.A., Schmiedekamp, C., Hall, J.M.
 Phys. Rev. A 18 1373-1380 1978 E
 Si K-shell ionization and electron transfer cross sections : solid targets
 F⁹⁺ + Si → F⁸⁺(1s) + Si⁺(1s⁻¹)
 (x-ray spectroscopy)
 400-2200 keV/amu
- 78E12 Tawara, H., Richard, P., Jamison, K.A., Gray, T.J.
 J. Phys. B 11 L615-620 1978 E
 Experimental differentiation between electron excitation and electron capture by one-electron (F⁸⁺) ions in He
 F⁸⁺ + He → F⁷⁺
 (X-ray spectroscopy)
 395-1840 keV/amu
- 78E26 Nutt, W.L., McCullough, R.W., Brady, K., Shah, M.B., Gilbody, H.B.
 J. Phys. B 11 1457-1462 1978 E
 Electron capture by He²⁺ ions in collisions with H and H₂ at impact energies below 10 keV.
 He²⁺ + H, H₂ → He⁺ + H⁺, H₂⁺ (furnace technique)
 0.1-2.5 keV/amu
- 78E27 Pedersen, E.H., Mikkelsen, J.V., Vaaben, J., Taulbjerg, K.
 Phys. Rev. Letters 41 1541-1544 1978 E
 Interference effect in resonant double charge transfer
 Mg⁺ + Mg → Mg²⁺ + Mg → Mg⁺, Mg
 (growth, LZ)
 0.05-42 keV/amu
- 78E28 Poulart, G., Brouillard, F., Claeys, W.
 J. Phys. B 11 L671 1978 E
 H₁ formation in low energy H⁺ - H₂ collisions.
 H⁺ + H₂ → H₂ + e
 0.001 - 3 eV (rel.)

- 78E13 Winter, H. El-Sherbini, Th.M. Bloemen, E. de Heer, F.J. Salop, A.
Phys. Letters 68A 211-214 1978 E
A comparison between radiative and non-radiative de-excitation after electron capture by multiply charged ions
 $Ne^{q+}(q=1-4), Ar^{q+}(q=1-8) + B \rightarrow Ne^{(q-1)+}, Ar^{(q-1)+}$ (B=He, Ne, Ar, Kr, Xe) (photon spectroscopy)
5 keV/amu
- 78T1 Abramov, U.A. Baryshniko, F.F. Lisita, V.S.
JETP Letters 27 464-467 1978 T
Change of intensity of spectral lines of multiply charged ions as a result of charge exchange with atomic hydrogen
 $O^{8+} + H \rightarrow O^{7+}(nl)$
- 78T2 Banyard, K.E. Moore, J.C.
J. Phys. B 11 3899-1978 T
Electron capture from H by fast alpha particles.
 $He^{2+} + H \rightarrow He^{+}(1s, 2s, 2p) + H(1s, 2s)$
500 - 8000 keV; CDW
- 78T19 Belkic, Dz. Salin, A.
J. Phys. B 11 3905-3911 1978 T
Differential cross sections for charge exchange at high energies
 $H^{+} + H \rightarrow H; H^{+} + Ar \rightarrow H + Ar^{+}(1s^{-1})$
293 keV (He) : 6×10^3 keV/amu (Ar)
- 78T25 Bell, K.L. Kingston, A.E. Madden, P.J.
J. Phys. B 11 3977 1978 T
Electron detachment from H- ions by proton impact.
 $H^{+} + H^{-} \rightarrow H^{+} + H(1s) + e$
1.5 - 1000keV; FB
- 78T26 Crothers, D.S.F. Todd, N.R.
J. Phys. B 11 L663 1978 T
Response to Nikitin and Reznikov: Total cross sections for proton-Be⁺ charge transfer.
 $H^{+} + Be^{+} \rightarrow H + Be^{2+}$
 $10^2 - 10^7$ eV; IP
- 78T20 Dalgarno, A. Butler, S.E.
Comm. At. Mol. Phys. 7 129-135 1978 T
Charge transfer of multiply ionized species
 $A^{2+} + H \rightarrow A^{+}$ (A=C, Mg, Si); $A^{3+} + H \rightarrow A^{2+}$ (A=C, N);
 $A^{3+} + He \rightarrow A^{2+}$ (A=Li, Be, B, C, Mg, Al)
review
- 78T3 Golden, J.E. McGuire, J.H. Omidvar, K.
Phys. Rev. A 18 2373-1978 T
Electron capture from atomic hydrogen into excited (n,l) levels of projectiles with Z_1, l .
 $H^{+} + H \rightarrow H(nlm) + H^{+}$; $He^{2+} + H \rightarrow He^{+}(nlm)$; $Be^{4+} + H \rightarrow Be^{3+}(nlm)$;
 $O^{8+} + H \rightarrow O^{7+}(nlm)$
(full Born; Jackson-Schiff)
100,200 keV/amu
- 78T22 Greenland, P.T.
J. Phys. B 11 3563-3571 1978 T
Highly stripped ions on hydrogen atoms: the adiabatic approach I. Energy gap and coupling at pseudocrossing
- 78T23 Greenland, P.T.
J. Phys. B 11 3573-3585 1978 T
Highly stripped ions on hydrogen atoms: the adiabatic approach II. Energy gap and coupling at pseudocrossing
- 78T21 Greenland, P.T.
J. Phys. B 11 L191-193 1978 T
Low velocity $C^{6+} + H(1s)$ charge transfer: the two state approximation
 $C^{6+} + H(1s) \rightarrow C^{5+}$ (S-matrix)
0.06-25 keV/amu
- 78T4 Grozdanov, T.P. Janev, R.K.
Phys. Letters 66A 191-194 1978 T
One-center capture in slow collisions of highly charged ions with atoms
 $Ar^{6+,7+} + He, Ar \rightarrow Ar^{5+,6+}$

- 78T15 Grozdanov, T.P., Janev, R.K.
Phys. Rev. A 17 880-888 1978 T
Charge exchange collisions of multiply charged ions with atoms
 $A^+ + B \rightarrow A^{(q-1)+} + B^+$ (A=5-40; B=H, Li, Na, K, Rb, Cs)
(tunnelling model)
0.002-500 keV/amu
- 78T17 Janev, R.K., Radulovic, Z.M.
Phys. Rev. A 17 889 1978 T
Ion-ion recombination and ion-pair formation processes in alkali-hydrogen diatomic systems.
 $Na^+ + H \rightarrow Na(3s, 3p, 3d, 4s, 4p) + H$, $E=10^2 - 5 \times 10^3$ eV (rel.)
 $Cs^+ + H \rightarrow Cs(6s, 6p, 7s, 7p) + H$, $E=10^2 - 5 \times 10^3$ eV (rel.)
 $M^+ + H \rightarrow M + H$ (M=Li, K, Rb), $E=10^1 - 10^3$ eV (rel.)
rate coefficient. (LZ)
- 78T128 Lal, M., Tripathi, A.N., Srivastava, M.K.
J. Phys. B 11 4249 1978 T
Charge transfer cross sections for protons colliding with hydrogenic ions I.
 $H^+ + He^+ \rightarrow H + He^2+$, $E=20-10000$ keV $H^+ + Li^2+ \rightarrow H + Li^+$, $E=50 - 10000$ keV
 $H^+ + Be^3+ \rightarrow H + Be^4+$, $E=100 - 10000$ keV $H^+ + B^4+ \rightarrow H + B^5+$, $E=200 - 10000$ keV
 $H^+ + C^5+ \rightarrow H + C^6+$, $E=200 - 10000$ keV $H^+ + N^6+ \rightarrow H + N^7+$, $E=200 - 10000$ keV
 $H^+ + O^7+ \rightarrow H + O^8+$, $E=200 - 10000$ keV $H^+ + Fe^24+ \rightarrow H + Fe^25+$, $E=1000 - 100000$ keV
CPB
- 78T16 Lee, C.M.
Phys. Rev. A 17 56-569 1978 T
Radiative charge exchange process in high energy ion-atom collisions
 $U^{92+} + B \rightarrow U^{91+} + hv + B^+$ (B=N, Ne, Ar, Kr):
 $U^{94+}(q=2, 91) + Ne \rightarrow U^{93+} + hv + Ne^+$:
(IP)
 $1 \times 10^4 - 3 \times 10^5$ keV/amu
- 78T17 Lin, C.D.
J. Phys. B 11 L185-190 1978 T
Electron capture for ion-atom collisions at intermediate energies
 $A^{2+} + B \rightarrow A^{(q-1)+} + B^+$ (1s¹) (A=C, N, O, F, Cl; B=Ne, Ar, Kr)
(two-state two-center AO)
1-4.5 MeV/amu
- 78T18 Lin, C.D., Soong, S.C., Tunnel, L.N.
Phys. Rev. A 17 1646-1654 1978 T
Two-state atomic expansion methods for electron capture from multielectron atoms by fast protons
 $H^+ + B \rightarrow H + B^+$ (B=C, N, O, Ne, Ar)
- 78T19 Moore, J.C., Banyard, K.E.
J. Phys. B 11 1613 1978 T
Continuum-distorted-wave calculation for electron capture from hydrogen negative ions by fast protons.
 $H^+ + H^- \rightarrow H(1s, 2s, 2p) + H(1s, 2s)$
5 - 2000 keV; CDW
- 78T110 Morrison, H.G., Opik, U.
J. Phys. B 11 473-492 1978 T
An impact-parameter method for heavy particle collisions involving one electron I. Theory and sample results on $H^+ - H$ and $He^{2+} - H$ collisions
 $H^+ + H \rightarrow H(2s, 2p) + H^+$; $He^{2+} + H \rightarrow He^+$
(close-coupling)
8-60 keV/amu (H); 10-18 keV/amu (He)
- 78T130 Mukherjee, S., Bhadra, K., Sill, N.C., Basu, D.
Phys. Letters 65A 285 1978 T
Capture in proton-He collisions.
 $H^+ + He^+ \rightarrow H(1s) + He^2+$
40 - 100 keV; CB
- 78T131 Olson, R.E.
J. Phys. B 11 L227 1978 T
Ionization and charge transfer cross sections for H^+ , He^{2+} + He^+ .
 $H^+ + He^+ \rightarrow H^+ + He^{2+} + e$; $H + He^{2+}$;
 $He^{2+} + He^+ \rightarrow He^{2+} + He^{2+} + e$; $He^+ + He^{2+}$
100 - 500 keV/amu; CTMC

- 78T11 Olson, R.E.
Phys. Rev. A 18 2464-2469 1978 T
Electron capture and impact ionization cross sections for multiply charged ions colliding with helium
 $A^+ + He \rightarrow A^{(q-1)+}$ (A=H, He, Li, Be, B, C, N, O)
(CTMC)
100-500 keV/amu
- 78T12 Olson, R.E., Shipsey, E.J., Browne, J.C.
J. Phys. B 11 699-708 1978 T
Charge transfer cross sections for B^{3+} , C^{4+} + H collisions
 $B^{3+}, C^{4+} + H \rightarrow B^{2+}, C^{3+}$
(PSS)
0.05-5 keV/amu
- 78T13 Ryufuku, H., Watanabe, T.
Phys. Rev. A 18 2005-2015 1978 T
Charge transfer in collisions of atomic hydrogen with O^{8+} , He^{2+} and H^+
 $H^+, He^{2+}, O^{8+} + H \rightarrow H, He^+, O^{7+}$ (UDWA, absorption model, DWBA)
0.025-200 keV/amu
- 78T14 Shakeshaft, R., Spruch, L.
J. Phys. B 11 L457-463 1978 T
Possibility of observing the second Born contribution to electron capture at high impact velocities
 $A^+ + B^{(q-1)+} \rightarrow A^{(q-1)+}$
(second Born)
 $2.5 \times 10^4 - 8 \times 10^4$ keV/amu
- 78T16 Shipsey, E.J., Redman, L.T., Bowne, J.C., Olson, R.E.
Phys. Rev. A 18 1961-1966 1978 T
Electron capture and ionization cross sections for collisions of He^{2+} with Li: production of $He^+(3l)$ at low velocities
 $He^{2+} + Li \rightarrow He^+(3l)$
(PSS, CTMC)
0.05-500 keV/amu
- 78T17 Sidis, V., Kubach, C.
J. Phys. B 11 2687-2703 1978 T
Theoretical study of the elastic and charge exchange processes in H^+ + Cs collisions
 $H^+ + Cs \rightarrow H^0$ (total, 2s, 2p)
(close-coupling)
0.05-4 keV/amu
- 78T18 Winter, T.G., Lane, N.F.
Phys. Rev. A 17 66-79 1978 T
Electron transfer in collisions of He^{2+} ions with H atoms at He^{2+} impact energies of 0.1-20.0 keV
 $He^{2+} + H \rightarrow He^+$
(PSS+MO)
 $2.5 \times 10^{-2} - 5$ keV/amu
- 78T32 Zhdanov, V.P., Chibisov, M.I.
Sov. Phys. -Tech. Phys. 23 532 1978 T
Effect of level degeneracy on charge exchange at a term pseudointersection.
 $H^+ + H \rightarrow H + H$
0.01 - 2519 eV; LZ
- 79E1 Adams, N.G., Smith, D., Grief, D.
J. Phys. B 12 1791-800 1979 E
Single charge transfer reactions of the ground and metastable states of Xe^{2+} at 300 K
 $Xe^{2+} (^3P, ^1D, ^3S_0) + B \rightarrow Xe^+$ (B= $H_2, N_2, O_2, CO_2, Ar, Xe$)
(selected ion drift tube technique)
300 K
- 79E2 Beuhler, R.J., Friedman, L., Porter, R.F.
Phys. Rev. A 19 486-494 1979 E
Electron-transfer reactions of fast Xe^{2+} ions with Xe in the energy range 15 keV - 1.6 MeV
 $Xe^{2+} + Xe \rightarrow Xe^{(q-1)+}, Xe^{(q-2)+}, Xe^{(q-3)+}, Xe^{(q-4)+}, Xe^{(q-1)+}$
0.1-15 keV/amu
- 79E26 Brouillard, F., Claeys, W., Poulaert, G., Rahmat, G., Van Wasserhove, G.
J. Phys. B 12 1253 1979 E
Double charge transfer in H^+ - H collisions.
 $H^+ + H \rightarrow H^+ + H^+$
30 - 200 eV (c.m.)

- 79E27
Crandall, D.H., Phaneuf, R.A., Meyer, f. W.
Phys. Rev. A 19 504 1979 E
Electron capture by slow multicharged ions in atomic and molecular hydrogen.
- 79E28
Dunn, K.F., Angel, G.C., Gilbody, H.B.
J. Phys. B 12 L623 1979 E
An experimental study of charge transfer and ionization in Cs^+ - Cs^+ collisions.
 $Cs^+ + Cs^+ \rightarrow Cs^{2+}$
40 - 280 keV (c.m.)
- 79E29
El-Sherbini, T.M., Salop, A., Bloemen, E. de Heer, F.J.
J. Phys. B 12 L579-582 1979 E
Target dependence of excitation resulting from electron capture in collisions of 200 keV Ar^{6+} ions with noble gases
 $Ar^{6+} + B \rightarrow Ar^{5+} + B^+$ (B=He, Ne, Ar, Kr, Xe)
(Photon spectroscopy)
5 keV/amu
- 79E29
Goffe, T.V., Shah, M.B., Gilbody, H.B.
J. Phys. B 12 3763 1979 E
One electron capture and loss by fast multiply charged boron and carbon ions in H and H_2 .
- 79E5
Gray, T.J., Richard, P., Gealy, G., Newcomb, J., Tawara, H.
IEEE NS-26 1127-1129 1979 E
X-ray production and electron transfer cross sections for 0.4-2.2 MeV/amu N, O and F ions on Al
 N^{6+} , O^{8+} , $F^{9+} + Al \rightarrow N^{6+}$, O^{7+} , $F^{8+} + hv$
0.4-2.3 MeV/amu
- 79E30
Hill, J., Geddes, J., Gilbody, H.B.
J. Phys. B 12 L341 1979 E
Improved measurements of cross sections for H(2s) formation in electron capture by 1.5-25 keV protons in H and H_2 .
- 79E6
Hill, J., Geddes, J., Gilbody, H.B.
J. Phys. B 12 L653-656 1979 E
H formation in electron capture by 4-25 keV metastable hydrogen atoms in the inert gases
 $H(2s) + B \rightarrow H^+ + B^+$ (B=He, Ne, Ar, Kr)
4-25 keV
- 79E7
Johnsen, R., Biondi, M.A.
Phys. Rev. A 20 87-97 1979 E
Thermal energy charge transfer quenching and association reactions of doubly charged ions in the rare gases
 $A^{2+} + B \rightarrow A^+ + B^+$ (A, B=He, Ne, Ar, Kr, Xe)
300 K
- 79E8
Jones, J.D.C., Lister, D.G., Twiddy, N.D.
J. Phys. B 12 2723-2726 1979 E
Charge transfer reaction rate coefficients for He⁺ and Ne⁺ with Ar at 300 K
 He^+ , $Ne^+ + Ar \rightarrow He^0$, Ne^0
300 K
- 79E9
Kita, S., Inoue, H.
J. Phys. B 12 2338-2349 1979 E
Charge exchange reactions in collisions of Li^+ -Li
 $Li^+ + Li \rightarrow Li(2s, 2p) + Li^+$
(TOF)
0.07-0.14 keV/amu
- 79E10
Loyd, D.H., Dawson, H.R.
Phys. Rev. A 19 948-952 1979 E
Electron capture into the n=3 states of hydrogen by proton impact on CO, CO₂ and N₂O
 $H^+ + B \rightarrow H(3s, 3p, 3d)$ (B=CO, CO₂ and N₂O)
(photon spectroscopy)
2.2-8.2 keV/amu
- 79E3
Dowek, D., Krutain, J., Thielmann, V., Barat, M.
J. Phys. B 12 2553-2563 1979 E
Collisional spectroscopy of open-shell systems I. C^+ + Ne collisions
 $C^+ + Ne \rightarrow C^0$
(energy loss spectroscopy)
0.04-0.17 keV/amu

- 79E31 McCullough, R.W., Nutt, W.L., Gilbody, H.B.
 J. Phys. B 12 4159 1979 E
 One electron capture by slow doubly charged ions in H and H₂.
- 79E32 Meyer, F.W., Phaneuf, R.A., Kim, H.J., Hvelplund, P., Stelson, P.H.
 Phys. Rev. A 19 515 1979 E
 Single-electron-capture cross sections for multiply charged O, Fe, Mo, Ta, W, and Au ions incident on H and H₂ at intermediate velocities.
- 79E12 Morgan, T.J., Eriksen, F.
 Phys. Rev. A 19 2185-2191 1979 E
 Formation of metastable hydrogen atoms by charge exchange of fast protons in magnesium and barium
 H⁺ + B → H^v(2s) (B = Mg, Ar, Ba)
 1.5-100 keV/amu
- 79E11 Morgan, T.J., Eriksen, F.J.
 Phys. Rev. A 19 1448-1456 1979 E
 Single- and double-electron capture by 1-100 keV protons in collisions with magnesium and barium
 H⁺ + B → H⁰, H¹ (B = Mg, Ar, Ba)
 1-100 keV/amu
- 79E13 Morgan, T.J., Stone, J., Mayo, M., Kurose, J.
 Phys. Rev. A 20 54-57 1979 E
 D⁺ production by multiple electron transfer collisions in alkaline-earth metal vapors
 D⁺ + B → D⁺ (B = Mg, Ca, Sr, Ba)
 (equilibrium charge distributions)
 1.25-100 keV/amu
- 79E14 Muller, A., Achenbach, C., Salzborn, E.
 Phys. Letters 70A 410-412 1979 E
 Dependence of the charge transfer between atoms and highly charged ions on the ionization potential of the atoms
 Xe¹⁰⁺ + B → Xe⁹⁺ (B = He, Na, Ne, Ar, Kr, Cd, Xe, Cs)
 0.75 keV/amu
- 79E15 Negata, T.
 J. Phys. Soc. Japan 46 1302-1306 1979 E
 Charge changing collisions of atomic beams in alkali-metal vapors II. total cross sections for one-electron capture by C⁺, O⁺, S⁺ ions and C, O, S atoms
 H⁺, C⁺, O⁺, S⁺ + B → H, C, O, S; H⁺, C⁺, O⁺, S⁺ (B = Na, K, Cs)
 0.5-5 keV/amu (H); 0.01500-15 keV/amu (S)
- 79E33 Nutt, W.L., McCullough, R.W., Gilbody, H/B.
 J. Phys. B 12 L157 1979 E
 Electron capture by 0.1-13 keV C⁺, N⁺ and O⁺ ions in H and H₂.
- 79E16 Olsen, J.O., Andersen, T., Barat, M., Gaussoergues, Ch. C., Sidis, V., Pommier, J., Agusti, J., Andersen, N., Russek, A.
 Phys. Rev. A 19 1457-1484 1979 E
 Excitation and charge transfer in low energy Na⁺ - Ne collisions
 Na⁺ + Ne → Na - Ne⁺
 (energy gain spectroscopy + photon spectroscopy)
 0.01-0.5 keV/amu
- 79E17 Olsen, J.O., Vedel, K., Dahl, P.
 J. Phys. B 12 929-944 1979 E
 Differential cross sections for charge transfer and excitation in low energy Be⁺ - He, Ne collisions
 Be⁺ + He, Ne → Be⁰
 (energy-gain spectroscopy)
 0.22-0.55 keV/amu
- 79T34 Peart, B., Dolder, K.T.
 J. Phys. B 12 4155 1979 E
 Measurements of cross sections for charge exchange between ⁴He⁺ and ³He²⁺ ions.
³He²⁺ + ⁴He⁺ → ³He⁺ + ⁴He²⁺
 0.1 - 20 keV (rel.)
- 79E35 Peart, B., Forrest, R.A.
 J. Phys. B 12 L23 1979 E
 Measurements of cross sections for double charge transfer in collisions between H⁺ and H⁻ ions.
 H⁺ + H⁻ → H⁺ + H⁺
 44 - 570 eV (rel.)

- 79E18 Pradel, P., Spiess, G., Sidis, V., Kubach, C.
J. Phys. B 12 1485-1505 1979 E
 Differential cross sections for the near-resonant charge transfer process $H^+ + Cs \rightarrow H(2s) + Cs^+$ at low energies
 $H^+ + Cs \rightarrow H(2s) + Cs^+$
 (Lyman spectroscopy : close-coupling)
 0.025-0.1 keV/amu
- 79E19 Rodbro, R., Persersen, E.H., Cocke, C.L., Macdonald, J.R.
Phys. Rev. A 19 1936-1947 1979 E
 Inner-shell electron capture by H^+ , He^+ and Li^{2+} projectiles from CH_4 , Ne and Ar
 H^+ , He^{2+} , $Li^{3+} + CH_4, Ne, Ar \rightarrow H^0, He^+, Li^{2+} + C^+(1s^{-1}), Ne^+(1s^{-1}), Ar^+(1s^{-1})$
 400-3000 keV/amu
- 79E20 Rundel, R.D., Nitz, D.E., Smith, K.A., Geis, M.W., Stebbings, R.F.
Phys. Rev. A 19 33-42 1979 E
 Resonant charge transfer in $He^+ - He$ collisions studied with the merging beam technique
 $He^+ + He \rightarrow He + He^+$
 (merging beam technique)
 $2.5 \times 10^{-5} - 4.7 \times 10^{-2}$ keV/amu
- 79E21 Sato, Y., Moore, J.H.
Phys. Rev. A 19 495-503 1979 E
 Electron capture in $N^{2+} - He$ and $N^{2+} - Ne$ collisions
 $N^{2+} + He, Ne \rightarrow N^+$
 (energy loss spectroscopy)
 0.014-0.17 keV/amu
- 79E22 Sharma, S., Awoold, G.L., Hasted, J.B., Maitur, D.
J. Phys. B 12 L163-166 1979 E
 Energy loss spectra of production ions in electron capture
 $N^{2+} + He, Ne, Ar \rightarrow N^+$
 (energy loss spectroscopy)
 0.1 keV/amu
- 79E23 Tawara, H.
Phys. Letters 71A 208-210 1979 E
 On a scaling of electron capture by fully ionized heavy ions in light gas targets at low energies
 scaling law at MeV
- 79T1 Abramov, V.A., Baryshnikov, F.F., Lisita, V.S.
Sov. Phys. -JETP 47 469-477 1979 T
 Charge transfer between hydrogen atoms and the nuclei of multicharged ions with allowance for the degeneracy of the final states
 $C^6+, O^8+ + H \rightarrow C^{5+}, O^{7+}$
 (LZ)
- 79T2 Banyard, K.E., Shirlcliffe, G.W.
J. Phys. B 12 3247-3256 1979 T
 Electron capture from lithium and its ions by high-energy protons
 $H^+ + Li \rightarrow H(nl) + Li^+(1^1S, 2^1S, 2^3S)$
 (CDW)
 200-10000 keV/amu
- 79T40 Banyard, K.E., Shirlcliffe, G.W.
J. Phys. B 12 3247 1979 T
 Electron capture from lithium and its ions by high-energy protons.
 $H^+ + Li^+ \rightarrow H(nl) + Li^{2+}; H^+ + Li^{2+} \rightarrow H(nl) + Li^{3+}$ ($n=1s, 2s, 2p$)
 200-10000 keV ; CDW
- 79T3 Bardsley, J.N., Cohen, J.S., Wadera, I.M.
Phys. Rev. A 19 2129-2130 1979 T
 Resonant contributions to single charge transfer between He^{2+} and He
 $He^{2+} + He \rightarrow He^+ + He^+$
 (quantal and JWKB)
 $10^{-7} - 10^{-2}$ keV/amu
- 79T41 Bazylev, V.A., Chibisov, M.I.
Sov. J. Plasma Phys. 5 327 1979 T
 Charge exchange in collisions of multiply charged ions
 $C^6+ + O^+ \rightarrow C^{5+} + O^{2+}; N^{7+} + C^+ \rightarrow N^{6+} + C^{2+}; N^{7+} + C^{2+} \rightarrow N^{6+} + C^{3+}; N^{7+} + N^+ \rightarrow N^{6+} + N^{2+};$
 $N^{7+} + O^{2+} \rightarrow N^{6+} + O^{3+}; O^{8+} + C^+ \rightarrow O^{7+} + C^{2+}; O^{8+} + N^{3+} \rightarrow O^{7+} + N^{4+}; O^{8+} + O^+ \rightarrow O^{7+} + O^{2+};$
 $O^{8+} + O^{3+} \rightarrow O^{7+} + O^{4+}$
 1 - 5 keV ; LZ

- 79T4 Becker, R.L., Mackellar, A.D.
 J. Phys. B 12 L345-350 1979 T
 Classical four-body calculations of $\text{He}^+ + \text{H}$ and $\text{H} + \text{H}$ collisions
 $\text{He}^+ + \text{H} \rightarrow \text{He}^0$
 (four-body CTMC)
 9-250 keV/amu
- 79T42 Belkic, Dz., Gayet, G., Salin, A.
 Phys. Report 56 279 1979 T
 Electron capture in high-energy ion-atom collisions
 $\text{H}^+ + \text{He}^+ \rightarrow \text{H}^+ + \text{He}^{2+}$
 30 - 450 keV; CDW
- 79T5 Briggs, J.S., Taulbjerg, K.
 J. Phys. B 12 2565-2573 1979 T
 Charge transfer by a double scattering mechanism involving target electrons
 $\text{H}^+ + \text{He} \rightarrow \text{H}(1s) + \text{He}^{2+} + e$
 (quantum description of Thomas peak)
 asymptotic form (v^{-11} au)
- 79T6 Butler, S.E., Bender, C.F., Dalgarno, A.
 Astrophys. J. 234 L59-61 1979 T
 Charge transfer of O^{2+} and Ne^{2+} with H
 $\text{O}^{2+}, \text{Ne}^{2+} + \text{H} \rightarrow \text{O}^+, \text{Ne}^+$
 (LZ)
 thermal energy
- 79T7 Butler, S.E., Dalgarno, A.
 Astrophys. J. 234 765-767 1979 T
 Charge transfer between N^+ and H
 $\text{N}^+ + \text{H} \rightarrow \text{N} + \text{H}^+$
 (DWA)
 10^5 - 10^2 keV/amu
- 79T10 Chan, F.T., Eichler, J.
 J. Phys. B 12 L305-308 1979 T
 Charge exchange between $\text{H}(2s)$ and energetic projectiles
 $\text{A}^{n+} + \text{H}(2s) \rightarrow \text{A}^{(n-1)+} + \text{H}^+$
 (ikonal approx.)
 10-1000 keV/amu
- 79T9 Chan, F.T., Eichler, J.
 Phys. Rev. A 20 1841-1847 1979 T
 Electron capture into arbitrary (n,l) levels of fast projectiles
 $\text{H}^+ + \text{H}(1s), \text{He} \rightarrow \text{H}(nl); \text{O}^{8+} + \text{H}, \text{He} \rightarrow \text{O}^{7+}(nl);$
 100-1000 keV/amu
- 79T8 Chan, F.T., Eichler, J.
 Phys. Rev. Letters 42 58-61 1979 T
 Approximation scheme for electron capture into arbitrary principal shells of energetic bare projectiles
 $\text{A}^{n+} + \text{H} \rightarrow \text{A}^{(n-1)+}(n)$
 (ikonal approx.)
 500-5000 keV/amu
- 79T43 Choi, B.H., Poe, R.T., Tang, T.K.
 ANL-Report 79-41 201 1979 T
 Charge exchange between singly ionized helium ions.
 $\text{He}^+ + \text{He}^+ \rightarrow \text{He}^{2+} + \text{He}$
 10 - 100 keV; PWBA
- 79T44 Das, G., Raffanetti, R.C., Kim, Y.K.
 ANL-Report 79-41 195 1979 T
 Low-lying state of $(\text{Cs}_2)^{++}$.
 $\text{Cs}^+ + \text{Cs}^+ \rightarrow \text{Cs} + \text{Cs}^{2+}; \text{Cs}^+ + \text{Cs}^{2+} + e$
 MO
- 79T45 Dickinson, A.S., Hardie, D.J.W.
 J. Phys. B 12 4147 1979 T
 Symmetric resonance charge transfer in $\text{He}^+(1s) - \text{He}^{2+}$ collisions.
 $\text{He}^{2+} + \text{He}^+(1s) \rightarrow \text{He}^+ + \text{He}^{2+}$
 0.02 - 20 keV; PSS
- 79T12 Duman, E.L., Menshikov, L.I., Smirnov, B.M.
 Sov. Phys.-JETP 49 260-266 1979 T
 Destruction of hydrogen atoms by collisions with multiply charged ions
 $\text{A}^{n+} + \text{H} \rightarrow \text{A}^{(n-1)+}(nl); \text{A}^{n+} + \text{H}^+ + e$
 (PSS)
 analytic expression for electron capture and ionization

- 79T11 Duman,E.L. Merzshikov,L.I.
Sov. Phys.-Dokl. 24 116-117 1979 T
Radiative capture of an electron of a target atoms by multiply charged ions analytical expressions
- 79T13 Duman,E.L. Smirnov,B.M.
Sov. Phys. - J. Plasma Phys. 4 650-652 1979 T
Charge exchange of hydrogen atoms with multiply charged ions
 $A^{z+} + H \rightarrow A^{(z-1)+}$ ($z=4-30$)
(tunneling model)
1-100 keV/amu
- 79T14 Eichler,J. Chan,F.T.
Phys. Rev. A 20 104-112 1979 T
Approach to electron capture into arbitrary principal shells of energetic projectiles
 $C^{6+} + H \rightarrow C^{5+}(nl)$ (eikonal approx.)
analytic expression scaled to OBK
50-500 keV/amu
- 79T15 Ford,A.L. Reading,J.F. Becker,R.L.
J. Phys. B 12 2905-2912 1979 T
Charge transfer and ionization in collisions of 2.5 to 9 Mev protons with argon
 $H^+ + Ar \rightarrow H + Ar^+$; $H^+ + Ar^+ + e$
(target-centered expansion method)
2.5-9 MeV/amu
- 79T16 Hatton,G.J. Lane,N.F. Winter,T.G.
J. Phys. B 12 L571-577 1979 T
Charge transfer for He^{2+} on H using molecular bases with plane-wave translational factors
 $He^{2+} + H \rightarrow He^+(2s)$
MO close-coupling with ETF)
0.25-25 keV/amu
- 79T46 Hickman,A.P.
J. Chem. Phys. 70 4872 1979 T
Approximate scaling formula for ion-ion mutual neutralization rates.
chemical reactions, rate constant; LZ
- 79T17 Kumar,A. Roy,B.N.
J. Phys. B 12 2025-2030 1979 T
Modified binray encounter calculations or electron capture from noble gas atom by He^+ ions II.
 $He^+ + B \rightarrow He^0$ (B=He,Ne,Ar,Kr,Xe)
(modified BEA)
20-250 keV/amu
- 79T18 Lin,C.D.
Phys. Rev. A 19 1510-1516 1979 T
Double K-shell electron capture for ion-atom collisions at intermediate energies
 $H^+ + He \rightarrow H + He^{2+}$; $He^{2+} + He \rightarrow He + He^{2+}$; $A^{z+} + Ne \rightarrow A^{(z-2)+} + Ne^{2+}(1s^{-2})$
(two-state two-centered AO)
10-200 keV/amu (H) ; 50-250 keV/amu (He) ; 500-4000 keV/amu (F)
- 79T19 Lin,C.D. Tunnell,L.N.
J. Phys. B 12 L485-490 1979 T
Subshell electron capture cross sections of argon atoms by protons
 $H^+ + Ar \rightarrow H + Ar^{n+}(nl^{-1})$ ($n=2,3$)
(two-state AO)
2-1000 keV/amu
- 79T47 Macek,J.
ANL-Report 79-41 191 1979 T
Charge exchange cross sections for the reaction
 $Xe^{6+} + Xe \rightarrow Xe^{5+} + Xe^{7+}$.
 $Xe^{6+} + Xe^{6+} \rightarrow Xe^{5+} + Xe^{7+}$
150 keV ; MO
- 79T20 McCarroll,R. Valiron,P.
Astron. Astrophys. 78 177-180 1979 T
Charge exchange of N^{3+} ions with atomic hydrogen in the interstellar gas
 $N^{3+} + H \rightarrow N^{2+} + H^+$
(MO/AZ)
 $10^{-7} - 2 \times 10^{-3}$ keV/amu

- 79T21 Moisewitsch, B.L., Stockman, S.G.
 J. Phys. B 12 L591-595 1979 T
 Electron capture at relativistic energies
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
 (OBK with Dirac wave function)
 10^2-10^4 keV/amu
- 79T22 Moisewitsch, B.L., Stockman, S.G.
 J. Phys. B 12 L695-698 1979 T
 Relativistic classical theory of electron capture
 $H^+ + H \rightarrow H + H^+$
 (relativistic classical theory)
 10^4-10^7 keV/amu
- 79T23 Morrison, H.G., Opik, U.
 J. Phys. B 12 L685-688 1979 T
 Excitation and charge transfer to the 2s and 2p states in $H^+ - H$ collisions in the energy
 range 49-125 keV
 $H^+ + H \rightarrow H(2s, 2p) + H^+$
 (modified close-coupling)
 49-125 keV/amu
- 79T24 Mukherjee, S., Sii, N.C., Basu, D.
 J. Phys. B 12 1259-1265 1979 T
 Electron capture by protons from some hydrogen-like ions
 $H^+ + He^+, Li^{2+} \rightarrow H + He^{2+}, Li^{3+}$
 (Coulomb-Born)
 5-1000 keV/amu
- 79T48 Mukherjee, S., Sii, N.C., Basu, D.
 J. Phys. B 12 1259 1979 T
 Electron capture by protons from some hydrogen-like ions.
 $H^+ + He^+, Li^{2+} \rightarrow H(1s, 2s) + He^{2+}, Li^{3+}$
 5 - 1000 keV ; CB
- 79T49 Olson, R.E.
 ANL-Report 79-41 171 1979 T
 Charge changing cross sections for $Cs^+ + Cs^+$ collisions.
 $Cs^+ + Cs^+ \rightarrow Cs + Cs^{2+}$; $Cs^+ + Cs^{2+} + e$
 100 keV ; MO
- 79T50 Olson, R.E.
 Phys. Letters 71A 341 1979 T
 Cross sections for alpha particles colliding with oxygen ions : Loss of alpha heating
 in Tokamak plasmas.
 $He^{2+} + O^{3+} \rightarrow He^{2+} + O^{4+} + e$; $He^+ + O^{4+}$; $He^{2+} + O^{4+} \rightarrow He^{3+} + O^{3+} + e$; $He^+ + O^{4+}$
 $He^{3+} + O^{3+} \rightarrow He^{2+} + O^{4+} + e$; $He^+ + O^{4+}$
 0.25 - 1.0 MeV/amu ; CTMC
- 79T25 Omidvar, K.
 Phys. Rev. A 19 65-71 1979 T
 Scaling of cross sections for K-shell capture by high energy protons and alpha
 particles from the multi-electron atoms
 $H^+, He^{2+} + B \rightarrow H^0, He^+ + B^+(1s^{-1})$ (B=H, He, Ar)
 scaling
- 79T27 Reading, J.F., Ford, A.L., Swafford, G.L., Fritchard, A.
 Phys. Rev. A 20 130-144 1979 T
 Innershell charge transfer in asymmetric ion-atom collisions
 $A^+ + Cu \rightarrow A^{(q-1)+} + Cu^+(1s^{-1}, 2l^{-1})$ (A=He, C, O)
 6000 keV/amu
- 79T28 Roy, A., Ghosh, A.S.
 J. Phys. B 12 99-104 1979 T
 The capture of electrons by fast protons from hydrogen atoms
 $H^+ + H \rightarrow H(1s, 2s, 2p) + H^+$
 (frozen target-second Born)
 30-2000 keV/amu
- 79T29 Roy, B.N., Rai, D.K.
 J. Phys. B 12 2015-2030 1979 T
 Modified binary-encounter calculations for electron capture from noble-gas atoms by
 protons I
 $H^+ + B \rightarrow H^0$ (B=He, Ne, Ar, Kr, Xe)
 10-500 keV/amu
- 79T26 Roy, P.P., Saha, B.C.
 Phys. Letters 71A 415-419 1979 T
 Electron capture in $H^+ - H_2$ collisions
 $H^+ + H_2 \rightarrow H^0$
 (first Born)
 50-5000 keV/amu

- 79T30 Ryufuku,H, Watanabe,T.
Phys. Rev. A 19 1538-1549 1979 T
Charge transfer cross sections for collisions of Li^{3+} , Be^{4+} , B^{5+} and C^{6+} ions with atomic hydrogen
 Li^{3+} , Be^{4+} , B^{5+} , C^{6+} + $H \rightarrow Li^{2+}$, Be^{3+} , B^{4+} , C^{5+}
(UDWA)
0.025-2000 keV/amu
- 79T31 Ryufuku,H, Watanabe,T.
Phys. Rev. A 20 1828-1837 1979 T
Total and partial cross sections for charge transfer in collisions of multicharged ions with atomic hydrogen
 $A^{z+} + H \rightarrow A^{(z-1)+}$ (A=C,Ne,Si,Ca)
(UDWA)
0.025-2000 keV/amu
- 79T32 Salop,A.
J. Phys. B 12 919-928 1979 T
The distribution of excitation resulting from electron capture in stripped-ion-hydrogen-atom collisions
 $A^{z+} + H \rightarrow A^{(z-1)+}(n)$ (A=B,C,O)
(CTMC)
2-72 keV/amu
- 79T33 Salop,A, Olson,R.E.
Phys. Letters 71A 407-410 1979 T
Electron removal from hydrogen by collisions with fully stripped iron ions
 $Fe^{26+} + H \rightarrow Fe^{25+} + H^+$; $Fe^{26+} + H^+ + e$
(PSS + CTMC)
0.35-535 keV/amu
- 79T34 Salop,A, Olson,R.E.
Phys. Rev. A 19 1921-1929 1979 T
Electron removal from hydrogen by collisions with fully stripped oxygen ions
 $O^{8+} + H \rightarrow O^{7+} + H^+$; $O^{8+} + H^+ + e$
(PSS + CTMC)
0.06-300 keV/amu
- 79T35 Shakeshaft,R.
Phys. Rev. A 20 779-786 1979 T
Relativistic effects in electron capture from hydrogen-like atom by a fast-moving bare ion
 H^+ , Ne^{10+} , $H \rightarrow H(1s)$, $Ne^{9+}(1s)$
(first Born with relativistic correction, Thomas model at relativistic energy)
 10^{-10^4} MeV/amu
- 79T52 Sinha,C, Mukherjee,S, Sil,N.C.
J. Phys. B 12 1391 1979 T
Electron capture in an arbitrary excited state by protons passing through hydrogenic ions.
 $H^+ + A^{(z-1)+} \rightarrow H(n) + A^{z+}$ (A=He, Li, C; $n=2 \sim \infty$)
50 - 400keV ; CB
- 79T36 Sinha,C, Mukherjee,S, Sil,N.C.
J. Phys. B 12 1391-1397 1979 T
Electron capture in an arbitrary excited S state by protons passing through hydrogenic ions
 $H^+ + B^{(z-1)+} \rightarrow H^0 + B^{z+}$ (B=He, Li, C; $n=2,3,4,6,00$)
(Coulomb-Born)
50-400 keV/amu
- 79T51 Sinha,C, Sil,N.C.
Phys. Letters 71A 201 1979 T
Charge transfer in proton-positive-ion collisions producing hydrogen atoms in any arbitrary p state.
 $H^+ + He^+ \rightarrow H + He^{2+}$
50 - 400 keV ; CB
- 79T38 Spruch,L, Shakeshaft,R.
Phys. Rev. A 19 1023-1028 1979 T
Classical cross section for charge transfer via "knock-on" capture from high Rydberg states at asymptotically high impact velocities
 $A^{z+} + B^{(z-1)+} \rightarrow A^{(z-1)+} + B^{z+}$

79T53

Sramek, S. Gallup, G. Macek, J.
ANL Report 79-41 183 1979 T
Preliminary estimate of heavy ion electron transfer cross sections.

$Ba^+ + Ba^+ \rightarrow Ba + Ba^{2+}$
100 - 300 keV ; CC-MO

79T38

Theisen, T.C. McGuire, J.H.
Phys. Rev. A 20 1406-1408 1979 T
Single and double electron capture in the independent electron approximation at high velocities

$He^{2+} + He \rightarrow He^+ + He^0$
(independent electron model with Bates-Born approx.)
25-250 keV/amu

79T39

Watson, W.D. Christensen, R.B.
Astrophys. J. 231 627-631 1979 T
Quantal calculations for charge transfer in collisions of C^{3+} and N^{3+} with H atoms
 $C^{3+}, N^{3+} + H \rightarrow C^{2+}, N^{2+}$
(quantal calculation/LZ)
 10^{-3} - 10^0 eV/amu

- 80E25 Afrosimov, V.V. Basalava, A.A. Donets, E.D. Panov, N.N.
Electron capture by multiply charged ions and nuclei of hydrogen molecule atoms.
JETP Letters 31 600 1980 E
 H^+ , He^+ , C^{4+} , N^{7+} , O^{8+} , Ne^{9+} , Ar^{16+} , Fe^{24+} , H_2
1*q keV
- 80E 1 Agagu, A. Oluwole, A.F.
K - K⁺ charge exchange cross section
J. Phys. B 13 1429-1432 1980 E
 $K^+ + K \rightarrow K^0 + K^+$
polarized K target
 3×10^{-5} keV/amu
- 80E 2 Andersen, T. Bisgaard, P. Pedersen, E.H.
Formation of excited Mg⁺ states in Mg²⁺ - Mg collisions (20 - 500 keV)
Phys. Rev. A 22 818-821 1980 E
 $Mg^{2+} + Mg \rightarrow Mg^+(3p) + Mg^+(3p)$
photon spectroscopy
0.8 - 21 keV/amu
- 80E26 Angel, G.C. Dunn, K.F. Neil, P.A. Gilbody, G.B.
Charge transfer and ionization in Xe⁺ - Xe⁺ collisions.
J. Phys. B 13 L391 1980 E
 $Xe^+ + Xe^+ \rightarrow Xe^{2+}$
38 - 303 keV (c.m.)
- 80E 3 Aubert, J. Bliman, S. Geller, R. Jacquot, B. van Houitte, D.
Charge-changing collisions of argon ions on argon gas. one-electron capture
Phys. Rev. A 22 2403-2407 1980 E
 $Ar^+(q=2-12) + Ar \rightarrow Ar^{(q+1)}$
growth method
(1-10)xq keV
ECR ion source
- 80E 4 Bayfield, J.E. Gardner, L.D. Gulkok, Y.Z. Saylor, T.K. Sharma, S.D.
Charge exchange measurements in helium using a double tandem accelerator-decelerator source of low energy highly stripped oxygen ions
Rev. Sci. Instr. 51 65-654 1980 E
 $O^{7+} + He \rightarrow O^{(q+1)+} + He^+$ (q=5-8)
15 - 100 keV/amu
deceleration with two tandems
- 80E27 Crandall, D.H. R.A. Phaneuf, R.A. Meyer, F.W.
Electron capture by heavy multicharged ions from atomic hydrogen at low velocities.
Phys. Rev. A 22 379 1980 E
 Ar^{q+} (q=2-9) + H, H₂ → $Ar^{(q-1)+}$; Fe^{q+} (q=5,6) + H, H₂ → $Fe^{(q-1)+}$; Xe^{q+} (q=2-12) + H, H₂ → $Xe^{(q-1)+}$
6.3*q keV
- 80E 5 El-Sherbini, T.M. Salop, A. Bloemen, E. de Heer, F.J.
Excitation and ionization resulting from electron capture in Ar^{q+} + H₂ collisions at ion projectile energies of 200 - 1200 keV
J. Phys. B 13 1433-1449 1980 E
 $Ar^{q+} + H_2 \rightarrow Ar^{(q-1)+} + H_2^+$, $Ar^{q+} + H^+ + H$, $Ar^{q+} + H_2^+ + e$
photon emission spectroscopy
5 - 30 keV/amu
- 80E28 Franzke, B.
Charge change cross sections for 1.4 MeV/u uranium in H₂ and N₂.
GSI Report 80-3 225 1980 E
- 80E29 Gardner, J., D. Bayfield, J.E. Koch, P.M. Sellin, I.A. Pegg, D.J. Peterson, R.S. Crandall, D.H.
Electron collisions at keV energies of boron and other multiply charged ions with atoms and molecules. III. Atomic hydrogen.
Phys. Rev. A 21 1397 1980 E
 B^{q+} (q=2-4), C^{q+} (q=2-4), N^{q+} (q=2-5), O^{q+} (q=2-5) + H → (6-23)q*keV
- 80E30 Geddes, J. Hill, J. Shah, M.B. Goffe, T.V. Gilbody, H.B.
Electron loss by 1-300 keV H ions H and H₂.
J. Phys. B 13 319 1980 E
 $H + H, H_2 \rightarrow H^+$
1-300 keV

- 80E 6 Huber,B.A.
Charge transfer of Ar^{2+} in He, Ne and Ar
J. Phys. B 13 809-818 1980 E
 $Ar^{2+} + He, Ne, Ar \rightarrow Ar^+, Ar^0$
translational spectroscopy
0.06 - 0.1 keV/amu
cross sections for exothermic and endothermic channels
- 80E31 Huber,B.A. Kahlert,H.J.
Electron transfer from molecular hydrogen to multiply charged Ar and Kr ions.
J. Phys. B 13 L159 1980 E
 $Ar^{n+}(q=2-6) + H_2; Kr^{n+}(q=2-7) + H_2$
- 80E7 Jones,J.D. Lister,D.G. Birkinshaw,K. Twiddy,N.D.
Quasi-resonant charge transfer at thermal energies in the rare gases
J. Phys. B 13 799-808 1980 E
 $A^+ + A \rightarrow A + A^+$ (A = Ne, Ar, Kr, Xe)
selected ion flow tube method
 3×10^{-5} keV/amu
rate constant
- 80E32 Kim,H.J. Meyer,F.W.
Electron loss from highly excited states of H^0 in collisions with N^{3+} .
Phys. Rev. Letters 44 1047 1980 E
 $N^{3+} + H(n=8-24) \rightarrow N^+$
- 80E33 Lichtenberg,W.J. Bethge,K. Schmidt-Bocking,H.
Electron-loss cross sections for negative ions at high energies.
J. Phys. B 13 343 1980 E
 $H^-, F^-, S^-, Cl^-, Se^-, Br^-, I^-, H_2^-, He, Ar, O_2^-, N_2^-$
20-200 keV
- 80E 8 Matic,M. Sidis,V. Vujovic,M. Cobic,B.
Near-resonant charge transfer in collisions of N^+ and O^+ ions with inert gases
J. Phys. B 13 3665-3676 1980 E
 $A^+, A^{2+} + B \rightarrow A^0, A^{0+}$ (A = O, N; B = He, Ne, Ar, Kr, Xe)
E: growth; T: Demkov model
0.14 - 2.1 keV/amu
- 80E10 Matsumoto,A. Tsurubuchi,S. Iwai,T. Ohtani,S. Okuno,K. Kaneko,Y.
Single-electron capture into Ar^r excited states in $Ar^{2+} + Na$ collisions below 12 keV
II. Relative population distribution in Ar^r excited states
J. Phys. Soc. Japan 48 575-582 1980 E
 $Ar^{2+} + Na \rightarrow Ar^r(nl) + Na^+$ (nl=4p, 4p', 4d)
E: photon emission spectroscopy; T: LZ
 $5 \times 10^{-3} - 0.3$ keV/amu
- 80E 9 Matsumoto,A. Tsurubuchi,S. Iwai,T. Ohtani,S. Okuno,K. Kaneko,Y.
Single-electron capture into Ar^r excited states in $Ar^{2+} + Na$ collision below 12 keV I.
Absolute measurement of emission cross-sections
J. Phys. Soc. Japan 48 567-574 1980 E
 $Ar^{2+} + Na \rightarrow Ar^r(nl) + Na^+$
photon emission spectroscopy
 $5 \times 10^{-3} - 0.3$ keV/amu
- 80E11 McAfee,K.B. Hozack,R.S. Johnson,R.E.
 Σ -oscillation and spin change during charge exchange in Ar^r on Ar
Phys. Rev. Letters 44 1247-1250 1980 E
 $Ar^r + Ar \rightarrow Ar + Ar^r$
crossed beam
0.005 keV/amu
- 80E12 Meyer,F.W.
Single electron capture and loss by H^+ , H^0 and H^- in Cs vapor in the energy range 0.1 - 2.0 keV
J. Phys. B 13 3823-3828 1980 E
 $H^+ + Cs \rightarrow H^0$
growth
0.1 - 2.0 keV/amu
- 80E34 Moran,T.F. Mathur,B.P.
Charge transfer reactions of C^+ , N^+ and O^+ ions with H_2 and N_2 .
Phys. Rev. A 21 1051 1980 E
 $C^+, N^+, O^+ + H_2, N_2$
0.6-3 keV

- 80E35 Morgan, T.J. Stone, J. Mayo, R.
H(2s) formation in H⁺-H and H-H collisions.
Phys. Rev. A 22 1460 1980 E
H⁺-H → H(2s); H-H → H(2s)
- 80E13 Morgenstern, R. Niehaus, A. Zimmermann, G.
Autoionizing states formed by electron capture in collisions of multiply charged Ne ions with He, H₂ and Xe
J. Phys. B 13 4811-4831 1980 E
Ne²⁺, Ne³⁺, Ne⁴⁺ + He, H₂, Xe → Ne, Ne⁺, Ne²⁺ + He²⁺, H₂²⁺, Xe²⁺ + e
electron emission spectroscopy
5x10⁻² - 5x10⁻¹ keV/amu
- 80E14 Nagata, T.
Charge changing collisions of atomic beams in alkali-metal vapors. IV. Total cross sections for single electron capture by H⁺ ion and H(1s) atom
J. Phys. Soc. Japan 48 2068-2075 1980 E
H⁺ + B → H⁺; H⁺(1s) + B → H (B = Cs, Rb, K, Na)
growth
0.4 - 5 keV/amu
total cross sections
- 80E15 Panov, M.N.
Electron capture into different excited states of multiply charged ions
Electronic and Atomic Collisions 437 1980 E
(North-Holland, Amsterdam)
Ar⁶⁺ + He → Ar⁵⁺(nl) + He⁺
- 80E36 Park, J.T. Aldag, J.E. Peacher, J.L., George, J.M.
Angular differential cross sections for excitation of atomic hydrogen to the n=2 level by proton impact.
Phys. Rev. A 21 751 1980 E
H⁺ + H → H⁺ + H(n-2)
- 80E16 Rille, E. Winter, H.
Excitation in electron capture collisions of Ne²⁺ (15-20 keV) with Xe
J. Phys. B 13 L531-536 1980 E
Ne²⁺ + Xe → Ne⁺(nl) + Xe⁺(nl)
photon emission spectroscopy
0.74 - 2.5 keV/amu
- 80E17 Schlachter, A.S. Stalder, K.R. Stearns, J.W.
D⁺ production by charge transfer of 0.3 - 10 keV D⁺, D⁰, and D⁻ in cesium, rubidium and sodium vapor targets
Phys. Rev. A 22 2494-2509 1980 E
D⁰ + Cs → D
growth
1.25 - 5 keV/amu
charge equilibrium fractions for Cs, Rb, Na
- 80E37 Seim, W. Müller, A. Salzborn, E.
Electron capture from atomic hydrogen by slow fully stripped lithium ions.
Phys. Letters 80A 20 1980 E
Li³⁺ + H → Li²⁺
9-42 keV
- 80E38 Sewell, E.C. Angel, S.C. Dunn, K.F. Gilbody, H.B.
Ionization and charge transfer in fast H⁺ - Li⁺ collisions.
J. Phys. B 13 2269 1980 E
H⁺ + Li⁺ → Li²⁺; H + Li²⁺; deduce H⁺ + Li²⁺ + e
62 - 350 keV (c.m.)
- 80E18 Shah, M.B. Geddes, J. Gilbody, H.B.
Absolute cross sections for H(2s) formation in electron capture by protons in gases
J. Phys. B 13 4049-4058 1980 E
H⁺ + B → H⁰(2s) + B⁺ (B = He, Ne, N₂, O₂, Ar, H₂)
photon counting
12 - 18 keV/amu
- 80E19 Smith, D. Adams, N.G. Alge, E. Villingier, H. Lindinger, W.
Reactions of Ne²⁺, Ar²⁺, Kr²⁺ and Xe²⁺ with the rare gases at low energies
J. Phys. B 13 2787-2799 1980 E
A²⁺ + B → A⁺ + B⁺ (A = Ne, Ar, Kr, Xe; B = He, Ne, Ar, Kr, Xe)
selected ion-flow tube method
3x10⁻⁵ eV

- 80E20 Sofield,C.J. Cowern,N.E.B. Praper,J. Bridwell,L. Freeman,J.M. Woods,C.J. Spencer-Harper,M.
Charge-exchange cross sections of nearly fully stripped ^{16}O ions in solid targets
Nucl. Instr. Meth. 170 257-260 1980 E
 $\text{O}^{q+} + \text{B}(\text{solid}) \rightarrow \text{O}^{(q-1)+} (q=7,8) ; \text{O}^{(q-1)+} (q=6,7) (B = C, Al)$
foil thickness dependence
2500 keV/amu
- 80E21 Tanis,J.A. Jacobs,W.W. Shafrath,S.M.
Systematics of target and projectile K x-ray production and radiative capture for 20 -
80 MeV Cl^{q+} ions incident on 25 - 200 $\mu\text{g}/\text{cm}^2$ Cu targets
Phys. Rev. A 22 483-495 1980 E
 $\text{Cl}^{q+} + \text{Cu} \rightarrow \text{Cl}^{(q-1)+} + \text{hv} + \text{Cu}^*$
x-ray spectroscopy
571 - 2285 keV/amu
- 80E22 Thielmann,U. Krutain,J. Barat,M.
Collisions spectroscopy of open-shell systems II. $\text{N}^+ - \text{Ne}$ collisions
J. Phys. B 13 4217-4232 1980 E
 $\text{N}^+ + \text{Ne} \rightarrow \text{N}^0$
TOF-energy loss spectroscopy
0.036 - 0.14 keV/amu
energy loss spectra
- 80E24 Van Zyl,B. Rothwell,H.L. Neumann,H.
Balmer-alpha and Balmer-beta emission cross sections for $\text{H}^+ + \text{Ar}$ collisions
Phys. Rev. A 21 730-737 1980 E
 $\text{H}^+ + \text{Ar} \rightarrow \text{H}^0(3l, 4l)$
photon spectroscopy
0.05 - 2.5 keV/amu
- 80E23 Varghese,S.L. Bissinger,G. Joyce,J.M. Laubert,R.
The electron capture cross section of 1.5 - 3 MeV protons from carbon
Nucl. Instr. Meth. 170 269-273 1980 E
 $\text{H}^+ + \text{B} \rightarrow \text{H}^0 (B = \text{CH}_4, \text{C}_2\text{H}_2, \text{C}_2\text{H}_4, \text{C}_2\text{H}_6, \text{C}_3\text{H}_4, \text{C}_3\text{H}_6, \text{C}_4\text{H}_6, \text{C}_4\text{H}_8)$
growth
1500 - 3000 keV/amu
- 80T 1 Amundson,P.A. Jakubassa,D.H.
Charge transfer in asymmetric heavy ion collisions
J. Phys. B 13 L467-472 1980 T
 $\text{H}^+ + \text{B} \rightarrow \text{H}^0 + \text{B}^+(1s^{-1}) (B = C, Ne, Ar)$
IA
200 - 6000 keV/amu
Impact parameter dependence of capture probabilities.
- 80T34 Baliunas,S.L. Butler,S.E.
Silicon lines spectral diagnostics : the effect of charge transfer.
Astrophys. J. 235 L45 - 48 1980 T
 $\text{Si}^+ + \text{H}^+ \rightarrow \text{Si}^{2+} + \text{H} ; \text{Si}^{2+} + \text{H}^+ \rightarrow \text{Si}^{3+} + \text{He}$
modeling
- 80T 2 Banyard,K.E. Shircliffe,G.W.
Charge exchange between simple structured projectiles in high energy collisions
Phys. Rev. A 22 1452-1454 1980 T
 $\text{H}(1s) + \text{H}(1s) \rightarrow \text{H} + \text{H}^+$
continuum-intermediate-state approximation
2 - 90 keV/amu
- 80T 3 Becker,R.L. Ford,A.L. Reading,J.F.
Contributions of multi-electron processes to inner-shell charge transfer and vacancy
production; projectile charge dependence in collisions of bare nuclei with argon
J. Phys. B 13 4059-4077 1980 T
 $\text{He}^{2+}, \text{C}^{4+} + \text{Ar} \rightarrow \text{He}^+, \text{C}^{3+} + \text{Ar}^+(1s^{-1})$
CC
1000 - 5000 keV/amu
 Z_p -scaling
Balkic,Dz.
Charge dependence of ionization cross sections.
J. Phys. B 13 L589 1980 T
 $\text{H}^+ + \text{He}^+ \rightarrow \text{H}^+ + \text{He}^{2+} + e$
40 - 500keV ; CDW

- 80T 4 Bransden, B.H. Newby, C.W. Noble, C.J.
Electron capture by fully stripped ions of helium, lithium, beryllium and boron from atomic hydrogen
J. Phys. B 13 42450-4255 1980 T
He²⁺, Li³⁺, Be⁴⁺, B⁵⁺ + H → He⁺, Li²⁺, Be³⁺, B⁴⁺(nl) + H⁺
CC(2-AO)
5 - 200 keV/amu
- 80T 5 Briggs, J.S. Dube, L.
The second Born approximation to the electron transfer cross section
J. Phys. B 13 771-784 1980 T
Aⁿ⁺ + B(2s, 1p)(n'l'm) → A⁽ⁿ⁻¹⁾⁺(nlm) + B²⁺
second Born approximation
- 80T 7 Butler, S.E. Dalgarno, A.
Charge transfer of multiply charged ions with hydrogen and helium; Landau-Zener calculations
Astrophys. J. 241 838-843 1980 T
A^{q+} + B → A^{(q-1)+} + B⁺ (A = C³⁺, C⁴⁺, N²⁺, N⁴⁺, O³⁺, O⁴⁺, Ne²⁺, Ne⁴⁺, Mg²⁺, Mg⁴⁺, Si³⁺, Si⁴⁺, S²⁺, S⁴⁺, Ar²⁺, Ar⁴⁺; B = H, He)
Landau-Zener model
10⁻² - 4x10⁻³ keV/amu
rate coefficients
- 80T 6 Butler, S.E. Heil, T.G. Dalgarno, A.
Charge transfer of multiply charged ions with hydrogen and helium; quantum calculations
Astrophys. J. 241 442-447 1980 T
A²⁺, A³⁺ + H, He → A⁺, A²⁺ + H⁺, He⁺ (A = C, N, O, Ne)
quantal calculation
5x10³ - 5x10⁴ K
rate coefficient
- 80T 8 Chambaud, G. Launay, J.M. Levy, B. Mille, P. Roueff, E. Minh, F.T.
Charge exchange and fine structure excitation in O - H⁺ collisions
J. Phys. B 13 4205-4216 1980 T
O⁺ + H → O + H⁺; H⁺ + O(2P₂) → H⁰ + O⁺ (S_{3/2})
CC
10 - 1000 K
- 80T10 Crothers, D.S.F. Todd, N.R.
One-electron capture by fast multiply charged ions in H; q³ scaling
J. Phys. B 13 2277-2294 1980 T
Aⁿ⁺ + H → A⁽ⁿ⁻¹⁾⁺ + H⁺
OBK, eikonal, CDW, CIS
1.3 - 250 keV/amu
q³ scaling low
- 80T 9 Crothers, D.S.F. Todd, N.R.
Electron capture by slow Zn²⁺, Cd²⁺, B²⁺, Mg²⁺ and C³⁺ ions in H
J. Phys. B 13 547-563 1980 T
Zn²⁺, Cd²⁺, B²⁺, Mg²⁺, C³⁺ + H
Phase-integral interpretation of the two-state exponential model within IP
2.5x10⁻³ - 25 (Zn²⁺, Cd²⁺), 0.25 - 2.5x10² (B²⁺), 400 - 1225 (Mg), 0 - 25 (C³⁺)
- 80T35 Dalgarno, A. Butler, S.E. Heil, T.G.
Charge transfer of doubly charged oxygen ions in helium.
J. Geophys. Res. 85 6047 - 6048 1980 T
O²⁺ + He → O⁺ + He⁺
LZ
rate coefficient at 300 K
- 80T11 Datta, S. Mukherjee, S.C.
Charge transfer in He²⁺-H(1s) collisions
J. Phys. B 13 539-546 1980 T
He²⁺ + H(1s) → He⁺(1s, 2s, 2p) + H⁺
Coulomb-Born
25 - 2500 keV/amu
- 80T12 Eichler, J. Narumi, H.
On the classical-trajectory eikonal approximation for electron capture into multicharged ions
Z. Phys. A 295 209-214 1980 T
He²⁺ + H(1s) → H⁺(1s) + H⁺
Eikonal approximation
200 - 50000 keV/amu
General expression for 1s-1s transfer for any projectile-target combination, normalized to OBK.

80T15 Gozdanov, T.P.
 Classical model for electron capture in collisions of highly charged, fully stripped ions with hydrogen atoms
 J. Phys. B 13 3835-3847 1980 T
 $A^{z+} + H \rightarrow A^{(z-1)+} + H^+$ ($z = 8, 10, 14, 18, 26, 36$)
 classical over-barrier model
 0.5 - 100 keV/amu
 total cross sections

80T16 Harel, C. Salin, A.
 Application of OEDM orbitals to many-electron systems ; He²⁺-He collisions
 J. Phys. B 13 785-789 1980 T
 $He^{2+} + He \rightarrow He^+(n) + He^+(1s)$, $He + He^{n+}(n = 1, 2)$
 MO close-coupling
 3.3 - 33 keV/amu

80T17 Jakubassa-Amundsen, D.H. Amundsen, P.A.
 On the semiclassical impulse approximation for electron capture in asymmetric ion-atom collisions
 Z. Phys. A 297 203-214 1980 T
 $H^+ + B \rightarrow H(1s) + B^+(1s^{-1})$ ($B = C, N, O, Ne, Ar$)
 semiclassical impulse approximation
 400 - 20000 keV/amu
 angular distribution

80T18 Jakubassa-Amundsen, D.H. Amundsen, P.A.
 Charge transfer in heavy ion collisions at relativistic velocities
 Z. Phys. A 298 13-19 1980 T
 impulse approximation

80T19 Lapicki, G. McDaniel, F.D.
 Electron capture from K shell by fully stripped ions
 Phys. Rev. A 22 1896-1905 1980 T
 modified OBK with corrections
 scaling law

80T20 Lin, C.D. Tunnell, L.N.
 Improved atomic model for charge transfer in multielectron ion-atom collisions at intermediate energies
 Phys. Rev. A 22 76-85 1980 T
 $H^+ + Ar \rightarrow H^0(1s) + Ar^+(1s^{-1})$; $H^+ + Ne, Kr \rightarrow H(1s) + Ne^+(2s^{-1}, 2p^{-1})$, $Kr^+(4s^{-1}, 4p^{-1})$; $F^+ + Ar \rightarrow F^+(1s) + Ar^+(1s^{-1})$
 Two-center AO expansion method
 1 - 200 keV/amu (H); 1000 - 24000 keV/amu (F)

80T21 Macek, J.H. Shakeshaft, R.
 Second Born approximation with the Coulomb Green's function; electron capture from hydrogen-like ions by a bare ion
 Phys. Rev. A 22 1441-1446 1980 T
 $H^+ + B^{(z-1)+}(1s) \rightarrow H(1s)$ ($B = Ne, Ca$)
 second Born approximation
 2500 - 10000 keV/amu

80T22 McCarroll, R. Valiron, P.
 Thermal charge exchange reaction with multicharged ions of astrophysical interest; application to the N³⁺-H system
 Electric and Atomic Collisions 453-456 1980 T
 (North-Holland)
 $N^{3+} + H \rightarrow N^{2+} + H^+$
 quantum calculation/Landau-Zener model
 $10^7 - 10^3$ keV/amu

80T23 Grozdanov, T.P. Janev, R.K.
 Electron capture in slow collisions of multiply charged ions with hydrogen molecules
 J. Phys. B 13 L69-72 1980 T
 $Kr^{3+ \rightarrow 2+} + H_2 \rightarrow Kr^{3+ \rightarrow 2+}$
 tunnelling model
 0.012 - 0.24 keV/amu
 total cross section

80T24 Grozdanov, T.P. Janev, R.K.
 Two-electron capture in slow ion-atom collisions
 J. Phys. B 13 3431-3442 1980 T
 He^2+ , C^4+ + $He \rightarrow He^0$, C^{2+} + He^{2+}
 asymptotic Landau-Herring method
 0.5 - 12 keV/amu
 total cross section

- 80T37 McGuire, J.H., Simony, P.R.
Calculation of cross sections for 2s-2p excitation of one-electron ions by He²⁺ and He⁰.
Phys. Rev. A 22 2270 1980 T
F⁷⁺(1s²2s) + He²⁺ → F⁷⁺(1s²2p) + He²⁺; Si¹²⁺(1s²2s) + He²⁺ → Si¹²⁺(1s²2p) + He²⁺
- 80T28 Rivarola, R.D., Piantecini, R.D., Satin, A., Belkic, D.
The influence of the static potential in high energy K-shell electron capture collisions
J. Phys. B 13 2601-2609 1980 T
H⁺ + He(1s²) → H(1s) + He⁺(1s)
CDW
293 keV/amu
- 80T29 Roy, P.K., Saha, B.C., Sil, N.C.
Formation of hydrogen atoms in arbitrary excited states by electron capture in p-H collision
J. Phys. B 13 3401-3420 1980 T
H⁺ + H(1s) → H(nlm) + H⁺
Born approx.; distorted-wave (Bassel-Gerjuoy) approx.; lime-dependent two-state (Band) approx.
25 - 4000 keV/amu
- 80T30 Ryufuku, H., Sasaki, K., Watanabe, T.
Oscillatory behavior of charge transfer cross sections as a function of the charge of projectiles in low energy collisions
Phys. Rev. A 21 745-750 1980 T
A^{Z+} + H → A^{(e-1)+} + H⁺ (A^{Z+} = B^{Z+}, B^{Z+}; C^{Z+}, C^{Z+}; N^{Z+}, N^{Z+}; O^{Z+}, O^{Z+})
UDWA, classical barrier model
1 - 25 keV/amu
oscillation of cross sections at low energies
- 80T31 Saha, H.P., Maiti, N., Sil, N.C.
Electron capture in the 3s level by proton and alpha-particle from atomic hydrogen
J. Phys. B 13 327-342 1980 T
H⁺ + H → H(3s) + H⁺, He⁺⁺ + H → He⁺(3s) + H⁺
Bates formula
25 - 800 (H⁺), 6.25 - 200 (He⁺⁺) keV/amu
- 80T32 Shakeshaft, R.
Innershell electron capture by a swift bare ion; second Born effects
Phys. Rev. Letters 44 442-444 1980 T
A^{Z+} + B^{(e-1)+} → A^{(e-1)+} + B^{Z+}
second Born approximation
Second and higher-order Born terms needed for innershell electron capture.
- 80T23 Moisewitsch, B.L., Stockman, S.G.
Electron capture by charged particles at relativistic energies
J. Phys. B 13 2975-2981 1980 T
H⁺, Ne¹⁰⁺ + H(1s) → H(1s), Ne⁹⁺(1s) + H⁺
OBK with Dirac wave function
10000 - 10000000 keV/amu
analytic expression
- 80T24 Moisewitsch, B.L., Stockman, S.G.
Non-orthogonality of atomic wave functions in electron capture at relativistic energies
J. Phys. B 13 4031-4037 1980 T
A^{Z+} + B^{(e-1)+}(1s) → A^{(e-1)+}(1s) (A = H, Ne, Ar; B = H, Cu)
relativistic OBK
1x10⁶ - 1x10²⁷ keV/amu
- 80T25 Mukherjee, S., Sil, N.C.
Ion-ion capture collisions in continuum distorted-wave approximation
J. Phys. B 13 3421-3430 1980 T
H⁺ + He⁺, Li²⁺, Be³⁺, C⁴⁺ → H(1s, 2s) + He⁺, Li¹⁺, Be²⁺, C³⁺
CDW
400 - 2000 keV/amu
- 80T26 Olson, R.E.
Ion-Rydberg atom collisions cross sections
J. Phys. B 13 483-492 1980 T
Aⁿ⁺ + B^{(e-1)+}(n) → A^{(e-1)+}(n) + B^{Z+} (q = 1, 2, 5, 10; n = 1, 2, 5, 10, 20)
CTMC
- 80T27 Reading, J.F., Ford, A.L.
K-shell hole production, multiple hole production, charge transfer and antisymmetry
Phys. Rev. A 21 124 1980 T

- 80T38 Sramel, S.J., Macek, J.H., Gallup, G.A.
Computed cross sections for electron transfer in $Ba^+ + Ba^+$ collisions.
Phys. Rev. A 22 1467 1980 T
 $Ba^+ + Bg^+ \rightarrow Ba + Ba^{++}$
25 - 500keV ; SLCT
- 80T33 Winter, T.G., Haiton, G.
Plane-wave-factor, molecular-state treatment of electron transfer in collisions of He^{2+} ions with H atoms
Phys. Rev. A 21 793-807 1980 T
 $He^{2+} + H \rightarrow He^+(nl) + H^+$
CC (3,4,10 MO) with ETF
0.25 - 17.5
- 80T39 Winter, T.G., J.Haiton, G.J., Lane, N.F.
Molecular-state treatment of collisions between protons and He^+ ions.
Phys. Rev. A 22 930 1980 T
 $H^+ + He^+ \rightarrow H + He^+ ; H^+ + He^+ \rightarrow H^+ + He^+ (2s, 2p, 2p)$
1.6 - 14 keV (c.m.) ; MO
- 81E26 Afrosimov, V.V., Basalaev, A.A., Donets, E.D., Lozhkin, K.O., Panov, M.N.
Processes involving the capture of an electron by the nuclei of atoms near helium atoms and hydrogen molecules at low energies.
Sov. Phys. - JETP Letters 34 171 1981 E
 $C^+, N^+, O^+, Ne^{++}, Ar^{++} + H_2$
0.5-8 keV/amu
- 81E1 Afrosimov, V.V., Basalaev, A.A., Gordeev, Yu.S., Donets, E.D., Zinov'ev, A.N., Ovchinnikov, S.Yu., Panov, M.N.
X radiation accompanying electron capture by oxygen and carbon nuclei in molecular hydrogen.
Sov. Phys. -JETP Letters 34 316 - 318 1981 E
 $C^{6+}, O^{8+} + H_2 \rightarrow C^+, O^{7+}$
photon emission spectroscopy
0.6 - 8 keV/amu
- 81E27 Aldag, J.E., Peacher, J.L., Martin, P.J., Sutcliffe, V., George, J., Redd, E., Kvate, T.J., Blankenship, D.M., Park, J.T.
Angular differential and total cross sections for the excitation of atomic hydrogen to $n=2$ state by helium ions.
Phys. Rev. A 23 1062 1981 E
 $He^+ + H \rightarrow He^+(\text{theta}) + H^+$
15-100 keV
- 81E28 Alton, G.D., Bridwell, L.B., Lucas, M., Moak, C.D., Miller, P.D., Jones, C.M., Kessel, Q.C., Aniar, A.A., Brown, M.D.
Single and multiple electron loss cross section measurements from 20 MeV Fe^{4+} on thin gaseous targets.
Phys. Rev. A 23 1073 1981 E
 $Fe^{4+} + He, Ne, Ar, Kr, Xe, H_2, N_2, O_2, CH_4, CO_2, CHF_3, CF_4, SF_6$
- 81E2 Barret, J.L., Leventhal, J.J.
Selective formation of $He^+(n=3)$ in $He^{2+} - Li$ collisions.
Phys. Rev. A 23 485 - 490 1981 E
 $He^{2+} + Li \rightarrow He^+(n=3)$
photon spectroscopy
0.125 - 1.75 keV/amu
emission cross section
- 81E29 Berkner, K.H., Graham, W.G., Pyle, R.V., Schlachter, A.S., Stearns, J.W.
Electron capture, electron loss and impact ionization cross sections for 103- to 3400-keV/amu multicharged iron ions colliding with molecular hydrogen.
Phys. Rev. A 23 2891 1981 E
 $Fe^{8+}(q=3,7,9,10-16,18,20-25) + H_2$
103-3400 keV/amu
- 81E3 Beyer, H.F., Mann, R., Folkmann, F.
High-charge-low-velocity electron capture studied by x-ray line quenching.
J. Phys. B 14 L377 - 381 1981 E
 $Ne^{8+}(1s2p^3P_1) + Ne \rightarrow Ne^{7+}$
K α -x-ray observation
 5.1×10^{-4} keV/amu
recoil ions

- 81E30 Bliman, S., Aubert, J., Geller, R., acquot, B., van Houtte, D.
Electron capture collisions at keV energies of multiply charged ions of carbon and argon with molecular deuterium.
Phys. Rev. A 23 1703 1981 E
 $C^{q+}(q=2-6), Ar^{q+}(q=2-12) + D_2$
2-10 keV
- 81E4 Bloemen, E.W.P., Winter, H., Mark, T.D., Dijkkamp, D., Barends, D., de Heer, F.J.
Absolute emission cross sections at 30.4 nm for e - He collisions and at 20.8 nm for Ne^{4+} - He collisions.
J. Phys. B 14 717 - 725 1981 E
 $e + He \rightarrow 2e + He^+ + hv$; $Ne^{4+} + He \rightarrow Ne^{3+} + He^+ + hv + He^+$
photon emission spectroscopy
9.9 (Ne^{4+} -He) keV/amu
- 81E5 Campbell, F.M., Browning, R., Latimer, C.J.
Symmetric charge transfer in argon, krypton and xenon: the effect of spin-orbit coupling studied using photoelectron-photoion coincidence spectroscopy.
J. Phys. B 14 1183 - 1195 1981 E
 $A^+(^2P_{3/2,1/2}) + A \rightarrow A(^1S_0) + A^+(^2P_{3/2,1/2})$
photoion-photoelectron coincidence
 $1.25 \times 10^{-4} - 2.5 \times 10^{-2}$ keV/amu
cross section ratios for initial states ($^2P_{3/2}$ and $^2P_{1/2}$)
- 81E6 Chetoui, A., Rozet, J.P., Briand, J.P., Stephan, C.
K excitation and K-K transfer cross sections for intermediate-velocity nearly symmetric collisions.
J. Phys. B 14 1625 - 1638 1981 E
 $Kr^{q+} + B \rightarrow Kr^{(q-1)+}(1s) + B^+(1s^{-1})$ (B = Ti, Mn, Ni, Cu, Zr, Ag)
x-ray spectroscopy
3614 keV/amu
- 81E7 Cocke, C.L., DuBois, R., Gray, T.J., Justiniano, E.
Capture by highly-charged low-energy ions studied with a secondary recoil ion source.
IEEE NS-28 1032 - 1035 1981 E
 $Ne^{q+}(q=2-6), Ar^{q+}(q=2-10), Kr^{q+}(q=2-10) + He \rightarrow Ne^{(q-1)+}, Ar^{(q-1)+}, Kr^{(q-1)+}$
TOF
(0.1-1.1)xq keV
oscillation of cross section over q
- 81E8 Cocke, C.L., DuBois, R., Gray, T.J., Justiniano, E., Can, C.
Coincidence measurements of electron capture and ionization in low-energy $Ar^{q+} + (He, Ne, Ar, Xe)$ collisions.
Phys. Rev. Letters 26 1671 - 1674 1981 E
 $Ar^{q+} + A \rightarrow Ar^{(q-1)+}, Ar^{(q-2)+} + A^+$ (A = He, Ne, Ar, Xe; i = 1 - 2)
coincidence technique
(0.25-0.66)xq keV
recoil ion source; total cross section
- 81E9 Dillingham, T.R., McDonald, J.R., Richard, P.
Ionization of one-electron ions and capture by bare and one-electron ions of C, N, O and F on He.
Phys. Rev. A 24 1237 - 1248 1981 E
 $A^{Z+} + He \rightarrow A^{(Z-1)+}; A^{(Z-1)+} + He \rightarrow A^{(Z-2)+}$ (A = C, N, O, F)
growth
500 - 2500 keV/amu
- 81E21 Geddes, J., Hill, J., Gilbody, H.B.
Formation of excited hydrogen atoms in electron detachment collisions by 3 - 25 keV H⁻ ions.
J. Phys. B 14 4837-4846 1981 E
 $H^- + B \rightarrow H(2s, 2p, 3s, 3p, 3d)$ (B = He, Ne, Ar, N₂); $H^- + H, H_2 \rightarrow H(2s, Ly-\alpha, 3s, B-\alpha)$
photon spectroscopy
3 - 25 keV/amu
- 81E10 Hall, J., Richard, P., Gray, T.J., Lin, C.D.
Double K-shell-to-K-shell electron transfer in ion-atom collisions.
Phys. Rev. A 24 2416 - 2419 1981 E
 $A^{Z+} + Ti \rightarrow A^{(Z-1)+}(1s), A^{(Z-2)+}(1s^2) + Ti^+(1s^{-1}), Ti^{2+}(1s^{-2})$ (A = N, P, Mg, Al, Si, S)
x-ray yields
1500 - 6500 keV/amu (Si); 5000 keV/amu (others)
- 81E11 Hird, B., Ali, S.P.
Electron transfer to Ar^{2+} from rare gas atoms.
J. Phys. B 14 267 - 280 1981 E
 $Ar^{2+} + He, Xe \rightarrow Ar^+$
1.5 - 5 keV

- 81E22 Holzschater, H.M. Church, D.A.
Near thermal charge transfer between Ar^{2+} and N_2
J. Appl. Phys. 74 2313-2318 1981 E
 $Ar^{2+} + N_2 \rightarrow Ar^+$
trapping technique
- 10^{-3} keV/amu
rate coefficient
- 81E23 Holzschater, H.M. Church, D.A.
Charge transfer reaction of multi-charged ions with O_2
Phys. Letters 86A 25-28 1981 E
 $O^{q+} + O_2 \rightarrow O^{(q-1)+}$ ($q = 2,3$)
trapped ion source
- 2×10^{-3} keV/amu
rate coefficient
- 81E24 Howald, A.M. Anderson, L.W. Lin, C.C.
Charge-changing cross sections for H⁺ ions incident on a Na vapor target.
Phys. Rev. A 24 44-47 1981 E
 $H + Na \rightarrow H, H^+$
growth
1 - 25 keV/amu
- 81E31 Huber, B.A.
Electron capture by slow multiply charged Ar and Ne ions from atomic hydrogen.
Z. Phys. A 4299 307 1981 E
 $Ar^{q+}(q=2-6), Ne^{q+}(q=2-4) + H$
1.4-15 keV
- 81E12 Hvelplund, P. Hangen, H.K. Knudsen, H. Andersen, L. Damsgaard, H. Fukusawa, F.
Electron capture into highly-lying Rydberg states in collisions between multiply charged ions and H_2
Phys. Scripta 24 40 - 42 1981 E
 $Au^{13+,15+} + H_2 \rightarrow Au^{12+,14+}$
optical measurement
100 keV/amu
Ar=n-1; dominant transitions ; no cross section given
- 81E13 Justiniano, E. Cocke, C.L. Gray, T.J. DuBois, R.D. Can, C.
Charge transfer and ionization in low energy $Ar^{q+} + Ne$ collisions.
Phys. Rev. A 24 2953 - 2962 1981 E
 $Ar^{q+}(q=2-9) + Ne \rightarrow Ar^{(q-1)+}, Ar^{(q-2)+}, Ar^{(q-3)+} + Ne^{q+}$ ($i = 1 - 3$)
coincidence technique
(0.1-1.1)xq keV
recoil ion source ; total cross section
- 81E14 Knudsen, H. Haugen, H.K. Hvelplund, P.
Single-electron capture cross sections for medium- and high-charged ions colliding with atoms.
Phys. Rev. A 23 597 - 610 1981 E
 $Au^{q+}(q=2-24), O^{q+}(q=1-8) + He \rightarrow Au^{(q-1)+}, O^{(q-1)+}$
growth
16.8 - 102 keV/amu (Au) ; 125 - 1000 keV/amu (O)
scaling law
- 81E32 Knudsen, H. Haugen, H.K. Hvelplund, P.
Single electron capture by highly charged ions colliding with atomic and molecular hydrogen.
Phy. Rev. A 24 2287 1981 E
scaling
- 81E15 Mann, R. Folkmann, F. Beyer, H.F.
Selective electron capture into highly stripped Ne and N target atoms after heavy ion impact.
J. Phys. B 14 1161 - 1181 1981 E
 $A^{q+} + B \rightarrow A^{(q-1)+}(n) + B^+$ ($A = Ne^{q+}, Ne^{10+}, N^{5+}$; $B = He, Ne, Ar, H_2, CH_4, NH_3$)
x-ray spectroscopy
 10^{-4} keV/amu
recoil ions ; no cross section
- 81E33 Martin, P.J. Blankenship, D.M. Kvale, T.J. Redd, E. Peacher, J.L. Park, J.T.
Electron capture at very small scattering angles from atomic hydrogen by 25-125 keV protons.
Phys. Rev. A 23 3357 1981 E
 $H^+ + H$
25-125 keV

- 81E16 Nagata, T. Okamura, Y. Katoh, E. Mukoyama, Y.
Single-electron capture cross sections for 0.4-5.0 keV He⁺ ions incident on alkali-vapor targets.
Phys. Letters 81A 265 - 267 1981 E
He⁺ + B → He⁰(B = Cs,Rb,K,Na)
growth
0.1 - 1.25 keV/amu
- 81E34 Peart,B, Forrest,R.A, Dolder,K.
Measurements of cross sections for charge transfer between Cs⁺ ions.
J. Phys. B 14 L383 1981 E
Cs⁺ + Cs⁺ → Cs + Cs²⁺
28 - 68 keV (c.m.)
- 81E36 Peart,B, Forrest,R.A, Dolder,K.
Measurements of inelastic collisions between homonuclear ions: Na⁺, K⁺ and Rb⁺.
J. Phys. B 14 L603 1981 E
Na⁺ + Na⁺ → Na²⁺; K⁺ + K⁺ → K²⁺; Rb⁺ + Rb⁺ → Rb²⁺
E=19.3 - 87.6 keV (c.m.)
- 81E37 Peart,B, Forrest,R.A, Dolder,K.
Measurements of inelastic collisions between Cs⁺ ions.
J. Phys. B 14 1655 1981 E
Cs⁺ + Cs⁺ → Cs²⁺
E= 19 - 79 keV (c.m.)
- 81E35 Peart,B, R.A.Forrest and K.Dolder
Measurements of cross sections for the formation of ⁷Li²⁺ by collisions between Li⁺ ions.
J. Phys. B 14 3457 1981 E
⁷Li⁺ + ⁷Li⁺ → ⁷Li²⁺
19.3 - 87.6 keV (c.m.)
- 81E39 Phaneuf,R.A.
Production of high-Q ions by laser bombardment method.
IEEE NS-28 1182 1981 E
C⁺(q=3,4,5) + H₁
- 81E38 Phaneuf,R.A.
Electron capture in very slow C⁺ + H collisions.
Phys. Rev. A 24 1138 1981 E
C⁺(q=3,4,5,6) + H → 1-e capture
1111-387 eV/amu
- 81E40 Schery,H. Huber,B.A.
Electron capture by slow multiply charged Mg, Al, Cs, Pb and Bi ions from He, Ne, Kr and H₂.
J. Phys. B 14 3197 1981 E
Mg⁺(q=2-5) + H₁,He ; Al⁺(q=2-5) + H₁,He ; Cs⁺(q=2-5) + He,Ne,Kr,H₁ ; Pb⁺(q=2-7) + H₁,He ; Bi⁺(q=2-7) + He
0.6-5 keV
- 81E41 Schlachter,A.S.
Collisions of highly stripped ions at MeV energies in gas targets: charge transfer and ionization.
IEEE NS-28 1039 1981 E
- 81E42 Schlachter,A.S, Berkner,K.H, Graham,W.G, Pyle,R.V, Steam,J.W, Tarnis,J.A.
Collisions of fast, highly stripped carbon, niobium and lead ions with molecular hydrogen.
Phys. Rev. A 24 1110 1981 E
C⁺(q=4,5,6), Nb⁺(q=23,28,31,34,36), Pb⁺(q⁺=52,53,54,55,57,59) + H₁,
60-800 keV/amu
- 81E17 Seim, W. Müller, A. Salzborn, E.
On the population of metastable ionic states in electron-capture collisions.
Z. Phys. A 301 11 - 16 1981 E
A⁺, A²⁺ + O₂ → A²⁺, A³⁺
growth
0.25 - 1.7 keV/amu
metastable state effect
- 81E43 Seim, W. Muller, A. Wirkner-Bott, I. Salzborn, E.
Electron capture by Li⁺ (i=2, 3), N⁺ and Ne⁺ (i=2, 3, 4, 5) ions from atomic hydrogen.
J. Phys. B 14 3475 1981 E
Li⁺ (i=2,3), N⁺ (i=2,3,4,5), Ne⁺ (i=2, 3, 4, 5) + H

- 81E44 Shah, M.B., Gilbody, H.B.
Experimental study of the ionization of atomic hydrogen by fast H^+ and He^{2+} ions.
J. Phys. B 14 2361 1981 E
 H^+ , He^{2+} + $H \rightarrow$
- 81E45 Shah, M.B., Gilbody, H.B.
Experimental study of the ionization of atomic hydrogen by fast multiply charged ions of carbon, nitrogen and oxygen.
J. Phys. B 14 2831 1981 E
 $C^{2+,3+,4+}$, $N^{2+,3+,4+,5+}$, $O^{2+,3+,4+,5+}$ + $H \rightarrow H^+$
190-2370 keV
- 81E18 Tanis, J.A., Shafroth, S.M., Willis, J.E., Clark, M., Swenson, J., Strait, E.N., Mowat, J.R.
Simultaneous electron capture and excitation in $S + Ar$ collisions.
Phys. Rev. Letters 47 828 - 831 1981 E
 $S^{9+} + Ar \rightarrow S^{(q-1)+} S^{(q-2)+}$ ($q = 13 - 16$)
coincidence with K x-rays
2180 keV/amu
- 81E19 Tanis, J.A., Shafroth, S.M., Willis, J.E., Mowat, J.R.
Radiative electron capture by Cl ions incident on C and Cu foils.
Phys. Rev. A 23 366 - 370 1981 E
 $Cl^{2+} + C, Cu \rightarrow Cu^{(q-1)+} + hv + C^+$; Cu^+
x-ray spectroscopy
1142 - 2285 keV/amu
- 81E25 Tsurubuchi, S., Iwai, T.
Excitation of $Li(2p)$ and $He(2p)$ in collisions of Li^+ with He at energies below 4.2 keV.
J. Phys. B 14 243 - 259 1981 E
 $Li^+ + He \rightarrow Li(2P_0, 2P_{3/2})$
photon spectroscopy technique
 $6.4 \times 10^{-2} - 6.0 \times 10^{-1}$ keV/amu
transitions ($2p \rightarrow 2s$; $4d \rightarrow 2p$; $3d \rightarrow 2p$) of Li; also He^+ transition ($2p \rightarrow 1s$)
- 81E20 Vane, C.R., Prior, M.H., Marrus, R.
Electron capture by Ne^{10+} trapped at very low energies.
Phys. Rev. Letters 46 107 - 110 1981 E
 $Ne^{10+} + Ne \rightarrow Ne^{9+}$
trapped ion
 $3.5 \times 10^{-4} - 2.25 \times 10^{-3}$ keV/amu
recoil ion + trapping; total cross sections
- 81E46 Wirkner-Bott, I., Seim, W., Müller, A., Kester, P., Salzborn, E.
Electron capture by Li^{3+} and Li^{2+} ions in H_2 and He.
J. Phys. B 14 3987 1981 E
 Li^{3+} , $Li^{2+} + H_2, He \rightarrow 1-e$ capture
8-38 keV
- 81T 1 Borondo, F., Macías, A., Riera, A.
Asymmetry effect in the neutralization reaction $H^+ + H$
Phys. Rev. Letters 46 420-423 1981 T
 $H^+ + H \rightarrow H(1s) + H(m)$
semi-classical approach
0.1 - 100 keV/amu
- 81T 3 Bransden, B.H., Ermolaev, A.M.
Charge exchange in $He^{2+} - Li$ collisions
Phys. Lett. 84A 316-318 1981 T
 $He^{2+} + Li \rightarrow He^+(m) + Li^+$
CC(2-AO)
1.25 - 16.0 keV/amu
- 81T41 Bransden, B.H., Nobel, C.J.
Charge transfer in $H^+ + He^+$ and $He^{2+} + H$ collisions.
J. Phys. B 14 1849 1981 T
 $H^+ + He^+ \rightarrow H(1s, 2s, 2p_0, 2p_1) + He^{2+}$; $H^+ + He^+(2s, 2p_0, 2p_1)$
 $E = 3.725 - 227.5$ keV; TCAE

- 81T2 Bransden, B.H. Noble, C.J.
Charge transfer in $H^+ + He^+$ and $He^{2+} + H$ collisions
J. Phys. B 14 1849-1856 1981 T
 $H^+ + He^+ \rightarrow H + He^+$; $He^{2+} + H \rightarrow He^+ + H$
Impact parameter
0.5 - 50 keV/amu
- 81T37 Burgdörfer, J.
Influence of the linear Stark effect on electron capture into fully stripped ions.
Phys. Rev. A 24 1756 - 1767 1981 T
 $H^+ + H, He \rightarrow H(n=2)$; $O^{8+} + He \rightarrow O^{7+}(n=2)$
OBK
50 - 400 keV/amu (H^+); $7 \times 10^2 = 1.3 \times 10^3$ keV/amu (O^{8+})
alignment parameters given; (2p)/(2s) ratios given
- 81T4 Burgdörfer, J.
Angular momentum coherences in the differential capture amplitude in hydrogen
J. Phys. B 14 1019-1034 1981 T
 $H^+, He^+ + Ar \rightarrow H(1s, 2s, 2p, 3s), He^+(1s, 2s, 2p), 3s$
Coulomb-Brinkman-Kramers approximation
6000 keV/amu
angular distribution; $A^{2+} + B^{(n-1)+}(1s) \rightarrow A^{(n-1)+}(nlm)$
- 81T36 Burgdorfer, J.
Influence of the linear Stark effect on electron capture into fully stripped ions
Phys. Rev. A 24 1736-1767 1981 T
 $H^+ + H, He \rightarrow H(n=2) + H^+$; $O^{8+} + He \rightarrow O^{7+}(n=2)$; $C^{6+} + He \rightarrow C^{5+}(n=2)$
modified OBK
50 - 400 keV/amu
- 81T5 Casaubon, J.I. Piancentini, R.D. Salin, A.
Charge exchange in low-energy $Li^{3+} - H$ collisions
J. Phys. B 14 L297-299 1981 T
 $Li^{3+} + H \rightarrow Li^{2+}(nl) + H^+$
impact parameter molecular approximation
1 - 5.7 keV/amu
- 81T39 Chibisov, M.I.
Exchange interaction between an atom and a multiply charged ion.
Sov. Phys.-Tech. Phys. 26 284 - 286 1981 T
analytical expression for exchange interaction
- 81T38 Chibisov, M.I.
Asymptotic form of three electron exchange in slow collisions of atoms and ions.
Sov. Phys.-Tech. Phys. 26 280 - 284 1981 T
asymptotic form for 3-electron exchange for triply charged ions; 1) direct exchange
2) successive exchange
- 81T6 Christensen, R.B. Watson, W.D.
Charge transfer in $S^{2+} + H$ collisions at eV collision energies
Phys. Rev. A 24 1331-1341 1981 T
 $S^{2+}(^3P) + H(1s) \rightarrow S^+ + H^+$
ab initio MO method
 10^{-3} keV/amu
- 81T7 Crothers, D.S.F.
Continuum distorted waves; capture into the nth shell
J. Phys. B 14 1035-1040 1981 T
 $A^{Z+} + H(1s) \rightarrow A^{(Z-1)+}(n) + H^+$ (A = H, He, Li, Be, B, C)
CDW
130 keV/amu
- 81T8 Crothers, D.S.F. Todd, N.R.
Molecular treatment of charge-transfer in $He^{2+} - H$ collisions
J. Phys. B 14 2251-2258 1981 T
 $He^{2+} + H \rightarrow He^+(nl) + H^+$
CC(5-MO) with ETF
0.5 - 6.0 keV/amu
- 81T40 Dalgarno, A. Heil, T.G. Butler, S.E.
Charge transfer of O IV with hydrogen.
Astrophys. J. 245 793 - 797 1981 T
 $O^{3+} + H \rightarrow O^{2+}(2s^2 2p^3 s \ ^1P^o, \ ^3P^o; 2s^2 2p^3 p \ ^1D, \ ^3D; 2s^2 2p^3 p \ ^1S, \ ^3S)$
MO
 $5 \times 10^3 - 5 \times 10^4$ K

- 81T9 Devi, K.R.S., Koonin, S.E.
Mean-field approximation to P + He scattering
Phys. Rev. Letters 47 27-30 1981 T
H⁺ + He → H⁰
time-dependent Hartree-Fock method
4 - 100 keV/amu
- 81T10 Dube, L.J., Briggs, J.S.
Systematics of the single and double electron scattering contribution to charge exchange
J. Phys. B 14 4595-4617 1981 T
A^{Z+} + B^{(e-1)(nlm)} → A^{(e-1)(n'l'm')}
first and second Born approximations
25 - 10000 keV/amu
- 81T11 Eichler, J.
Eikonal theory of charge exchange between arbitrary hydrogenic states of target and projectile
Phys. Rev. A 23 498-509 1981 T
A^{Z+} + H(nl) → A^{(e-1)(n'l)} + H⁺ (A = H, He, Li, B, C, Fe)
eikonal approximation
10 - 3000 keV/amu
- 81T13 Fujiwara, K.
Close-coupling calculation for electron capture by an alpha particle from atomic hydrogen
J. Phys. B 14 3977-3986 1981 T
He^{Z+} + H → He^(nlm) + H⁺
CC (19AO)
1.3 - 100 keV/amu
- 81T12 Ford, A.L., Reading, J.F., Becker, R.L.
Innershell capture and ionization in collisions of H⁺, He^{Z+} and Li^{Z+} projectiles with neon and carbon
Phys. Rev. A 23 510-518 1981 T
A^{Z+} + B → A^{(e-1)(1s)} + B^{+(1s¹, 2l¹)} (A = H, He, Li; B = C, Ne)
target-centered basis expansion method
200 - 2000 keV/amu (C); 400 - 4000 keV/amu (Ne)
- 81T14 Gargaud, M., Hanssen, J., McCarroll, R., Valiron, P.
Charge exchange with multiply charged ions at low energies; application to the N^{Z+}/H and C^{Z+}/H systems
J. Phys. B 14 2259-2276 1981 T
N^{Z+} + H → N^{Z+(nl)} + H⁺; C^{Z+} + H → C^{Z+(nl)} + H⁺
CC (MO)
7x10⁻⁷ - 7x10⁻³ (N^{Z+}), 8x10⁻⁷ - 8x10⁻³ (C^{Z+}) keV/amu
- 81T15 Gayet, R., Rivarola, R.D.R., Salin, A.
Double electron capture by fast nuclei
J. Phys. B 14 2421-2427 1981 T
He^{Z+} + He → He⁰; F^{Z+} + Ar → F^{Z+(1s²)}
CDW
1.25 - 350 keV/amu (He); 1578 - 3263 keV/amu (F)
- 81T16 Green, T.A., Shipsey, E.J., Brown, J.C.
Modified method of perturbed stationary states. III. Charge-exchange cross-sections for C^{Z+} - H collisions
Phys. Rev. A 23 546-561 1981 T
C^{Z+} + H → C^{Z+(n)} + H⁺
CC (MO)
0.05 - 30.0 keV/amu
- 81T17 Heil, T.G., Butler, S.E., Dalgarno, A.
Charge transfer of multiply charged ions at thermal energies
Phys. Rev. A 23 1100-1109 1981 T
N^{Z+} + H → N⁺ + H⁺; C^{Z+} + H → C^{Z+(nl)} + H
CC (MO)
1.4x10⁻⁶ - 5.8x10⁻⁴ (N^{Z+}), 2.2x10⁻⁵ - 6.7x10⁻⁴ (C^{Z+}) keV/amu
- 81T19 Ho, T.S., Lieber, M., Chan, F.T.
Eikonal approximation of electron-capture cross sections in collisions of H-atoms with fast projectiles
Phys. Rev. A 24 2925-2932 1981 T
p + H → H(nl) + p; C^{Z+} + H → C^{Z+(nl)} + p; O^{Z+} + H → O^{Z+(nl)} + p; Fe^{Z+} + H → Fe^{Z+(nl)} + p
eikonal approximation
20 - 100 (p), 40 - 200 (others) keV/amu

- 81T20 Ho,T.S. Lieber,M. Chan,F.T. Omidvar,K.
Eikonal approximation for charge transfer from a multielectron atom to fast projectiles
Phys. Rev. A 24 2933-2945 1981 T
 $H^+ + He, C, Ar, N_2, O_2 \rightarrow H; He^{2+} + He, C \rightarrow He^+; Li^{3+} + C, Ne \rightarrow Li^{2+}$
eikonal approximation
500 - 10000 keV/amu
- 81T18 Ho,T.S. Umberger,D. Day,R.L. Lieber,M. Chan,F.T.
Eikonal calculation of electron capture cross sections from an arbitrary nlm shell of a hydrogenic target into arbitrary n'l'm' shell of a fast bare projectile
Phys. Rev. A 24 705-713 1981 T
 $A^{Z+} + B^{Z'+1}(nlm) \rightarrow A^{Z+}(n'l'm') + B^{Z+}$
Eikonal, OBK
20 - 200 keV/amu
- 81T21 Jakubassa-Amundsen,D.H.
Semiclassical impulse approximation for L-shell electron capture in asymmetric heavy ion collisions
J. Phys. B 14 2647-2656 1981 T
 $H^+ + B \rightarrow H + B^*(2l^+)$ (B = Ne, Ar)
semiclassical impulse approximation
50 - 4000 keV/amu
capture probability
- 81T22 Kimura,M. Thorson,W.R.
Direct and charge-exchange excitation processes in $H^+ - H(1s)$ collisions at 1 to 7 keV
Phys. Rev. A 24 1780-1792 1981 T
 $H^+ + H(1s) \rightarrow H(2s, 2p) + H^+$
MO with ETF
1 - 7 keV/amu
- 81T23 Kimura,M. Thorson,W.R.
Molecular-state study of $He^{2+} + H(1s)$ and $He^+ + He^+(1s)$ collisions
Phys. Rev. A 24 3019-3031 1981 T
 $He^{2+} + H(1s) \rightarrow He^+(total, 2l); H^+ + He^+(1s) \rightarrow H(1s; n=2)$
CC
0.25 - 5 keV/amu
- 81T24 Kubach,C. Stidis,V.
Theoretical study of near-resonant charge exchange collisions of H^+ with alkali atoms
Phys. Rev. A 23 110-118 1981 T
 $H^+ + B \rightarrow H^0(2s+2p)$ (B = Rb, K, Na)
CC
0.2 - 6 keV/amu
- 81T25 Ludde,H.J. Dreizler,R.M.
Direct and capture processes in proton-hydrogen scattering I. Pilot study for bombarding energies of 2 and 8 keV
J. Phys. B 14 2191-2201 1981 T
 $H^+ + H \rightarrow H(total, 2s, 2p) + H^+$
numerical solution of time-dependent Schroedinger equation
2 - 8 keV/amu
- 81T26 Macek,J. Taulbjerg,K.
Correction to Z_A/Z_B expansions for electron capture
Phys. Rev. Letters 46 170-174 1981 T
 $H^+ + Ar \rightarrow H^0 + Ar^+(1s^{-1})$
second Born approximation
2000 - 15000 keV/amu
- 81T27 Macias,A. Riera,A. Yonez,M.
Molecular treatment of $He^+ + H$ collisions
Phys. Rev. A 23 2941-2949 1981 T
 $He^+(1s) + H(1s) \rightarrow He(1s2p, ^1,3P)$
MO with IP
0.125 - 7.25 keV/amu
- 81T28 Mandal,C.R. Datta,S. Mukherjee,S.C.
Charge-transfer cross sections for collisions of fast Li^{3+} ions with atomic hydrogen
Phys. Rev. 24 3044-3050 1981 T
 $Li^{3+} + H \rightarrow Li^{2+}(1s, 2s, 2p, 3s, 3p, 3d) + H^+$
Coulomb-Born, Born
14.4 - 288 keV/amu

- 81T42 McGuire, J.H. Stolterfoht, N. Simony, P.R.
Screening and antiscreening by projectile electrons in high velocity atomic collisions.
Phys. Rev. A 24 97 1981 T
 $\text{He}^{2+} + \text{A}^{z+} \rightarrow \text{He}^{z+} + \text{A}^{z+} + \text{e}$ (A=He, Li, Be, C, F)
10 - 10⁴ keV/amu ; PWBA
- 81T29 Olson, R.E.
n, l distribution in A^{q+}
Phys. Rev. A 24 1726-1733 1981 T
 $Z^{q+} + \text{H} \rightarrow Z^{(q-1)+} + \text{H}^+$ (z = 1-20)
CTMC
50, 100 keV/amu
- 81T43 Olson, R.E. and B.Liu
Interactions of Cs⁺ with Cs⁺.
J. Phys. B 14 L279 1981 T
 $\text{Cs}^+ + \text{Cs}^+ \rightarrow \text{Cs}^+ + \text{Cs}^{2+} + \text{e}$
Molecular orbital energy level. Cross sections estimated. (MO)
- 81T30 Presnyakov, L.P. Uskov, D.B. Janev, R.K.
New analytic approach to the theory of charge exchange in atom-multiply charged ion collisions
Phys. Letters 84A 243-246 1981 T
 $\text{A}^{z+} + \text{H} \rightarrow \text{A}^{(z-1)+}(\text{nl}) + \text{H}^+$ (z = 5-15, 20, 30)
modified decay model
0.5 - 25 keV/amu
Analytic expression for l-distribution; q-oscillation; only total cross sections given.
- 81T31 Shimakura, N. Inoue, H. Koike, F. Watanabe, T.
Impact parameter treatment for Li⁺-Li collisions using molecular basis with electron translation factors
J. Phys. B 14 2203-2214 1981 T
 $\text{Li}^+ + \text{Li} \rightarrow \text{Li}(2s) + \text{Li}^+$
MO with ETF
0.015 - 0.14 keV/amu
differential in angle
- 81T32 Shipsey, E.J. Browne, J.C. Olson, R.E.
Electron capture and ionization in C³⁺, N³⁺, O³⁺ + H collisions
J. Phys. B 14 869-880 1981 T
C³⁺, N³⁺, O³⁺ + H → C²⁺, N²⁺, O²⁺ + H⁺
PSS (low velocities), CTMC (high velocities)
10⁻² - 10³ keV/amu
total cross sections
- 81T33 Sidis, V. Kubach, C. Fussen, D.
Developments in the H⁺ + H⁺ problem
Phys. Rev. Letters 47 1280-1284 1981 T
 $\text{H}^+ + \text{H}^+ \rightarrow \text{H}^0(\text{n}) + \text{H}^0$
IPM
0.02 - 10 keV/amu
- 81T34 Sidis, V. Kubach, C. Pommier, J.
Systematic theoretical investigation of charge exchange in He⁺ - alkali-atom collisions
Phys. Rev. A 23 119-126 1981 T
 $\text{He}^+ + \text{B} \rightarrow \text{H}(2s+2p)$ (B = Cs, Rb, K, Na)
CC
0.013-0.3 keV/amu
- 81T35 Simony, P.R. McGuire, J.H.
Exact second Born calculations of 1s-1s electron capture in p + H
J. Phys. B 14 L737-741 1981 T
 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(1s)$
second Born approximation
10000, 50000 keV/amu
angular differential cross section
- 82E 1 Beyer, H.F. Mann, R. Folkmann, F.
Electron capture by slow Ne⁸⁺ recoil ions
J. Phys. B 15 1083-1088 1982 E
Ne⁸⁺ + He, Ne, Ar, CH₄, Xe → Ne⁷⁺
Kα x-ray observation
recoil ion source ; recoil energy

- 82E 2 Bissinger,G. Joyce,J.M. Lapiokl,G. Laubert,R. Varghese,S.L.
Failure of cross section additivity for electron capture from hydrogen gases to bound states of hydrogen ions
Phys. Rev. Letters 49 318-322 1982 E
 $H^+ + B \rightarrow H^0$ (B = CH₄, C₂H₂, C₃H₆, C₄H₈)
growth
800 - 3000 keV/amu
- 82E 3 Bloemen,E. Dijkkamp,D. de Heer,F.J.
Production of excited projectile states in collisions of 25-800 keV Ne^{z+} (z=1,2,3,4) with He, Ne and Ar
J. Phys. B 15 1391-1413 1982 E
Ne^{z+} (z=1,2,3,4) + He, Ne, Ar → Ne^{(z-1)+} + He⁺, Ne⁺, Ar⁺
photon emission spectroscopy
1.24 - 39,6 keV/amu
- 82E 4 Brazuk,A. Winter,H.
Excitation by electron capture in collisions of ground state and metastable Ne²⁺ with Xe at 40 keV
J. Phys. B 15 2233-2244 1982 E
Ne²⁺ + Xe → Ne^(nl) + Xe⁺
photon emission spectroscopy
2.0 keV/amu
- 82E 5 Bruch,R. Dube,L.J. Trabert,E. Heckmann,P.H. Raith,B. Brand,K.
Electron capture to Rydberg states ; C⁺ in collisions with H₂
J. Phys. B 15 L857-862 1982 E
C⁺ + H₂, He → C^{+(nl)} + H₂⁺, He⁺
E : EUV ; T : TA, CDW, first and second Born
166 - 416 keV/amu
- 82E 6 Church,D.A. Holzschelter,H.M.
Charge transfer from atomic hydrogen to O²⁺ and O³⁺ ions with electron-volt energy
Phys. Rev. Letters 49 643-646 1982 E
O²⁺, O³⁺ + H → O⁺, O²⁺
trapping technique
10⁴ K
rate constant
- 82E 7 Dmitriev,I.S. Vorobiev,N.F. Zaikov,V.P. Kononova,Zh.M. Nikolaev,V.S.
Teplova,Ya.A. Fainberg,Yu.A.
Oscillations of the charge exchange cross sections and the average equilibrium charge of helium ions
J. Phys. B 15 L351-355 1982 E
He²⁺ + He, N₂, Ne, Ar → He⁺, He⁰ ; He⁰ : He⁺ + He, N₂, Ne, Ar → He⁰
growth
331 - 2070 keV/amu
- 82E 8 Dowek, D. Dhucq, D. Sidis, V. Barat, M.
Collision spectroscopy of the He, He⁺ - H₂(D₂) systems. A triatomic extension of the molecular-orbital-promotion model.
Phys. Rev. A 26 746-761 1982 E
He, He⁺ + H₂ →
translational energy spectroscopy
0.05 - 0.75 keV/amu
angular distribution. no absolute cross sections
- 82E 8 El-Sherbini,T.M. de Heer,F.J.
Projectile excitation in the collisions of Ar^{q+} (q=1, 2 and 3) with He and Ne
J. Phys. B 15 423-438 1982 E
Ar^{q+} + He, Ne → Ar^r, Ar² (q=1-3)
photon emission spectroscopy
0.375 - 10 keV/amu
- 82E 44 Forrest,R.A. Peart,B. Dolder,K.
Measurements of inelastic collisions between Ti⁺ ions.
J. Phys. B 15 L45 1982 E
Ti⁺ + Ti⁺ → Ti²⁺
33 - 92 keV (c.m.)
- 82E 9 Groh,W. Schlachter,A.S. Muller,A. Salzborn,E.
Transfer ionization in slow collisions of He²⁺ ions in rare gases
J. Phys. B 15 L207-212 1982 E
He²⁺ + A → He⁺ + A⁺ + (i-1)e
coincidence
1.88 - 8 keV/amu
charge fraction

- 82E10 Havener, C.C. Westerveld, W.B. Risley, J.S. Tolk, N.H. Tully, J.C.
Observation of a large electric dipole moment produced in electron transfer collisions of H⁺ on He
Phys. Rev. Letters 48 296-929 1982 E
H⁺ + He → H⁰(n=3) + H⁺
Balmer-alpha line observation
40 - 80 keV/amu
polarization as a function of electric field
- 82E11 Hegerberg, R. Elford, M.T. Skulterud, H.R.
The cross section for symmetric charge exchange of Ne⁺ in Ne at low energies
J. Phys. B 15 797-811 1982 E
A⁺ + A → A⁺ + A^{*} (A = Ne, Ar)
drift tube method
1x10⁻⁴ - 1.25x10⁻³ keV/amu
- 82E45 Hoffman, J.M. Miller, G.H. Lockwood, G.L.
Charge transfer of ground state C⁺, N⁺, and O⁺ in N₂ and H₂.
Phys. Rev. A 25 1930 1982 E
C⁺, N⁺, O⁺ + N₂, H₂ → 1-e capture
3-100 keV
- 82E46 Huber, B.A. Kahlert, H.J.
Total cross sections for electron capture by multiply charged ions in H, H₂ and He.
SFB Report 82-05-104 1982 E
compilation
- 82E47 Hvelplund, P. Andersen, A.
Electron capture by fast H⁺, He⁺ and He²⁺ ions in collisions with atomic and molecular hydrogen.
Phys. Scri. 26 375 1982 E
H⁺, He⁺, He²⁺ + H, H₂ →
0.25-2.75 MeV
- 82E12 Iwai, T. Kaneko, Y. Kimura, M. Kobayashi, N. Ohtani, S. Okuno, K. Takagi, S. Tawara, H. Tsurubuchi, S.
Cross sections for one-electron capture by highly stripped ions of B, C, N, O, F, Ne and S from He below 1 keV/amu
Phys. Rev. A 26 105-115 1982 E
A^{q+} + He → A^{(q-1)+} + He⁺ (A = B, C, N, O, F, Ne, S; q = 1-9)
growth
0.44 - 1.11 keV/amu
total cross section
- 82E13 Kadota, K. Dijkamp, D. van der Woude, R.L. de Boer, A. Yan, P.G. de Heer, F.J.
One-electron capture into excited states for He²⁺ - Li collisions in the energy range of 1.5 - 150 keV
J. Phys. B 15 3275-3296 1982 E
He²⁺ + Li → He⁺(nl) + Li⁺
photon emission spectroscopy
4 - 40 keV/amu
- 82E14 Kadota, K. Dijkamp, D. van der Woude, R. Yan, P.G. de Heer, F.J.
Absolute cross sections for one-electron capture into the excited projectile states in collisions between He²⁺ (15-150 keV) and Li atoms
Phys. Letters 88A 135-139 1982 E
He²⁺ + Li → He⁺(nl)
optical spectroscopy
3.75 - 37.5 keV/amu
- 82E15 Kambara, T. Aways, Y. Hitachi, A. Kase, M. Kohno, I. Tonuma, T.
X-ray from radiative electron capture induced by 110 MeV Ne ions
J. Phys. B 15 3759-3767 1982 E
Ne¹⁰⁺ + H₂, He, CH₄, N₂, O₂, Ne → Ne⁹⁺ + hv
x-ray spectroscopy
5500 keV/amu
- 82E16 Kamber, Y. Mathur, D. Hasted, J.B.
Energy loss spectra of single electron capture products from Ar²⁺ collisions with Ar, Kr, and Xe
J. Phys. B 15 2051-2059 1982 E
Ar²⁺ + B → Ar⁺(nl) (B = Ar, Kr, Xe)
energy loss spectroscopy
0.013 keV/amu
no cross sections

- 82E17 Katayama, I., Berg, G.P.A., Hurlimann, W., Martin, S.A., Meissburger, J., Oelert, W., Rogge, M., Romer, J.G.M., Tain, J., Styzien, B.
Charge transfer reactions of ^3He in carbon at 68, 99 and 130 MeV
Phys. Letters 92A 385-388 1982 E
 $^3\text{He}^{2+} + \text{C} \rightarrow \text{He}^+$
foil thickness dependence
22000 - 43000 keV/amu
- 82E48 Kim, H.J., Meyer, F.W.
Electron removal from $\text{H}^{\nu}(n)$ in fast collisions with multiply charged ions.
Phys. Rev. A 26 1310 1982 E
 $\text{N}^q, \text{O}^q, \text{Ar}^q$ ($q=1-5$) + $\text{H}(n=9-24) \rightarrow 1\text{-e capture}$
25 keV/amu
- 82E18 Kimura, M., Iwai, T., Kaneko, Y., Kobayashi, N., Matsumoto, A., Ohtani, S., Okuno, K., Takagi, S., Tawara, H., Tsubouchi, S.
The (n,l) distributions in electron capture reactions for C^{3+} , N^{4+} and O^{5+} ions colliding with He
J. Phys. B 15 L851-856 1982 E
 $\text{A}^q + \text{He} \rightarrow \text{A}^{(q-1)+} + \text{He}^+$ ($\text{A}^q = \text{C}^{3+}, \text{N}^{4+}, \text{O}^{5+}$)
energy-loss/-gain spectroscopy
 $2.5 \times 10^{-1} (\text{C}^{3+}), 2.85 \times 10^{-1} (\text{N}^{4+}), 3.12 \times 10^{-1} (\text{O}^{5+})$ keV/amu
- 82E43 Koizumi, T., Okuno, K., Kobayashi, N., Kaneko, Y.
Drift tube study symmetric resonance single- and double-charge transfer in $\text{Kr}^+ + \text{Kr}$, $\text{Xe}^+ + \text{Xe}$, $\text{Kr}^+ + \text{Kr}$ and $\text{Xe}^+ + \text{Xe}$ systems
J. Phys. Soc. Japan 51 2650 - 2656 1982 E
 $\text{A}^+ + \text{A} \rightarrow \text{A} + \text{A}^+$; $\text{A}^{2+} + \text{A} \rightarrow \text{A} + \text{A}^{2+}$ ($\text{A} = \text{Kr}, \text{Xe}$)
drift tube technique
 $1.25 \times 10^{-7} - 6 \times 10^{-4}$ (keV/amu)
- 82E19 Kusakabe, T., Hamaki, H., Nagai, N., Kuroda, K., Maeda, N., Sakisaka, M.
Ion-impact ion source applied to low energy charge-transfer collisions
Nucl. Instr. Meth. 198 577-581 1982 E
 $\text{He}^{2+} + \text{Ne} \rightarrow \text{He}^+, \text{He}^0$
growth
0.2 - 0.75 keV/amu
- 82E41 Mahan, B.H., Martner, C., Okeefe, A.
Laser-induced fluorescence studies of the charge transfer reactions of N_2^+ with Ar and N_2 .
J. Chem. Phys. 76 4433 - 4438 1982 E
 $\text{N}_2^+ + \text{Ar}, \text{N}_2 \rightarrow \text{N}_2$
trapped ion technique
 10^{-5} keV/amu
strong vibrational state dependence in N_2 targets but not in Ar targets
- 82E20 Mann, R., Cocke, C.L., Schlachter, A.S., Prior, M., Marrus, R.
Selective final-state population in electron capture by low-energy highly charged projectiles studied by energy-gain spectroscopy
Phys. Rev. Letters 49 1329-1332 1982 E
 $\text{Ne}^{9+}, \text{Ne}^{10+} + \text{He}, \text{Ne}, \text{Ar}, \text{Xe} \rightarrow \text{Ne}^{8+(n)}, \text{Ne}^{9+(n)}$
energy-gain spectroscopy
0.025- keV/amu
crossing radius ; n-distribution only
- 82E38 Marrus, R., Prior, M., Vane, C.R.
Electron capture by trapped, low-energy, multiply charged neon ions.
Nucl. Instr. Meth. 202 171-175 1982 E
 $\text{Ne}^{8+} (q = 3 - 10) + \text{Ne} \rightarrow \text{Ne}^{6+, 10+} + \text{Ne}^+$
trapped ion
thermal
- 82E21 Matsumoto, A., Ohtani, S., Iwai, T.
Experimental study of one-electron capture by ground and metastable Ar^{2+} ions from Na at 1.5 keV
J. Phys. B 15 1871-1881 1982 E
 $\text{Ar}^{2+} (\text{D}, \text{P}) + \text{Na} \rightarrow \text{Ar}^+ + \text{Na}^+$
optical attenuation method
 3.75×10^{-2} keV/amu
- 82E22 McCullough, R.W., Goffe, T.V., Shaha, M.B., Lennon, M.O., Gilbody, H.B.
Electron capture by He^{2+} and He^+ ions in lithium vapor
J. Phys. B 15 111-117 1982 E
 $\text{He}^{2+}, \text{He}^+ + \text{Li} \rightarrow \text{He}^+, \text{He}^0$
growth
1.7 - 200 keV/amu
total cross section

- 82E49 McCullough, R.W., Shah, M.B., Lemmon, M., Gilbody, H.B.
Electron loss by fast Li⁺ ions.
J. Phys. B 15 791 1982 E
Li⁺ + Ar, H₂, N₂, O₂ → Li, Li⁺, Li²⁺, Li³⁺
100-2400 keV
- 82E23 Miathe, K., Dreiseidler, T., Salzborn, E.
Charge transfer of hydrogen atoms in N₂ and in caesium vapor
J. Phys. B 15 3069-3084 1982 E
H + N₂, Cs → H⁺, H⁰
growth
0.1 - 5 keV/amu
scattering effect in cross sections (theta = 0.8, 2.6)
- 82E24 Murray, G.A., Stone, J., Mayo, M., Morgan, T.J.
Single and double electron transfer in He²⁺ + Li collisions
Phys. Rev. A 25 1805-1807 1982 E
He²⁺ + Li → He⁺, He⁰
total cross section
- 82E25 Nagata, T.
Attenuation cross sections for single electron capture of proton in collision with alkali-atom targets
Mass spectroscopy in Japan 30 153-161 1982 E
H⁺ + Cs, Rb, K, Na → H
attenuation method
0.3 - 5 keV/amu
- 82E50 Neil, P.A., Angel, G.C., Dunn, K.F., Gilbody, H.B.
Collisions between Cs⁺ ions - a further experimental study.
J. Phys. B 15 4219 1982 E
Cs⁺ + Cs⁺ → Cs²⁺
42 - 271 keV (c.m.)
- 82E51 Newman, J.H., Cogan, J.D., Ziegler, D.L., Nitz, D.E., Rundel, R.D., Smith, K.A., Stebbings, R.F.
Charge transfer in H⁺ - H and H⁺ - D collisions within the energy range 0.1-150 eV.
Phys. Rev. A 25 2976 1982 E
H⁺ + H, D → H
0.1-150 keV
- 82E39 Niki, H., Izawa, Y., Oiani, H., Yamanaka, C.
Charge exchange effect on laser isotope separation of atomic uranium (in Japanese).
Trans. Inst. Elec. Eng. 102C 45-51 1982 E
U⁺ + U → U + U⁺
4x10⁻⁴ keV/amu
- 82E26 Ontani, S., Kaneko, Y., Kimura, M., Kobayashi, N., Iwai, T., Matsumoto, A., Okuno, K., Takagi, S., Tawara, H., Tsurubuchi, S.
Observation of electron capture into selective state by fully stripped ions from He atom
J. Phys. B 15 1533-535 1982 E
C⁶⁺, O⁸⁺ + He → C⁵⁺(nl), O⁷⁺(nl) + He⁺
Energy-loss/gain spectroscopy
0.45 keV/amu
- 82E27 Panev, G.S.
Charge transfer in collisions of Mg⁺ ions with Ca atoms
Phys. Letters 91A 348-350 1982 E
Mg⁺ + Ca → Mg + Ca⁺
crossed beam
0.006 - 0.08 keV/amu
total cross section
- 82E28 Pedersen, E.H., Folkmann, F., Pedersen, N.H.
Differential cross sections for K-shell ionization and capture by H⁺ in C(CH₃) and Ne
J. Phys. B 15 739-762 1982 E
H⁺ + B → H + B⁺(1sⁿ) (B = C, Ne)
Auger electron coincidence
200 - 600 keV/amu (C), 500 - 1500 keV/amu (Ne)
impact parameter dependence
- 82E29 Pedersen, E.H., Pedersen, N.H.
Differential cross sections for K-shell ionization and capture in asymmetric collisions; scaling properties
J. Phys. B 15 2205-2220 1982 E
A⁺ + B → A⁽ⁿ⁻¹⁾⁺ + B^{+(1s)} (A = H, He, Li; B = C, Ne, Ar)
Auger electron coincidence
200 keV/amu (C), 500 keV/amu (Ne), 1700 keV/amu (Ar)
probability as a function of impact parameter

- 82E30 Pedersen, E.P., Loftager, P., Rasmussen, J.L.
Electron capture in close collisions between protons and carbon (CH_4)
J. Phys. B 15 4423-4436 1982 E
 $\text{H}^+ + \text{C} \rightarrow \text{H} + \text{C}^+(1s^{-1})$
Auger electron coincidence
200 - 2000 keV/amu
Impact parameter dependence
- 82E31 Rille, E., Winter, H.
State-selective and total one-electron capture in $\text{Ne}^{q+} - \text{Li}$ collisions ($q = 1, 2$; $E \leq 30$ keV) $\text{Ne}^{q+} + \text{Li} \rightarrow \text{Ne}^{q-1+}(3l, 4l)$ ($q=1,2$)
J. Phys. B 15 3489-3507 1982 E
photon spectroscopy
0.25 - 1.5 keV/amu (Ne^{2+} ; 1 - 3 keV/amu (Ne^{3+})
total and partial cross sections
- 82E32 Rille, E., Olson, R.E., Peacher, J.L., Blankenship, D.M., Kvale, T.J., Redd, E., Park, J.T.
Isotope effect in electron-capture differential cross sections at intermediate energies
Phys. Rev. Letters 49 1819-1821 1982 E
 $\text{H}^+, \text{D}^+ + \text{H}, \text{D} \rightarrow \text{H}^0, \text{D}^0$
E: growth with high temperature oven; T: CTMC
40 keV/amu
projectile dependence at small angles; no target isotope dependence; scaling law
- 82E33 Pedersen, E.P., Loftager, P., Rasmussen, J.L.
Electron capture in close collisions between protons and carbon (CH_4)
J. Phys. B 15 4423-4436 1982 E
 $\text{H}^+ + \text{C} \rightarrow \text{H} + \text{C}^+(1s^{-1})$
Auger electron coincidence
200 - 2000 keV/amu
Impact parameter dependence
- 82E34 Taitis, J.A., Bernstein, E.M., Graham, W.G., Clark, M., Shafroth, S.M., Johnson, B.M., Jones, K.W., Meron, M.
Resonant behavior in the projectile x-ray yield associated with electron capture in $\text{S} + \text{Ar}$ collisions
Phys. Rev. Letters 49 1325-1328 1982 E
 $\text{S}^{13+} + \text{Ar} \rightarrow \text{S}^{12+}$
coincidence with x-ray
2180 - 5000 keV/amu
- 82E35 Tawara, H., Richard, P., Kawatsura, K.
Radiative electron-capture processes in zero- and one-electron heavy ion collisions with He
Phys. Rev. A 26 154-161 1982 E
 $\text{F}^{8+}, \text{F}^{9+} + \text{He} \rightarrow \text{F}^{7+}, \text{F}^{8+} + \text{He}^+ + \text{h}\nu$
x-ray spectroscopy
789 - 2100 keV/amu
- 82E36 Tsurubuchi, S., Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Maizumi, A., Ohiani, S., Okuno, K., Takagi, S., Tawara, H.
Two-electron capture into autoionising states of $\text{N}^{3+}(3l3l')$ and $\text{O}^{3+}(1s3l3l')$ in collisions of N^{7+} and O^{7+} with He
J. Phys. B 15 L733-737 1982 E
 $\text{N}^{7+}, \text{O}^{7+} + \text{He} \rightarrow \text{N}^{3+}(3l, 3l'), \text{O}^{3+}(1s3l3l') + \text{He}^{2+}$
Energy-loss/gain spectroscopy
0.5 keV/amu (N^{7+}); 0.44 keV/amu (O^{7+})
- 82E37 Phaneuf, R.A., Alvarez, I., Meyer, F.W., Crandall, D.H.
Electron capture in low-energy collisions of C^{3+} and O^{6+} with H and H_2 .
Phys. Rev. A 26 1892 1982 E
 C^{3+} ($q=3,4,5,6$), O^{6+} ($q=2,3,4,5,6$) + $\text{H}, \text{H}_2 \rightarrow 1\text{-e capture}$
- 82E38 Piotrowski, Yo.A., Tolmachev, Yu.A., Kasyanenko, S.U.
Investigation of the non-resonant charge-exchange process in helium-mercury systems.
Opt. Spectrosc. (USSR) 52 452 - 453 1982 E
 $\text{He}^+ + \text{Hg} \rightarrow \text{He} + \text{Hg}^{m+}(7^2P_{3/2})$
after-glow method
rate coefficient at thermal energies
- 82E39 Richard, P., Pepmiller, P.L., Kawatsura, K.
Electron excitation and capture in F^{8+} plus Ne collisions
Phys. Rev. A 25 1937-1942 1982 E
 $\text{F}^{8+}(1s) + \text{Ne} \rightarrow \text{F}^{7+}$
x-ray spectroscopy
526 - 2100 keV/amu
- 82E40 Shah, M.B., Gilbody, H.B.
Ionization of H_2 by fast protons and multiply charged ions of He, Li, C, N and O.
J. Phys. B 15 3441 - 3453 1982 E
 $\text{H}^+, \text{He}^{2+}, \text{C}^{2+}, \text{C}^{3+}, \text{C}^{4+} + \text{H}_2 \rightarrow \text{H}, \text{He}^+, \text{C}^+, \text{C}^{2+}, \text{C}^{3+} + \text{H}^+ + \text{H}^+ + \text{e}$
projectile-recoil ion coincidence
16 - 160 keV/amu
- 82E41 disassociative and non-dissociative ionization cross sections for $\text{H}^+, \text{He}^{2+}, \text{Li}^+, \text{Li}^{2+}, \text{Li}^{3+}, \text{C}^{3+}$ ($q = 2, 3, 4$), N^{3+} ($q = 2, 3, 4, 5$), O^{3+} ($q = 2, 3, 4, 5$)
- 82E42 Tawara, H., Richard, P., Kawatsura, K.
Radiative electron-capture processes in zero- and one-electron heavy ion collisions with He
Phys. Rev. A 26 154-161 1982 E
 $\text{F}^{8+}, \text{F}^{9+} + \text{He} \rightarrow \text{F}^{7+}, \text{F}^{8+} + \text{He}^+ + \text{h}\nu$
x-ray spectroscopy
789 - 2100 keV/amu
- 82E43 Tsurubuchi, S., Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Maizumi, A., Ohiani, S., Okuno, K., Takagi, S., Tawara, H.
Two-electron capture into autoionising states of $\text{N}^{3+}(3l3l')$ and $\text{O}^{3+}(1s3l3l')$ in collisions of N^{7+} and O^{7+} with He
J. Phys. B 15 L733-737 1982 E
 $\text{N}^{7+}, \text{O}^{7+} + \text{He} \rightarrow \text{N}^{3+}(3l, 3l'), \text{O}^{3+}(1s3l3l') + \text{He}^{2+}$
Energy-loss/gain spectroscopy
0.5 keV/amu (N^{7+}); 0.44 keV/amu (O^{7+})

- 82T 1 Bienstock, S. Heil, T.G. Botcher, C. Dalgarno, A.
 Charge transfer of C^{3+} ions in atomic hydrogen
 Phys. Rev. A 25 2850-2852 1982 T
 $C^{3+} + H \rightarrow C^{2+}(2nl) + H^+$
 CC (MC)
 0.00083 - 0.416 keV/amu
- 82T 2 Botcher, C. Heil, T.G.
 Low-energy charge exchange from hydrogen atoms by few-electron ions
 Chem. Phys. Letters 86 506-509 1982 T
 $Be^{4+}, B^{3+}, C^{3+}, C^{2+}, B^{4+}, C^{3+}, C^{2+}, C^{3+} + H \rightarrow C^{3+}, C^{4+}$
 fully quantal FSS
 $1.0 \times 10^{-4} - 0.1$ keV/amu
 total cross section
- 82T 3 Bransden, B.H. Noble, C.J.
 Charge transfer in $Li^{3+} + H$ collisions
 J. Phys. B 15 451-455 1982 T
 $Li^{3+} + H \rightarrow Li^{2+}(nlm) + H^+$
 CC (8, 14, 20-AO)
 1.4 - 200 keV/amu
- 82T 4 Briggs, J.S. Greenland, P.T. Kocbach, L.
 Differential cross sections for high energy electron capture in the impulse
 approximation
 J. Phys. B 15 3085-3102 1982 T
 $H^+ + H, Ne \rightarrow H^0; Li^{3+} + Ne^9 \rightarrow Li^{2+}$
 impulse approximation
 10000 keV/amu (H) ; 20000 keV/amu (Li)
 angular differential cross sections
- 82T 5 Crothers, D.S.F. McCann, J.F.
 Continuum-distorted-wave capture into the n-th shell ; l, m distribution
 Phys. Letters 92A 170-174 1982 T
 $C^{6+} + H(1s) \rightarrow C^{3+}(nlm) + H^+$
 CDW
- 82T 6 Datta, S. Mandal, C.R. Mukherjee, S.C. Sil, N.C.
 Calculation of cross sections for electron capture by fast Li^{2+} ions from atomic
 hydrogen in the continuum distorted wave approximation
 Phys. Rev. A 26 2551-2566 1982 T
 $Li^{2+} + H \rightarrow Li^{2+}(1s, 2s, 2p, 3s, 3p, 3d)$
 CDW
 100 - 1500 keV/amu
- 82T 7 Eichenauer, D. Grun, N. Scheid, W.
 Classical trajectory calculations of the differential cross sections for charge transfer in
 $H^+ - H$ collisions
 J. Phys. B 15 L17-20 1982 T
 $H^+ + H(1s) \rightarrow H(1s)$
 CTMC
 25, 60 keV/amu
 angular differential cross sections
- 82T 9 Ermolaev, A.M. Miraglia, J.E. Bransden, B.H.
 Ionization and charge exchange in collisions between Li^+ ions at intermediate energies
 J. Phys. B 15 L677-680 1982 T
 $Li^+ + Li^+ \rightarrow Li^0 + Li^{2+}; Li^+ + Li^+ + e$
 first Born approximation
 5 - 1000 keV/amu
- 82T 38 Ermolaev, A.M. Noble, C.J. Bransden, B.H.
 Charge exchange between Cs^+ ions and related studies.
 J. Phys. B 15 457 1982 T
 $Cs^+ + Cs^+ \rightarrow Cs(6s, 6p, 5d) + Cs^+$; $E=300 - 5000$ keV (c.m.)
 $Li^+ + Li^+ \rightarrow Li(2s, 2p, 3s, 3p, 3d) + Li^{2+}$; $E=50 - 750$ keV (c.m.)
 $H^+ + Li^+ \rightarrow H(1s) + Li^{2+}$; $E=72 - 242$ keV (rel.) (TSAE)
- 82T 8 Ermolaev, A.M. Noble, C.J. Bransden, B.H.
 Charge exchange between Cs^+ ions and related studies
 J. Phys. B 15 457-470 1982 T
 $Cs^+ + Cs^+ \rightarrow Cs(5p^6, nl) + Cs^{2+}(5p^5) (nl=5d, 6s, 6p); Li^+ + Li^+ \rightarrow Li(1s^2, nl) + Li^{2+}$
 (n ≤ 3)
 two-state AO close-coupling
 4.5 - 75 keV/amu

- 82T136 Errea, L.F. Mendez, L. Riera, A.
On the choice of translation factors for approximate molecular wave functions.
J.Phys.B 15 101 - 110 1982 T
 $\text{He}^{2+} + \text{H}(1s) \rightarrow \text{H}^+(n=2) + \text{H}^+$
MO with translation factor
0.25 - 25 keV/amu
- 82T110 Ford, A.L. Reading, J.F. Becker, R.L.
Coupled-channel calculations of ionization and charge transfer in $\text{p}+\text{Li}^{2+}$ and transfer in $\text{Li}^{2+,3+} + \text{H}(1s)$
J. Phys. B 15 3257-3274 1982 T
 $\text{Li}^{2+}(1s) + \text{H}(1s) \rightarrow \text{Li}^+(1sn) + \text{H}^+(n \leq 3)$; $\text{Li}^{3+} + \text{H}(1s) \rightarrow \text{Li}^{2+}(nl) + \text{H}^+(n \leq 4)$
perturbed one-and-a-half center
70, 86 - 400 keV/amu
- 82T113 Fritsch, W.
Atomic orbital expansion description for slow ion-atom collisions ; a curved-line trajectory study
J. Phys. B 15 L389-392 1982 T
 $\text{C}^{6+} + \text{H} \rightarrow \text{C}^{5+}$
atomic expansion method
0.1 - 1.0 keV/amu
total cross section
- 82T111 Fritsch, W. Lin, C.D.
Excitation and charge transfer to 2s and 2p states in 1 - 20 keV $\text{H}^+ - \text{H}$ collisions
Phys. Rev. A 26 762-769 1982 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}(2s, 2p)$
AO
1 - 20 keV/amu
- 82T112 Fritsch, W. Lin, C.D.
Electron transfer in $\text{Li}^{3+} + \text{H}$ collisions at low and intermediate energies
J. Phys. B 15 L281-288 1982 T
 $\text{Li}^{3+} + \text{H} \rightarrow \text{Li}^{2+}(nl) + \text{H}^+(n \leq 3)$
AO close-coupling
0.2 - 20 keV/amu
- 82T114 Fritsch, W. Lin, C.D.
Close-coupling calculations for inelastic processes in intermediate energy ion-atom collisions
J. Phys. B 15 1255-1268 1982 T
 $\text{H}^+ + \text{A}^{(Z)+} \rightarrow \text{H} + \text{A}^{Z+}$ (A = H, He)
two-center atomic orbital expansion method
1.5 - 100 keV/amu
- 82T110 Fritsch, W. Lin, C.D.
Atomic expansions for describing charge transfer in slow ion-atom collisions
Phys. Scripta T3 241-243 1982 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}(2s) + \text{H}^+$; $\text{Li}^{3+}, \text{C}^{6+} + \text{H} \rightarrow \text{Li}^{2+}; \text{C}^{5+} + \text{H}^+$
atomic expansion method
0.1 - 100 keV/amu
total cross section
- 82T137 Gargaud, M. McCarrroll, R. Valion, P.
Charge transfer ionization of Si^+ by H^+ at thermal energies.
Astron.Astrophys. 106 197 - 200 1982 T
 $\text{Si}^+(\text{?P}) + \text{H}^+ \rightarrow \text{Si}^{2+}(\text{?S}) + \text{H}$; $\text{Si}^{2+} + \text{H} \rightarrow \text{Si}^+ + \text{H}^+$
MO
10 - 19^6 K
- 82T116 Green, T.A. Peek, J.M. Riley, M.E. Shipsey, E.J. Brown, J.C.
Electron capture cross section for $\text{C}^{6+} - \text{H}(1s)$ collisions at electron-volt energies: a test of the Landau-Zener formula
Phys. Rev. A 26 1278-1282 1982 T
 $\text{C}^{6+} + \text{H}(1s) \rightarrow \text{C}^{5+}$
Landau-Zener + close-coupling
 $3 \times 10^{-4} - 2 \times 10^{-2}$ keV/amu
total cross section
- 82T117 Green, T.A. Riley, M.E. Shipsey, E.J. Brown, J.C.
Semiclassical trajectory on $\text{C}^{6+} - \text{H}$ charge exchange cross sections at low energy
Phys. Rev. A 26 3668-3671 1982 T
 $\text{C}^{6+} + \text{H} \rightarrow \text{C}^{5+}$
semiclassical approximation
 $3 \times 10^{-3} - 1.3$ keV/amu
total cross section

- 82T15 Green, T.A., Shipsey, E.J., Brown, J.C.
Modified method of perturbed stationary states. IV. Electron capture cross sections for the reaction $C^{6+} + H(1s) \rightarrow C^{5+}(nl) + H^+$
Phys. Rev. A 25 1364-1373 1982 T
 $C^{6+} + H \rightarrow C^{5+}(nl) + H^+$
Close coupling PSS (MO) with variationally optimized ETF
 $1 \times 10^{-3} - 2.25 \text{ keV/amu}$
- 82T18 Ho, T.S., Eichler, J., Lieber, M., Chan, F.T.
Calculation of the differential cross section for electron capture in fast ion-atom collisions
Phys. Rev. A 25 1456-1461 1982 T
 $H^+ + H(1s) \rightarrow H(nlm) + H^+$
optical eikonal approximation
25 - 125 keV/amu
angular differential for $1s \rightarrow nlm$ capture
- 82T19 Ishihara, T., Tsuji, A.
Eikonal approximation for electron capture into partially stripped projectile ions
Phys. Rev. A 26 2987-2989 1982 T
 $A^{q+} (q=1,2) + H \rightarrow A^{(q-1)+}(nl) (A = Li, C)$
eikonal approximation
50 - 500 keV/amu
ratio to OBK
- 82T40 Janev, R.K., Belic, D.S.
Quasi-resonant charge exchange collisions between multiply charged ions.
J. Phys. B 15 3479 1982 T
 $C^{4+} + B^+ \rightarrow C^+ + B^{3+}; H^{6+} + O^+ \rightarrow He^+(1s) + O^+; N^{5+} + C^+ \rightarrow N^{4+} + C^+; C^{3+} + B^+ \rightarrow C^{2+}(2s2p) + B^{2+}; O^{4+} + N^{3+} \rightarrow O^{3+} + N^+; N^{4+} + C^+ \rightarrow N^{3+}(2s2p) + C^+; F^{6+} + O^+ \rightarrow F^{5+} + O^+; O^{5+} + N^+ \rightarrow O^{4+}(2s2p) + N^{4+}; Ne^{6+} + F^+ \rightarrow Ne^{5+} + F^{2+};$
0.1 - 100 keV (c.m.) ; RZD
- 82T21 Kimura, M., Olson, R.E., Pascale, J.
Molecular treatments of electron capture by protons from the ground and excited states of alkali-metal atoms
Phys. Rev. A 26 3113-3124 1982 T
 $H^+ + B \rightarrow H^0(\text{total}; 2s, 2p) (B = Na, K, Rb, Cs)$
MO
0.01 - 10.0 keV/amu
total, 2s, 2p cross sections
- 82T20 Kimura, M., Olson, R.E., Pascale, J.
Electron capture collisions of H^+ with ground-and excited state Na
Phys. Rev. A 26 1138-1141 1982 T
 $H^+ + Na(3s, 3p) \rightarrow H(2s, 2p)$
pseudo potential molecular-structure calculation with ETF
0.1 - 10 keV/amu
- 82T41 Lal, M., Srivastava, M.K., Tripathi, A.N.
Charge-transfer cross sections for particles colliding with hydrogenic ions.
Phys. Rev. A 26 305 1982 T
 $He^{2+} + A^{(z-1)+} \rightarrow He^+(1s, 2s, 2p) + A^{z+} (A=He, Li, Be, C, Fe)$
20 - 500000 keV ; CPB - scaling
- 82T22 Lin, C.D., Winter, T.G., Fritsch, W.
Three-center atomic expansion method for ion-atom collisions
Phys. Rev. A 25 2395-2398 1982 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
three-center atomic expansion
2 - 25 keV/amu
Charge transfer probability, no cross section except for 13.7, 9.90, 7.8, 3.03 Å at 2, 5, 10 and 25 keV, respectively.
- 82T23 Ludde, H.J., Dreizler, R.M.
Direct and capture processes in proton-hydrogen scattering. II. Total cross sections for bombarding energies of 1 to 50 keV
J. Phys. B 15 2703-2712 1982 T
 $H^+ + H(1s) \rightarrow H(nl) + H^+ (n \leq 3)$
pseudo-state close-coupling
1 - 50 keV/amu
- 82T39 Janev, R.K., Belic, D.S.
Double resonant charge exchange in ion-ion collisions.
Phys. Letters 89A 190 1982 T
 $A^{z+} + A^{(z-2)+} \rightarrow A^{(z-2)+} + A^z (A=Li, Be, B, C, N, O, F, Ne)$
threshold - 1 MeV ; IP ; scaling

- 82T24 Luedde, H.J., Dreizler, R.M.
Electron capture with He^{2+} , Li^{3+} , Be^{4+} and B^{5+} projectiles from atomic hydrogen
J. Phys. B 15 2713-2720 1982 T
 $\text{He}^{2+} + \text{H} \rightarrow \text{He}^{\nu}(\text{n}l) + \text{H}^+$ ($\text{n} \leq 3$); Li^{3+} , Be^{4+} , $\text{B}^{5+} + \text{H} \rightarrow \text{Li}^{2+}$, Be^{3+} , $\text{B}^{4+} + \text{H}^+$
pseudo-state close-coupling
2 - 50 keV/amu
- 82T25 Macek, J., Alston, S.
Theory of electron capture from a hydrogenlike ion by a bare ion
Phys. Rev. A 26 250-270 1982 T
 $\text{A}^{Z+} + \text{B}^{(Z-1)+} \rightarrow \text{A}^{(Z-1)+} + \text{B}^{Z+}$
strong potential Born approximation
- 82T26 Ohyama-Yamaguchi, T., Iikawa, Y.
Charge transfer in collisions of Li^{3+} and Be^{4+} ions with atomic hydrogen at low impact energy
J. Phys. Soc. Japan 51 2982-2988 1982 T
 Li^{3+} , $\text{Be}^{4+} + \text{H} \rightarrow \text{Li}^{2+}$, Be^{3+}
PSS
0.1 - 20 keV/amu
total cross section
- 82T27 Olson, R.E.
Electron capture and ionization in H^+ , He^{2+} + Li collisions
J. Phys. B 15 L163-167 1982 T
 H^+ , $\text{He}^{2+} + \text{Li} \rightarrow \text{H}^0$, He^+ , $(\text{He}^0) + \text{Li}^+$, (Li^{2+}) ; H^+ , $\text{He}^{2+} + \text{Li}^+ + \text{e}$
CTMC
50 - 400 keV/amu
- 82T28 Olson, R.E., Kimura, M.
Angular scattering in slow multiply charged ion atom collisions
J. Phys. B 15 4231-4238 1982 T
 $\text{C}^{6+} + \text{H} \rightarrow \text{C}^{5+}$
quantal
0.25 - 225 keV/amu
total cross section as a function of scattering angles
- 82T29 Reading, J.F., Ford, A.L., Becker, R.L.
One and a half centered calculations of ionization and charge transfer in H^+ + He^+ and He^{2+} + H collisions
J. Phys. B 15 625 1982 T
 $\text{He}^{2+} + \text{H}(1s) \rightarrow \text{He}^{\nu}(\text{n}l) + \text{H}^+$ ($\text{n} \leq 5$); $\text{H}^+ + \text{He}^{\nu}(1s, 2s, 2p) \rightarrow \text{H}(1s) + \text{He}^{2+}$
perturbed one-and-a-half-center
75.5 (He^{2+}); 20 - 400 (H^+) keV/amu
- 82T30 Rivaola, R.D., Miraglia, J.E.
Comparison between the continuum distorted-wave and the second Born-Kramers approximations at high energies electron capture
J. Phys. B 15 2221-2232 1982 T
 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(1s) + \text{H}^+$
CDW, second Born-Kramers approximations
10000, 50000 keV/amu
- 82T31 Ryufuku, H.
Ionization, excitation and charge transfer for impact of H^+ , Li^{3+} , B^{5+} , C^{6+} and Si^{14+} ions on atomic hydrogen
Phys. Rev. A 25 720-736 1982 T
 H^+ , Li^{3+} , B^{5+} , C^{6+} , $\text{Si}^{14+} + \text{H} \rightarrow \text{H}^0$, Li^{2+} , B^{4+} , C^{5+} , $\text{Si}^{13+} + \text{H}^+$
UDWA
0.01 - 5000 keV/amu
- 82T42 Maikagan, J.P., Piacentini, R.D., Rivaola, R.D.
Differential cross sections for one-electron two center symmetric systems.
Phys. Letters 88A 128 1982 T
 $\text{A}^{Z+} + \text{A}^{(Z-1)+} \rightarrow \text{A}^{(Z-1)+} + \text{A}^{Z+}$ ($\text{A}=\text{He, Li, C, Ne}$)
25 keV/amu; TSAE-VC
- 82T25 Moisewitsch, B.L.
Second Born approximation for electron capture at ultrahigh relativistic impact energies
J. Phys. B 15 3103-3110 1982 T
 $\text{A}^{Z+} + \text{B}^{(Z-1)+} \rightarrow \text{A}^{(Z-1)+}$
relativistic second Born approximation
asymptotic formula (E^{-1})

82T32 Salin, A.
Charge exchange in Li^{3+} - H collisions
Phys. Letters 91A 61-63 1982 T
 $\text{Li}^{3+} + \text{H} \rightarrow \text{Li}^{2+} + \text{H}^+$
OEEM
1.29 - 50 keV/amu
total cross section

82T33 Simony, P.R., McGuire, J.H., Eichler, J.
Exact second Born electron capture for p + He
Phys. Rev. A 26 1337-1343 1982 T
 $\text{H}^+ + \text{He}(1s^2) \rightarrow \text{H}(1s)$
second Born approximation
1000 - 100000 keV/amu
angular differential cross sections

82T45 Sinha, C., Guha, S., Roy, P.K., Sil, N.C.
Electron capture by protons passing through helium-like ions,
Phys. Rev. A 26 2586 1982 T
 $\text{H}^+ + \text{Li}^+ \rightarrow \text{H} + \text{Li}^{2+}$; $\text{He}^+ + \text{A}^{Z-2+} \rightarrow \text{H} + \text{A}^{Z-1+}$ (A=Be, B, C, O)
50 - 1000keV

82T44 Sinha, C., Guha, S., Sil, N.C.
Electron capture by protons in collisions with some alkali-like ions using a model potential approach,
J. Phys. B 15 1759 1982 T
 $\text{H}^+ + \text{A}^+ \rightarrow \text{H} + \text{A}^{2+}$ (A = Mg, Ca, Sr, Ba)
10 - 1000keV; CB

82T43 Sinha, C., Sil, N.C.
A modified Coulomb-Born approximation and charge transfer in proton-positive ion collisions,
Indian J. Pure and Appl. Phys. 20 26 1982 T
 $\text{H}^+ + \text{He}^+ \rightarrow \text{H} + \text{He}^+$, E=40 - 798 keV; $\text{H}^+ + \text{Li}^+ \rightarrow \text{H} + \text{Li}^+$, E=44 - 873 keV;
 $\text{H}^+ + \text{C}^+ \rightarrow \text{H} + \text{C}^+$, E=46 - 922 keV; $\text{H}^+ + \text{N}^+ \rightarrow \text{H} + \text{N}^+$, E=47 - 933 keV
MCB

82T34 West, B.W., Lane, N.F., Coben, J.S.
Radiative charge transfer in collisions of He^{2+} ions and ground state H atoms
Phys. Rev. A 26 3164-3169 1982 T
 $\text{He}^{2+} + \text{H}(1s) \rightarrow \text{He}^+(1s) + \text{H}^+ + h\nu$
optical potential method
 1×10^{-4} - 1 keV/amu

82T46 Winter, T.G.
Electron transfer in p - He^+ and He^{2+} - H collisions using Sturmian basis,
Phys. Rev. A 25 697 1982 T
 $\text{H}^+ + \text{He}^+ \rightarrow \text{H} + \text{He}^{2+}$
4 - 120 keV (e.m.); CC-S

83E 1 Afrosimov, V.V., Basalaev, A.A., Donets, E.D., Zinovev, A.N., Lozhkin, K.O., Panov, M.N.
Electron capture cross sections of nuclei and multiply charged ions at hydrogen atoms
JETP Letters 37 24-27 1983 E
 $\text{A}^{Z+}, \text{A}^{(Z-1)+}, \text{A}^{(Z-2)+} + \text{H} \rightarrow \text{A}^{(Z-1)+}, \text{A}^{(Z-2)+}, \text{A}^{(Z-3)+}$ (A = C, N, O, Ne)
growth
0.47 - 5.2 keV/amu

83E 2 Afrosimov, V.V., Donets, E.D., Zinovev, A.N., Ovechinnikov, S.Y., Panov, M.N.
Cross sections for characteristic x-ray emission in collisions of $\text{C}^{6+}, \text{N}^{6+}, \text{N}^{7+}$, and O^{8+} ions with hydrogen
JETP Letters 38 80-83 1983 E
 $\text{C}^{6+}, \text{N}^{6+}, \text{N}^{7+}, \text{O}^{8+} + \text{H} \rightarrow \text{C}^{5+}, \text{N}^{5+}, \text{N}^{6+}, \text{O}^{7+}$ (2p-1s; Σ (np-1s))
x-ray observation
0.47 - 7.5 keV/amu
oven (dissociation 85%)

83E 3 Baptist, R., Bliman, S., Bonnet, J.J., Chauvet, G., Dousson, S., Hitz, D., Jacquot, B., Knystautas, E.J.
Radiative decay of lithium-like ions following charge exchange collisions of 60 keV O^{6+} ions with H_2
Phys. Lett. 93A 185-188 1983 E
 $\text{O}^{6+} + \text{H}_2 \rightarrow \text{O}^{5+}(\text{nl}) + \text{H}_2^+$
photon emission spectroscopy
3.75 keV/amu
no cross sections given

83E 4 Bliman, S., Bonnefoy, M., Bonnet, J.J., Dousson, S., Fleury, A., Hitz, D., Jacquot, B.
Charge exchange collision experiments with highly charged ions - status report
Phys. Scripta T3 63-67 1983 E
 $A^{q+} + He \rightarrow A^{(q-1)+} (A = C, O, Ne); Ar^{q+} (q=3-16) + D_2 \rightarrow Ar^{(q-1)+}$
growth
2 - 5 keV/amu
ECR source; total cross section and x-ray production cross section

83E 5 Bliman, S., Bonnet, J.J., Chauvet, G., Dousson, S., Hitz, D., Jacquot, B., Knystautas, E.J.
Radiative decay of lithium-like ions following charge exchange collisions of 3 keV
amu⁻¹ C⁴⁺ ions with H₂
J. Phys. B 16 L243-245 1983 E
 $C^{4+} + H_2 \rightarrow C^{3+}(nl) + H_2^+$
photon emission spectroscopy
3.3 keV/amu

83E 6 Bliman, S., Hitz, D., Jacquot, B., Harel, C., Salin, A.
Charge exchange in the O⁸⁺ - He collisions at keV amu⁻¹ energies
J. Phys. B 16 2849-2860 1983 E
 $O^{8+} + He \rightarrow O^{7+}(n) + He^+, O^{6+}(n,n^+) + He^{2+}$
E: TOF; T: OEDM
0.9 - 5.3 keV/amu

83E 7 Chetoui, A., Wohrer, K., Rozet, J.P., Jolly, A., Stephan, C., Belkic, Dz., Gayet, A.,
Salin, A.
State-to-state charge exchange cross sections in high-velocity asymmetric and near-
symmetric collisions of 400 MeV Fe⁶⁺ ions
J. Phys. B 16 3993-4003 1983 E
 $Fe^{26+} + B \rightarrow Fe^{25+}(nl) + B^+(1s^{-1}) (B = He, N, Ar)$
E: x-ray spectroscopy, T: continuum-distorted wave, strong-potential Born, impulse
7000 keV/amu
x-ray (1s \rightarrow np, nd)

83E 8 Church, D.A., Kenefick, R.A., Burns, W.S., Holmes, C.S.O.R., Hultdt, S., Berry, S.,
Breinig, M., Elston, S., Rozet, J.P., Sellin, I.A., Taylor, D., Thomas, B.
Charge transfer to multicharged recoil ions in a Penning trap
Phys. Rev. Letters 51 1636-1639 1983 E
 $Ne^{6+} + Ne \rightarrow Ne^{(q-1)+} (q=2-6)$
trapping method
 $q \times 10^{-4}$ keV/amu
rate coefficients

83E 9 Cocks, C.L., Gray, T.J., Justiniano, E., Can, C., Waggoner, B., Varghese, S.L., Mann, R.
Electron capture collisions involving low-energy highly stripped projectiles
Phys. Scripta T3 75-78 1983 E
 $Ar^{q+} + He \rightarrow Ar^{(q-1)+} (q=3-6); Ne^{q+} (q=2-8) + He \rightarrow Ne^{(q-1)+}, Ne^{(q-2)+}; Ar^{q+} (q=2-10) +$
 $Li \rightarrow Ar^{(q-1)+}$
growth, energy gain spectroscopy
0.006 - 0.075 keV/amu
recoil ion; total cross section; n-distribution for Ne⁶⁺ + Xe

83E10 Darnsgaard, H., Hängen, H.K., Hvelplund, P., Knudsen, H.
Coincidence measurements of electron capture and target ionization in multiply
charged Ar^{q+} + (He, Ne) collisions
Phys. Rev. A 27 112-116 1983 E
 $Au^{q+} (q=5-21) + He, Ne \rightarrow Au^{(q-1)+}, Au^{(q-2)+} + He^{r+} (r=1,2), Ne^{r+} (r=1-6)$
coincidence
100 keV/amu

83E11 Dijkkamp, D., Brazuk, A., Drenje, A.G. de Heer, F.J., Winter, H.
State-selective single-electron capture by 80 keV C⁴⁺ ions from He, H₂ and Li
J. Phys. B 16 L343-346 1983 E
 $C^{4+} + He, H_2, Li \rightarrow C^{3+}(nl) + He^+, H_2^+, Li^+$
photon emission spectroscopy
6.66 keV/amu

83E56 Fussen, D., W. Claeys, A., Cornet, J., Jureta and P. Defrance
Absolute total cross section measurement of ion pair production in H(1s)-H(2s)
collisions.
J. Phys. B 15 L715 1983 E
 $H(1s) + H(2s) \rightarrow H^+ + H$

83E12 Gordeev, Yu.S., Dijkkamp, D., Drenje, A.G. de Heer, F.J.
Electron capture into different (n,l) states in slow collisions of C⁶⁺, N⁶⁺, O⁶⁺ and Ne⁶⁺
projectiles on He and H₂ targets
Phys. Rev. Letters 50 1842-1845 1983 E
 $C^{6+}, N^{6+}, O^{6+}, Ne^{6+} + He \rightarrow C^{5+}(nl), N^{5+}(nl), O^{5+}(nl), Ne^{5+}(nl) + He^+; N^{6+}, O^{6+} +$
 $H_2 \rightarrow N^{5+}(nl), O^{5+}(nl) + H_2^+$
photon emission spectroscopy
0.56 - 6.25 keV/amu

- 83E13 Groh, W., Müller, A., Schlachter, A.S., Salzborn, E.,
Transfer ionization in slow collisions of multiply charged ions with atoms
J. Phys. B 16 1997-2015 1983 E
 $A^{q+} + B \rightarrow A^{(q+k)+} + B^+ + (i-k)e$ (A=Ne(q=1-7); Ar(q=1-9); Kr(q=1-12); Xe(q=1-15))
coincidence
(3-5)xq keV
contribution of transfer ionization; charge fraction
- 83E14 Hall, J., Richard, P., Gray, T.J., Newcomb, J., Perriller, P., Lin, C.D., Jones, K.,
Johnson, B., Gregory, D.,
Systematics of single and double K-shell vacancy production in titanium bombarded by heavy ions
Phys. Rev. A 28 99-110 1983 E
 $A^{z+} + Ti \rightarrow A^{(z-1)+}(1s) + Ti^+(1s^{-1})$; $A^{(z-2)+}(1s^2) + Ti^{2+}(1s^{-2})$ (A = C, N, O, F, Mg, Si, S, Cl)
x-ray measurements
500 - 6500 keV/amu
- 83E15 Hanaki, H., Kusakabe, T., Nagai, N., Sakisaka, M.,
Electron capture of He^{2+} from gas target atoms at round a few keV
J. Phys. Soc. Japan 52 424-430 1983 E
 $He^{2+} + A \rightarrow He^+ + He^0$ (A = Ne, Ar, Kr, Xe, N_2)
growth method
0.175 - 1.125 keV/amu
recoil ion source
- 83E17 Huber, B.A.,
Energy gain and loss spectroscopy of charged changing collisions between multiply charged ions and neutrals
Phys. Scripta T3 96-100 1983 E
 $A^{q+} + B \rightarrow A^{(q-1)+}$ (A = Ne, Ar, Kr, Xe; B = H_2 , He, Ar, Xe; q=2-6)
growth, energy gain spectroscopy
0.25 keV/amu
cross section vs. crossing radius
- 83E57 Huber, B.A., Bumbel, A., Wiesemann, K.,
A high-density effusive target of atomic hydrogen.
J. Phys. E 16 145 1983 E
 $Kr^{n+} + H, H_1 \rightarrow 1-e$ capture; $Kr^{n+} + H \rightarrow 1-e$ capture
1-5 keV
- 83E16 Huber, B.A., Kahlert, H.J.,
State-selective electron capture by $Ar^{2+}(^3P, ^1D, ^1S)$ ions in He, Ne and Kr
J. Phys. B 16 4655-4669 1983 E
 $Ar^{2+} + He, Ne, Ar \rightarrow Ar^+$
translational energy spectroscopy
0.015 keV/amu
metastable beam fraction determined through beam attenuation
- 83E54 Hug, M.S., Doverspike, L.D., Champion, R.L.,
Electron detachment for collisions of H and D with hydrogen molecules.
Phys. Rev. A 27 2831-2839 1983 E
 $H, D + H_2 \rightarrow H, D$
parallel plate technique
threshold - 0.2 keV/amu
- 83E18 Hvelplund, P., Samsøe, E., Andersen, L.H., Haugen, H.G., Knudsen, H.,
Population of n,l states in electron-capture collisions between highly charged, medium-velocity ions and H_2
Physica Scripta T3 176-181 1983 E
 $Au^{q+} + H_2 \rightarrow Au^{(q-1)+}(n) + H_2^+$ (1.2 ≤ q ≤ 18)
photon emission spectroscopy
100 keV/amu
- 83E19 Johnsen, R.,
Spectroscopic observations of the radiative charge transfer and association of helium ions with neon atoms at thermal energy
Phys. Rev. A 28 1460-1468 1983 E
 $He^+ + Ne \rightarrow He + Ne^+ + hv$
selected ion drift tube technique
 3×10^{-5} keV/amu
rate coefficient
- 83E20 Kahlert, H.J., Huber, B.A., Wiesemann, K.,
Charge exchange and transfer ionisation in low-energy $Ne^{2+} - Xe$ collisions
J. Phys. B 16 449-459 1983 E
 $Ne^{2+} + Xe \rightarrow Ne^+ + Xe^+$; $Ne^+ + Xe^{2+} + e$
energy-loss/-gain spectroscopy
 10^{-2} keV/amu

- 83E21 Kamber, E. Y. Hasted, J. B.
Single electron capture by Ar^{2+} and Ar^{3+} ions impacting helium
J. Phys. B 16 3025-3035 1983 E
 $Ar^{2+}, Ar^{3+} + He \rightarrow Ar^+, Ar^{2+}(nl) + He^+ + \Delta E$
energy loss spectroscopy
0.0135, 0.03 keV/amu
energy loss spectra
- 83E22 Knudsen, H. Hvelplund, P. Andersen, L. H. Bjornelund, S.
Experimental investigation of electron capture by highly charged ions of medium velocities
Phys. Scripta T3 101-109 1983 E
general analysis
- 83E23 Kuen, I. Stori, H. Howorka, F.
Measurement of direct and charge exchange excitation cross sections in collisions of 1 - 800 eV (laboratory frame) He^+, Ne^+, Ar^+, Kr^+ and B^+ ions and of 1 - 3600 eV He^{2+}, Ne^{2+} , and Ar^{2+} ions with O_2 (wavelength region 2000 - 8000 Å)
Phys. Rev. A 28 119-126 1983 E
 $A^+ + O_2 \rightarrow A^0 (A = He, Ne, Ar, Kr, B); A^{2+} + O_2 \rightarrow A^+ (A = He, Ne, Ar)$
photon-spectroscopy
 $1.2 \times 10^{-5} - 0.45$ keV/amu (A^+); $1.2 \times 10^{-3} - 0.9$ keV/amu (A^{2+})
emission cross sections
- 83E24 Kusakabe, T. Hanaki, H. Nagai, N. Horiuchi, T. Konomi, I. Sakisaka, M.
Charge transfer cross sections for multiply charged slow Ne, Ar, Kr and Xe ions on various gas targets I. rare gas targets
Mem. Fac. Eng. Kyoto Univ. 45 35-49 1983 E
Kr and Xe ions on various gas targets I. rare gas targets $A^{q+} + B \rightarrow A^{(q-k)+} + B^{k+} (A = Ne, Ar, Kr, Xe; q=2-11; B = He, Ne, Ar, Kr, Xe; k=1-5)$
growth
0.15 - 3 keV/amu
- 83E26 Kusakabe, T. Hanaki, H. Nagai, N. Horiuchi, T. Sakisaka, M.
q-dependence of electron capture cross sections for slow Kr^{q+} and Xe^{q+} ions on H_2 and He
Phys. Scripta T3 191-193 1983 E
 $Kr^{q+} (q=2-9), Xe^{q+} (q=2-10) + H_2, He \rightarrow Kr^{(q-k)+}, Xe^{(q-k)+} (k=1-2)$
growth
0.29 keV/amu
total cross section
- 83E25 Kusakabe, T. Nagai, N. Hanaki, H. Horiuchi, T. Sakisaka, M.
Charge transfer cross sections for slow Ne^{q+} ions on He and H_2
J. Phys. Soc. Japan 52 4122-4128 1983 E
 $Ne^{q+} + B \rightarrow Ne^{(q-k)+} + B^{k+} (q=2-5; B = He, H_2; k=1-2)$
growth
0.15 - 3 keV/amu
- 83E27 Lennon, M. McCullough, R. W. Gilbody, H. B.
State-selective electron capture by C^{2+}, C^{3+}, N^{2+} and Ar^{2+} ions in rare gases
J. Phys. B 16 2191-2204 1983 E
 $C^{2+} + He, Ne, Ar \rightarrow C^+; N^{2+} + He, Ne \rightarrow N^+; Ar^{2+} + He, Ne \rightarrow Ar^+; C^{3+} + He \rightarrow C^{2+}$
energy-loss/-gain spectroscopy
 $0.13 - 5 (C^{2+}); 5.7 \times 10^{-2} - 0.57 (N^{2+}); 3.5 \times 10^{-3} - 0.125 (Ar^{2+}); 0.25 - 1.5 (C^{3+})$
- 83E28 Lindinger, W.
Reactions of doubly charged ions at near thermal energies
Phys. Scripta T3 115-119 1983 E
 $A^{2+} + B \rightarrow A^+ (A = He, C, O, Ne, Mg, Ar, Ca, Kr; B = He, Ne, Ar, Kr, Xe, Hg, H_2, N_2, O_2, NO, CO_2, SO_2, NO_2, NH_3, CH_4, C_2H_2)$
swarm method
thermal energy
rate coefficient - crossing radius
- 83E30 Matsumoto, A. Iwai, T. Kaneko, Y. Kimura, M. Kobayashi, N. Ohtani, S. Okuni, K. Takagi, S. Tawara, H. Tsurubuchi, S.
Measurement of relative population between $B^{2+}(2s)$ and $B^{2+}(2p)$ in electron capture collision of B^{3+} with He
J. Phys. Soc. Japan 52 3291-3293 1983 E
 $B^{3+} + He \rightarrow B^{2+}(2s, 2p)$
energy-gain spectroscopy
0.09 - 0.3 keV/amu
relative value
- 83E29 Matsumoto, A. Sano, T. Twai, T.
Observation of N_2^+ 3914 Å band emission in collisions of singly- and doubly-charged Ar, Kr and Xe ions with N_2 at keV energies
J. Phys. Soc. Japan 52 1173-1177 1983 E
 $A^{q+} + N_2 \rightarrow A^{(q-1)+} + N_2^+ (B = 2Ar^+ (A = Ar, Kr, Xe, q=1,2))$
optical spectroscopy
0.03 - 0.2 keV/amu
relative emission cross section

- 83E31 Mayo, M. Stone, J.A. Morgan, T.J.
Charge changing cross sections for 1 - 70 keV H⁺ and H⁰ in collisions with calcium and strontium metal vapors
Phys. Rev. A 28 1315-1321 1983 E
H⁺(H⁰) + Ca, Sr → H⁰, H⁺ (H⁺, H)
growth
1 - 70 keV/amu
- 83E32 McCullough, R.W. Lennon, M. Wilkie, F.G. Gilbody, H.B.
State-selective electron capture by N²⁺ ions in atomic hydrogen using collision spectroscopy
J. Phys. B 16 L173-176 1983 E
N²⁺ + H → N⁺(2s2p) 3p⁰, 3D⁰ + H⁺
energy-loss/-gain
0.57 keV/amu
- 83E33 Mikoushkin, V.M. Ogursov, G.N. Flaks, I.P.
Autoionisation in quasimolecular system formed in multiply charged ion-atoms collisions
J. Phys. B 16 L405-408 1983 E
He⁺, He²⁺, Ne⁸⁺, Ar¹⁶⁺ + Xe → He, He⁺, Ne⁽ⁿ⁻¹⁾⁺, Ar⁽ⁿ⁻¹⁾⁺ + Xe²⁺ + e (n=1,2,3)
electron emission spectroscopy
1.25 - 7.5 (He⁺, He²⁺), 0.25 - 1.5 (Ne⁸⁺), 0.125 - 0.75 (Ar¹⁶⁺) keV/amu
- 83E34 Muller, A. Groh, W. Salzborn, E.
Statistical interpretation of transfer ionization in slow collisions of multiply charged ions with atoms
Phys. Rev. Letters 51 107-109 1983 E
Xe⁸⁺ + Xe → Xe^(q+) + Xe^{q+} + (k-i)e (q=3-15)
statistical model for transfer ionization and multiple-ionization
- 83E35 Neil, P.A. Angel, G.C. Dunn, K.F. Gilbody, H.B.
Charge transfer and ionization in H⁺ - C⁺ and H⁺ - N⁺ collisions
J. Phys. B 16 2185-2190 1983 E
H⁺ + C⁺, N⁺ → H⁰ + C²⁺, N²⁺
crossed beam technique
65 - 470 keV/amu
- 83E36 Ohtani, S.
Recent activities at NICE Nagoya
Phys. Scripta T3 110-114 1983 E
A^{q+} + He → A^{(q-1)+}(n) + He⁺ (A=C, N, O; q=3-8)
energy gain spectroscopy
1xq/M (keV/amu)
total cross section vs. crossing radius
- 83E37 Okuno, K. Tawara, H. Iwal, T. Kaneko, Y. Kimura, M. Kobayashi, N. Matsumoto, A. Ohtani, S. Takagi, S. Tsurubuchi, S.
Energy-spectroscopic studies of electron-capture processes by low-energy, highly stripped C, N, and O ions from He
Phys. Rev. A 28 127-134 1983 E
C⁴⁺, C³⁺, N⁵⁺, N⁶⁺, O⁶⁺ + He → (single and double) electron transfer
energy-loss/-gain spectroscopy
0.33, 0.66 (C⁴⁺); 0.41, 0.82 (C³⁺); 0.36, 0.72 (N⁵⁺); 0.43, 0.86 (N⁶⁺); 0.37, n-distribution; no cross sections
- 83E38 Panov, M.N. Basalava, A.A. Lozhkin, K.O.
Interaction of fully stripped, hydrogenlike and heliumlike C, N, O, Ne and Ar ion with H and He atoms and H₂ molecules
Phys. Scripta T3 124-130 1983 E
Ar^{q+}(q=3-7) + He → Ar^{(q-1)+}(nl) + He⁺
photon emission spectroscopy
0.6 - 8 keV/amu
- 83E39 Peart, B. Rinn, K. Dolder, K.
Measurements of cross sections for inelastic collisions between He⁺ ions
J. Phys. B 16 2831-2835 1983 E
He⁺ + He⁺ → He⁰ + He²⁺; He⁺ + He²⁺ + e
crossed beam
7 - 29 keV/amu
- 83E58 Peart, B. Rinn, K. Dolder, K.
Measurements of charge transfer and He²⁺ production in collisions between protons and He⁺ ions.
J. Phys. B 16 1461 1983 E
H⁺ + He⁺ → H + He²⁺; He²⁺
14 - 67 keV (c.m.)

- 83E41 Pedersen, E.H., Cocke, C.L., Rasmussen, J.L., Varghese, S.L., Waggoner, W.
Capture of Ar K-shell electrons by protons
J. Phys. B 16 1799-1804 1983 E
 $H^+ + Ar \rightarrow H + Ar^+(1s^{-1})$
x-ray coincidence
1500 - 10000 keV/amu
impact parameter dependence
- 83E42 Pedersen, E.H., Cocke, C.L., Stockli, M.
Experimental observation of the Thomas peak in high velocity electron capture by protons from He
Phys. Rev. Letters 50 1910-1913 1983 E
 $H^+ + He \rightarrow H^0$
2820 - 7400 keV/amu
angular distributions in Thomas peak
- 83E43 Phaneuf, R.A.
Electron capture by slow Fe^{2+} ions from hydrogen atoms and molecules
Phys. Rev. A 28 1310-1314 1983 E
 $Fe^{2+}(q=3-14) + H, H_2 \rightarrow Fe^{(q-1)+}$
growth
0.01 - 0.095 keV/amu
total cross sections
- 83E44 Prior, M.H., Marrus, R., Vane, C.R.
Electron capture by trapped Ne^{6+} ions at very low energies
Phys. Rev. A 26 141-150 1983 E
 $Ne^{6+}(q=1-10) + Ne, Xe \rightarrow Ne^{(q-1)+}$
trapping beam technique
 $5 \times 10^{-5} - 3.5 \times 10^{-3}$ keV/amu
trapped recoil ion
- 83E45 Saksaka, M., Hanaki, H., Nagai, N., Horiuchi, T., Konomi, I., Kusakabe, T.
A statistical model for collisions of multiple electron transfer
J. Phys. Soc. Japan 52 716-717 1983 E
 $Kr^{q+}(q=2-9) + Kr \rightarrow Kr^{(q-2)+} + Kr^{i+}$ ($i=1-5$)
0.29 keV/amu
multiple electron transfer
- 83E46 Schuessler, H.A., Holder, C.H., Sing, O.
Orbiting charge transfer cross sections between He^+ ions and cesium atoms at near-thermal ion-atom energies
Phys. Rev. A 28 1817-1820 1983 E
 $He^+ + Cs \rightarrow He(1s^2, 1s2s, 1s2p)$
trapped technique
 $3.9 \times 10^{-5} - 2.4 \times 10^{-4}$ keV/amu
- 83E47 Shields, G.C., Moran, T.F.
Single- and double-electron transfer reactions of ground and metastable state Ar^{2+} ions
J. Phys. B 16 3591-3601 1983 E
 $Ar^{2+} + B \rightarrow Ar^+, Ar^0$ ($B = O_2, N_2, CO, CO_2, CH_4, C_2H_6$)
TOF
0.1 - 0.175 keV/amu
total cross section
- 83E48 Schlachter, A., Stearns, J.W., Graham, W.G., Berkner, K.H., Pyle, R.V., Tanis, J.A.
Electron capture for fast highly charged ions in gas targets; an empirical scaling rule
Phys. Rev. A 27 3372-3374 1983 E
300 - 8500 keV/amu
total cross section; scaling law
- 83E49 Rudd, M.E., DuBois, R.D., Toburen, L.H., Ratcliffe, C.A., Goffe, T.V.
Cross sections for ionization of gases by 5 - 4000 keV protons and for electron capture by 5 - 150 keV protons
Phys. Rev. A 28 3244-3257 1983 E
 $H^+ + B \rightarrow H^0$ ($B = He, Ne, Ar, Kr, H_2, N_2, CO, O_2, CH_4, CO_2$)
condenser plate method
5 - 150 keV/amu
- 83E50 Shah, M.B., Gillbody, H.B.
Crossed-beam coincidence studies of ionization and electron capture in collisions of multiply charged ions with hydrogen atoms.
J. Phys. B 16 4395 - 4403 1983 E
 $Ar^{q+} + H \rightarrow Ar^{(q-1)+} + H^+$ ($q = 3, 4, 5, 6$)
projectile-recoil ion coincidence
3.5 - 100 keV/amu
ionization cross sections also given for C^{3+} ($q = 2, 3, 4, 5, 6$), O^{7+} ($q = 2, 3, 4, 5, 6$), Ar^{4+} ($q = 3, 4, 5, 6, 7, 8, 9$) + H ($E = 10 - 400$ keV/amu)

- 83E49 Stevens, J. Petersen, R.S. Pollack, E.
Electron capture in small-angle $Ar^{2+} + Ar$ collisions
Phys. Rev. A 27 2396-2402 1983 E
 $Ar^{2+} + Ar \rightarrow Ar^+(2p) + Ar^+(3s^2 3p^4 nl)$
energy loss/gain spectroscopy
0.0725 keV/amu
scattering angle 0-1; relative cross section
- 83E52 Winter, H.
Empirical state-selection rules for electron capture in low energy-ion-atom collisions
Phys. Scripta T3 159-162 1983 E
 $Ne^+, Ne^{2+}, O^+ + Li \rightarrow Ne(nl), Ne^+(nl), O(nl) + Li^+$
energy-loss/gain spectroscopy
7 - 25 keV/amu
- 83E53 Yan, P.G. van der Woude, R. Dijkkamp, D. de Heer, F.J.
Electron capture into excited states in collisions between multiply charged ions and atoms
Phys. Scripta T3 120-123 1983 E
 $He^{2+}, C^{3+}, O^{4+}(q=1,2,3) + Li \rightarrow He^+, C^{(q-1)+}, O^{(q-1)+}(nl); C^{3+}, O^{4+} + H_2 \rightarrow C^{(q-1)+}, O^{(q-1)+}(nl)$
photon emission spectroscopy
1 - 37.5 keV/amu
- 83T 1 Allan, R.J. Dickinson, A.S. McCarroll, R.
Molecular treatment of charge exchange in $H^+ + Li$ collisions
J. Phys. B 16 467-480 1983 T
 $H^+ + Li \rightarrow H(n=2)$
PSS
0.03 - 15 keV/amu
- 83T37 Alston, S.
Theory of electron capture from a hydrogen-like ions by a bare ion; intermediate-state contributors to the amplitude
Phys. Rev. A 27 2342-2357 1983 T
 $H^+ + B \rightarrow H + B^+$ (B = C, Ne, Ar)
strong potential Born approximation
100 - 20000 keV/amu
- 83T 2 Barany, A. Brandas, E. Elander, N. Rittby, M.
Resonances in low energy charge transfer between multiply charged ions and neutral atoms described with dilated Titchmarsh-Weyle theory
Phys. Scripta T3 233-235 1983 T
Titchmarsh-Weyle theory
quasi-molecule with polarization force; no cross sections given
- 83E50 Takagi, S. Ohtani, S. Kadota, K. Fujita, J.
Collision experiment on highly ionized ions using vacuum spark source.
Nucl. Instr. Meth. 213 539 1983 E
 $Fe^{6+} + H_p, Ar \rightarrow Fe^{5+}$
2.5-10 keV
- 83E50 Takagi, S. Ohtani, S. Kadota, K. J. Fujita, J.
Cross sections for one-electron capture by highly stripped ions of Be, B and C from H_2 and Ar below 10 keV.
J. Phys. Soc. Japan 52 3759 1983 E
 $Be^{9,10,11+}, B^{8,9,10+} + H_p, Ar \rightarrow 1-e$ capture
 $C^{7,8,9,10,11+} + Ar \rightarrow 1-e$ capture
2-10 keV
- 83E50 Terasawa, M. Gray, T.J. Hagmann, S. Hall, J. Newcomb, J. Pempiller, P. Richard, P.
Electron capture by and electron excitation of two-electron fluorine ions incident on helium
Phys. Rev. A 27 2868-2875 1983 E
 $F^{7+}(1s2s^3S) + He \rightarrow F^{6+}(1s2s2p^4p)$
x-ray spectroscopy
315 - 2100 keV/amu
total cross section
- 83E51 Winter, H.
Comments on n radiative decay of lithium-like ions following exchange collisions of 3 keV/amu C^{3+} with H_2^n
J. Phys. B 16 L521-523 1983 E
 $C^{4+} + H_2 \rightarrow C^{3+}(nl)$
VUV photon spectroscopy
3 keV/amu

- 83T 3
 Bienstock, S. Heil, T.G. Dalgarno, A.
 Charge transfer of O^{3+} ions in collisions with atomic hydrogen
 Phys. Rev. A 27 2741-2743 1983 T
 $O^{3+} + H \rightarrow O^{2+} + H^+$
 CC (MO)
 0.000006 - 0.312 keV/amu
- 83T 6
 Devi, K.R.S. Garcia, J.D.
 $He^{2+} + He$ collisions in time-dependent Hartree-Fock theory
 J. Phys. B 16 2837-2847 1983 T
 $He^{2+} + He(1s^2) \rightarrow He^+, He^0$
 time-dependent Hartree-Fock theory
 7.5 - 37.5 keV/amu
- 83T 7
 Dickinson, A.S. McCarroll, R.
 Adiabatic switching factors in slow atomic collisions
 J. Phys. B 16 459-466 1983 T
 $H^+ + Li$
 MO with adiabatic switching factors
 transition probabilities only
- 83T 43
 Duman, E.L. Tishchenko, N.P. Shmatov, I.P.
 Theory of charge-exchange transitions to excited states in ion-atom collisions.
 Sov. Phys.- Dokl. 28 641 - 643 1983 T
 $He^+(1s) + Rb \rightarrow He(1s^2) + Rb^{*+}(5p)$
 Landau-Zener model
 rate coefficients at thermal energies
- 83T 8
 Errea, L.F. Mendez, L. Riera, A.
 Excitation and charge transfer in $He^+ + H$ collisions. A molecular approach including two electron transition factors
 Phys. Rev. A 27 3357-3360 1983 T
 $He^+ + H \rightarrow He^0$
 common-translation-factor method
 2.5, 6.5 keV/amu
- 83T 47
 Falcon, C.A.
 Charge exchange in low-energy $^3He^+ - ^4He^{2+}$ collisions
 J. Phys. B 16 1793 1983 T
 $^3He^+ + ^4He^{2+} \rightarrow ^3He^{2+} + ^4He^+$
 20 - 100 eV (c.m.) ; PSS
- 83T 3
 Borondo, F. Macias, A. Riera, A.
 Asymmetry effect in $H^+ + H^+$ neutralization application to the $n=3$ pseudo crossing
 Chem. Phys. Letters 100 63 1983 T
 $H^+ + H^+ \rightarrow H + H(n=2, 3)$
 MO with pseudo-crossing
 0.05 - 5 keV/amu
- 83T 39
 Brandt, D.
 Resonant transfer and excitation in ion-atom collisions
 Phys. Rev. A 27 1314-1318 1983 T
 $Si^{11+} + He \rightarrow Si^{10+}; S^{13+} + He, Ar \rightarrow S^{12+}$
 IA
- 83T 4
 Bransden, B.H. Noble, C.J. Chandler, J.
 Theoretical studies of the interaction of He^{2+} with $H(1s)$ and H^+ with He
 J. Phys. B 16 4191-4201 1983 T
 $He^{2+} + H \rightarrow He^+(nl) + H^+$; $He^+(1s) + H^+ \rightarrow He^{2+} + H(nl)$; $He^{2+} + H \rightarrow He^{3+} + H^+$
 (2s, 2p)
 CC (AO)
 3.7 - 230 keV/amu
- 83T 5
 Crothers, D.S.F.
 Refined orthogonal variation-perturbation continuum-distorted-wave treatment of $B^{3+} + H(1s) \rightarrow B^{(2,3)}(nl) + H^+$ at intermediate velocity for $n, Z \gg 1$
 Phys. Scripta T3 236-240 1983 T
 $A^{2+} + H(1s) \rightarrow A^{(2,3)}(n) + H^+$ ($A = 12-18, n = 9-16$)
 orthogonal variation-perturbation CDW
 100 keV/amu
 n-dependence

- 83T11 Fritsch, W. Lin, C.D.
Atomic orbital expansion study of electron capture in $H^+ + Li$ and $He^{2+} + Li$ collisions
J. Phys. B 16 1595-1603 1983 T
 $He^{2+} + Li \rightarrow He^+(nl) + Li^+$
CC (40-AO)
0.5 - 20 (H^+), 0.1 - 2.0 (He^{2+}) keV/amu
- 83T9 Fritsch, W. Lin, C.D.
Coupled-state calculations for excitation, charge transfer and ionization in 1 - 75 keV proton-hydrogen atom collisions
Phys. Rev. A 27 3361-3364 1983 T
 $H^+ + H \rightarrow H(2s, 2p)$
TSAE
1 - 75 keV/amu
- 83T12 Goritz, M., Briggs, J.S., Alston, S.
Strong potential Born theory of radiative electron capture
J. Phys. B 16 L665-670 1983 T
 $Ne^{10+} + H \rightarrow Ne^{9+} + H^+ + hv$
strong potential Born approximation
5625 keV/amu
- 83T13 Grun, N., Scheid, W.
Calculation of the impact parameter dependence of the charge exchange for $Li^{3+} + H$ at 10.5 keV by the finite difference method
J. Phys. B 16 L425-428 1983 T
 $Li^{3+} + H \rightarrow Li^{2+}$
finite difference method
1.5 keV/amu
P(b) dependent on magnetic substates ($m=0, 1, 2$)
- 83T14 Hardie, D.J.W., Olson, R.E.
Charge transfer and ionization processes involving multiply charged ions in collision with atomic hydrogen
J. Phys. B 16 1983-1996 1983 T
 $X^{q+} + H \rightarrow X^{(q-1)+} + H^+$; $X^{q+} + H^+ + e^-$ ($X^{q+} = H^+, He^{2+}, C^{6+}, O^{8+}$)
CTMC
25, 50, 100 keV/amu
total (E=25-200 keV/amu); partial (E=25-50 keV/amu)
- 83T15 Harel, C., Salin, A.
Application of OEDM orbitals to many electron systems; He - H collisions
J. Phys. B 16 55-70 1983 T
 $He^+ + H(1s) \rightarrow He(1s^2, 1s2p)$
OEDM
0.19 - 7.5 keV/amu
total cross sections included
- 83T16 Heil, T.G., Butler, S.E., Dalgarno, A.
Charge transfer of doubly charged and triply charged ions with atomic hydrogen at thermal energies
Phys. Rev. A 27 2365-2383 1983 T
 $A^{2+}, A^{3+} + H \rightarrow A^+, A^{2+}$ (A = C, N, O, Ne)
MO
 $10^{-2} - 10^{-4}$ keV/amu
- 83T18 Janev, R.K.
Excited states created in charge transfer collisions between atoms and highly charged ions
Phys. Scripta T3 208-221 1983 T
 $A^{2+} + H \rightarrow A^{(q-1)+}(n,l) + H^+$ (A = He, Li, Be, C, N, F, Ne, Mg, Al, Si, S, Ar, Ca, Cr, Ni, Sr)
Landau-Zener model with rotational transitions
1 - 100 keV/amu
review; general scaling for n and l distribution
- 83T19 Janev, R.K., Belic, D.S.
Electron capture into excited states in $H + Ar^{18+}, Kr^{36+}$ and Xe^{54+} charge transfer collisions
Physica Scripta T3 246-248 1983 T
 $Ar^{18+}, Kr^{36+}, Xe^{54+} + H \rightarrow Ar^{17+}(n), Kr^{35+}(n), Xe^{53+}(n) + H^+$
MLZ
 $10^{-2} - 10^2$ keV/amu
- 83T17 Janev, R.K., Belic, D.S., Bransden, B.H.
Total and partial cross sections for electron capture in collisions of hydrogen atoms with fully stripped ions
Phys. Rev. A 28 1293-1302 1983 T
 $A^{z+} + H \rightarrow A^{(z-1)+}(n,l) + H^+$ (z = 5-54, A^{z+} fully stripped ion)
0.03 - 80 keV/amu
Multichannel Landau-Zener theory with rotational coupling included.

- 83T20 Kazanskii, A.K. Komarov, I.V.
Charge exchange of C^{6+} and O^{8+} ions with hydrogen atoms; strong coupling calculation
Sov. J. Tech. Phys. 27 1064-1067 1983 T
 C^{6+} , O^{8+} + H \rightarrow C^{5+} , O^{7+}
strong coupling
0.25 - 4.0 keV/amu
total cross section
- 83T22 Kimura, M. Sato, H. Olson, R.E.
Molecular treatment of charge transfer in Li^+ + Ca collisions
Phys. Rev. A 28 2085-2090 1983 T
 Li^+ + Ca \rightarrow $Li(2s, 2p)$ + Ca^+
PSS with ETF
0.1 - 20 keV/amu
- 83T21 Kimura, M. Thorson, W.R.
Molecular-state studies of charge transfer in Li^{3+} - H, Be^{4+} - H and B^{5+} - H collisions
J. Phys. B 16 1471-1480 1983 T
 Li^{3+} , Be^{4+} , B^{5+} + H \rightarrow Li^{2+} , Be^{3+} , B^{4+}
MO switching function
1 - 15 keV/amu
total cross section
- 83T46 Kohring, G.A. Wetmore, A.E. Olson, R.E.
Ion scattering from state-selected Rydberg atoms
Phys. Rev. A 28 2526 - 2528 1983 T
 H^+ + $H(n=10, l=9; m_l=0, 9) \rightarrow H + H^+$
CTMC
0.25 - 25 keV/amu
charge transfer; sensitive to m l ionization; insensitive to ml
- 83T23 Ludde, H.J. Dreizler, R.M.
Direct and capture processes in proton-hydrogen scattering III. differential cross sections and charge exchange probabilities
J. Phys. B 16 1009-1015 1983 T
 H^+ + H \rightarrow $H^0(1s, 2l)$
time-dependent Schrödinger equation
1 - 2 keV/amu
- 83T24 Ludde, H.J. Dreizler, R.M.
Method for the calculation of global probabilities for many electron systems
J. Phys. B 16 3971-3981 1983 T
 He^{2+} + He \rightarrow He^+ , He^0
IP
- 83T25 Macias, A. Riera, A. Yanez, M.
Excitation and charge transfer in He^+ + H collisions. A study of the origin dependence of calculated cross sections
Phys. Rev. A 27 213-219 1983 T
 $He^+(1s) + H(1s) \rightarrow He(1s2p \ ^13P)$
Impact parameter formalism
0.125 - 7.5 keV/amu
- 83T26 McCarroll, R. Valiron, P.
Charge exchange of highly charged ions at low energy
Phys. Scripta T3 226-232 1983 T
 $C^{4+} + H \rightarrow C^{3+}(nl) + H^+$; $N^{3+} + H \rightarrow N^{2+}(nl) + H^+$
CC (MO)
 $8 \times 10^{-7} - 4 \times 10^{-2} (C^{4+})$; $7 \times 10^{-7} - 3.5 \times 10^{-2} (N^{3+})$ keV/amu
- 83T27 McGuire, J.H. Eichler, J. Simony, P.R.
Exact second Born calculations for electron capture for systems with various projectile and target charges
Phys. Rev. A 28 2104-2112 1983 T
 H^+ + H, Be, C, O, Ne \rightarrow H^0 ; $He^{2+} + He \rightarrow He^+$; $Be^{4+} + Be \rightarrow Be^{3+}$; $C^{6+} + C \rightarrow C^{5+}$; $O^{8+} + O \rightarrow O^{7+}$; $Ne^{10+} + Ne \rightarrow Ne^{9+}$
second Born approximation
10000 - 200000 keV/amu
angular distribution
- 83E48 Miraglia, J.E.
Ion-atom single ionization at high and intermediate energies
J. Phys. B 16 1029 1983 T
 H^+ + He^+ \rightarrow H^+ + $He^{2+} + e$
30 - 300 keV; MCDW, MSA

- 83T28 Opradolec, L., Valiron, P., McCarroll, R.
Single charge exchange in Ar^{6+} - He collisions
J. Phys. B 16 2017-2028 1983 T
 $Ar^{6+} + He \rightarrow Ar^{5+}(3s^2nl) + He^+$
MO close-coupling (model potential)
0.12 - 1.2656 (4 states) ; 0.025 - 1.2656 (6 states) keV/amu
- 83T44 Ostrovskii, V.N.
Charge exchange involving ion excitation.
Sov. Phys.-JETP 57 766 - 769 1983 T
 $He^+ + Hg(6s^2) \rightarrow He + Hg^{*+}(7p)$
asymptotic theory
- 83T45 Ostrovskii, V.N., Tolmachev, Yu.A.
Calculation of cross sections for charge-exchange with ion excitation.
Opt. Spectrosc. (USSR) 55 646 - 647 1983 T
 $He^+ + Hg(6s^2) \rightarrow He(2s^2) + Hg^{*+}(7p \ ^2P_{3/2})$
asymptotic theory
rate coefficients at thermal energies
- 83T29 Presnyakov, L.P., Uskov, D.B., Janev, R.K.
Charge exchange in slow collisions of multiply charged ions with atoms
Soviet J.-JETP 56 525-531 1983 T
 $A^{q+} + H_2 \rightarrow A^{(q-1)+} + H_2$ ($A = C^{5+}, N^{7+}, O^{8+}, Ne^{10+}, Ar^{18+}$) ; $C^{6+} + H \rightarrow C^{5+}$
decay model
0.1 - 20 keV/amu
- 83T30 Salin, A.
Comments on adiabatic switching factors in slow atomic collisions
J. Phys. B 16 L661-664 1983 T
- 83T40 Sato, H., Kimura, M.
Molecular state calculations of charge transfer in $H^+ + Li$ and $He^{2+} + Li$ collisions.
Phys. Letters 96A 286 - 289 1983 T
 $H^+, He^{2+} + Li \rightarrow H, He^+(total)$
MO
0.1 - 20 keV/amu
- 83T31 Sato, H., Kimura, M., Weimore, A.E., Olson, R.E.
Electron capture cross sections for TiH^{4+}
J. Phys. B 16 3037-3044 1983 T
 $Ti^{4+} + H \rightarrow Ti^{3+}(nl) + H^+$; $Ti^{3+} + H^+ \rightarrow Ti^{4+} + H(nl)$
Impact parameter PSS (MO) with ETF
0.1 - 10 keV/amu
- 83T32 Shields, G.A., Daigamo, A., Sternberg, A.
Line emission from charge transfer with atomic hydrogen at thermal energies
Phys. Rev. A 28 2137-2140 1983 T
 $O^{3+}(2p) + H \rightarrow O^{2+}(2p3p, \ ^1P, \ ^3D_1)$
modeling
 6.25×10^{-5} keV/amu
evaluation from astrophysical data
- 83T33 Shipsey, E.J., Green, T.A., Brown, J.C.
Modified method of perturbed stationary states. V. Electron-capture cross sections for the reaction $O^{8+} + H(1s) \rightarrow O^{7+}(n, l) + H^+$
Phys. Rev. A 27 821-832 1983 T
 $O^{8+} + H \rightarrow O^{7+}(nl) + H^+$ ($n=4, 5, 6, 7, l=0 - n-1$)
close coupling ; PSS (MO) with variationally optimized ETF
 13×10^{-3} - 34 keV/amu
- 83T36 Sidis, V., Kubach, C., Fussen, D.
Ionic-covalent problem in the $H^+ + H \leftrightarrow H^+ + H$ collisional system
Phys. Rev. A 27 2431-2446 1983 T
 $H^+ + H^+ \rightarrow \leftarrow H(nl) + H$
MO model
0.02 - 10 keV/amu
- 83T34 Tan, C.K., Lee, A.R.
Electron capture into excited states of hydrogen
J. Phys. B 16 1445-1459 1983 T
 $H^+ + H \rightarrow H(n) + H^+$ ($n \leq 4$) ; $H^+ + He \rightarrow H(n) + He^+$ ($n \leq 5$)

- 83T35 Taulbjerg, K., Briggs, J.S.
Multiple scattering theory of electron capture in intermediate-to high-velocity collisions
J. Phys. B 16 3811-3824 1983 T
CDW method
formulation only
- 83T41 Wang, T.S., Delos, J.B.
Electron detachment for H(D) in collisions with Ne.
J. Chem. Phys. 79 4306 - 4309 1983 T
H, D + Ne -> H(D)
- 83T42 Yoshida, J. O-Ohata, K.
Charge transfer reaction of $O^{3+} + H \rightarrow O^{2+} + H^+$ in low energy collision.
J. Phys. Soc. Japan 52 417 - 423 1983 T
 $O^{3+} + H \rightarrow O^{2+} + H^+$
PSS
2 - 240 keV/amu
- 84E 1 Andersen, L.H., Frost, M., Hvelplund, P., Knudsen, H., Datz, S.
Correlated two-electron effects in highly charged ion-atom collisions; transfer ionization and transfer excitation in 20-MeV $Au^{13+} + He$ collisions
Phys. Rev. Letters 52 518-521 1984 E
 $Au^{13+} + He \rightarrow Au^{14+} + He^+$; $Au^{13+} + He^{2+}$
Electron emission spectroscopy coincidence with final projectile charge state
3939.0 keV/amu
- 84E52 Andersen, N., Andersen, T., Jepsen, L., Macek, J.
Electron detachment processes in keV H, Li, Na, K - rare gas collisions.
J. Phys. B 17 2281-2294 1984 E
 $A + He, Ne, Ar \rightarrow A, A^+$ (A = H, Li, Na, K)
growth
0.36 - 100 keV/amu
total detachment cross section
- 84E 2 Anholt, R., Andriamonjio, S.A., Morenzoni, E., Stoller, Ch., Molitoris, J.D., Meyerhof, W.E., Borman, H., Xu, J.S., Xu, Z.Z., Rasmussen, J.O., Hoffmann, D.H.
Observation of radiative capture in relativistic heavy ion-atom collisions
Phys. Rev. Letters 53 234-237 1984 E
 $A^q + B \rightarrow A^{(q-1)+} + hv + B^+$ (q = z, z-1; A = Xe, La, U; B = Be-Ta)
x-ray spectroscopy
 10^4 keV/amu
REC cross sections; angular distribution
- 84E 3 Astrer, G., Barany, A., Cederquist, H., Danared, H., Huldt, S., Hvelplund, P., Johnson, A., Knudsen, H., Liljeby, L., Renfelt, K.G.
Absolute cross sections for multielectron processes in low-energy $Ar^{q+} - Ar$ collisions as measured with a new technique
J. Phys. B 17 L877-883 1984 E
 $Ar^{q+} + Ar \rightarrow Ar^{(q+1)+} + Ar^{2+} + (r+s-q)e$
TOF
0.45xq keV/amu
recoil ions
- 84E 4 Aumayr, F., Fehring, M., Winter, H.
Inelastic $H^+ - Li(2s)$ collisions (2-20 keV); II. electron capture into H(2p) and H(3l) subshells
J. Phys. B 17 4201-4211 1984 E
 $H^+ + Li(2s) \rightarrow H(2p), H(3s, 3p, 3d)$
photon spectroscopy
2 - 20 keV/amu
- 84E 6 Bahring, A., Hertel, J.V., Meyer, E., Schmidt, H.
Polarization dependence of resonant charge transfer in low energy collisions of Na^+ with laser-excited $Na^*(3p)$
Phys. Rev. Letters 53 1433-1436 1984 E
 $Na^+ + Na^*(3s, 3p) \rightarrow Na(3s, 3p) + Na^+$
E; photon spectroscopy; T: MO modal calculation
0.045 - 0.075 keV/amu
polarization measured
- 84E 5 Baptist, R., Borne, J.J., Chauvet, G., Desclaux, J.P., Dousson, S., Hitz, D.
Polarisation of light emitted after charge transfer from H_2 to C^{4+} ions
J. Phys. B 17 L417-421 1984 E
 $C^{4+} + H_2 \rightarrow C^{3+}(3lm) + H_2^+$
photon emission spectroscopy
0.3 - 3 keV/amu

- 84E7 Berkowitz, K. Zorn, J.C.
Charge transfer into the metastable 2s level of hydrogen by protons colliding with K and Na
Phys. Rev. A 29 611-616 1984 E
 $H^+ + K, Na \rightarrow H(2s)$
growth
0.5 - 2.5 keV/amu
- 84E8 Boellaard, A.
Electron capture into He^{2+} - Li collisions at 0.55 - 10.0 keV
POM Institute for Atomic and Molecular Physics Report No. 58.2 1984 E
 $He^{2+} - Li \rightarrow He^{+}(nl)$
photon spectroscopy
0.138 - 2.5 keV/amu
- 84E10 Bordenave-Montesquieu, A. Benoit-Cattin, P. Gleizes, A. Marrakchi, A.I. Dousson, S. Hitz, D.
Two-electron capture into autoionising configurations $N^{+}(1snl'n'l')$ with $n=2,3,4$ and $n \geq n$ electron spectroscopy in collisions of $N^{+}(1s)$ with He and H_2 at 4.2 keV/amu¹
J. Phys. B 17 L223-227 1984 E
 $N^{6+} + He, H_2 \rightarrow N^{+}(1snl'n'l') + He^{2+}, H_2^{2+}$ ($n=2,3,4; n \geq n$)
electron emission spectroscopy
4.2 keV/amu
- 84E9 Bordenave-Montesquieu, A. Benoit-Cattin, P. Gleizes, A. Marrakchi, A.I. Dousson, S. Hitz, D.
Autoionisation of $N^{2+}(nl'n'l')$ with $n=2,3,4$ and $n' \geq n$ measured by electron spectroscopy in collisions of N^{7+} with He and H_2 at 4.9 keV/amu¹
J. Phys. B 17 L127-131 1984 E
 $N^{7+} + He, H_2 \rightarrow N^{2+}(nl'n'l') + He^{2+}, H_2^{2+}$ ($n=2,3,4; n' \geq n$)
electron emission spectroscopy
4.9 keV/amu
- 84E12 Brazuk, A. Dijkkamp, D. Drenjfe, A.G. de Heer, F.J. Winter, H.
Measurement of metastable fractions in multiply charged ion beams by ion excitation in core-conserving electron capture
J. Phys. B 17 2489-2505 1984 E
 $C^{2+}, N^{3+}, O^{4+}, N^{2+} + Li \rightarrow C^+, N^{2+}, O^{3+}, N^+ + Li^+$
photon emission spectroscopy
1.665 (C^{2+}), 1.43 (N^{3+}), 1.25 (O^{4+}), 1.43 (N^{2+}) keV/amu
- 84E11 Brazuk, A. Winter, H. Dijkkamp, D. Boellaard, A. de Heer, F.J. Drenjfe, A.G.
Absolute emission cross sections for detection of plasma impurity ions with active neutral lithium beam diagnostics
Phys. Lett. 101A 139-141 1984 E
 $C^{2+}, O^{2+} + Li \rightarrow C^{(q-1)+}, O^{(q-1)+} + Li^+$ ($q = 3, 4, 5, 6; q^+ = 4, 5, 6, 7$)
photon emission spectroscopy
1.66, 2.5 ($C^{2+} + Li$); 1.25, 1.88 ($O^{2+} + Li$) keV/amu
- 84E50 de Bruijn, D.P. Neuteboom, J. Sidis, V. Los, J.
A detailed experimental study of the dissociative charge exchange of H_2^+ with Ar, Mg, Na and Cs targets at keV energies
Chem. Phys. 85 215-231 1984 E
 $H_2^+ + B \rightarrow H_2^+ (B = Ar, Mg, Na, Cs)$
growth
0.75 - 3.75 keV/amu
- 84E13 Dijkkamp, D. Brazuk, A. Drenjfe, A.G. de Heer, F.J. Winter, H.
Single-electron capture into $C^{2+}(n,l)$ subshells in C^{4+} - Li collisions (20-80 keV)
J. Phys. B 17 4371-4385 1984 E
 $C^{4+} + Li \rightarrow C^{2+}(nl) + Li^+$ ($nl \leq 7$)
photon emission spectroscopy
0.8 - 6.7 keV/amu
- 84E14 Dmitriev, I.S. Vorobev, N.F. Konovalova, Zh.M. Nikolaev, V.S. Novozhilova, V.N. Tapolova, Ya.A. Fainberg, Yu.A.
Loss and capture of electrons by fast ions and atoms of helium in various media
Sov. Phys. -JETP 57 1157-1164 1984 E
 $He^{2+}; He^+ + B \rightarrow He^+, He^0; He^0$ ($B = He, Ne, N_2, Sr$)
E: growth; T: modified OBK
331 - 2070 keV/amu
- 84E15 DuBois, R.D.
Electron production in collisions between light ions and rare gases; The importance of the charge transfer and direct ionization channels
Phys. Rev. Letters 52 2348-2351 1984 E
 $H^+, He^+ + B \rightarrow H^0, He^0 + B^+$ ($B = Ne, Ar, Kr$)
coincidence between H^0, He^0 and B^+ ions
15 - 100 (H); 4 - 25 (He) keV/amu

- 84E16 DuBois,R.D. Giese,J.P. Cocke,C.L.
Contribution of electron capture to 2p-vacancy production in p-Mg collisions
Phys. Rev. A 29 1079-1082 1984 E
H⁺ + Mg(2p) → H⁰ + Mg(2p¹); H + Mg(2p¹)
growth
25 - 80 keV/amu
- 84E53 Friedrich, B. Herman, Z.
Dynamics of low energy charge transfer processes : Ar²⁺ + He → Ar⁺ + He⁺ at eV collision energies.
Chem. Phys. Letters 107 375-380 1984 E
Ar²⁺(²P, ¹D) + He → Ar⁺
crossed beam technique
1.25x10⁻⁵ - 4x10⁻³ keV/amu
relative cross sections only, different angular distributions for ³P and ¹D states
- 84E17 Gould,H. Greiner,D. Lindstrom,P. Symons,T.J.M. Crawford,H.
Electron capture by U⁹⁺ and U²⁺ and ionization of U⁹⁰⁺ and U⁹¹⁺
Phys. Rev. Letters 52 180-183 1984 E
U⁹¹⁺, U⁹²⁺ + B → U⁹⁰⁺, U⁹¹⁺ (B = C, Cu, Ta)
growth method
4x10⁵ - 9.6x10⁵ keV/amu
- 84E18 Graham,W.G. Berkner,K.H. Pyle,R.V. Schlachter,A.S. Stearns,J.W. Tanis,J.A.
Charge transfer cross sections for multiply charge ions colliding with gaseous targets at energies from 310 keV/amu to 8.5 MeV/amu
Phys. Rev. A 30 722-728 1984 E
A^{q+} + B → A^{(q-1)+}, A^{(q-2)+}, A^{(q-1)0} (A = C, Ar, Fe, Nb, Pb; q = 6-59; B = H₂, He, N₂, Ne, Ar, Xe)
growth
310- 8500 keV/amu
total cross section
- 84E30 Hanaki,H. Kusakabe,T. Horiuchi,T. Konomi,I. Nagai,N. Yamaguchi,T. Sakisaka,M.
Charge transfer cross sections for multiply charged slow Ne, Ar, Kr and Xe ions on various gas targets II. molecular gas targets
Mem. Fac. Eng. Kyoto Univ. 46 1-17 1984 E
A^{q+} + B → A^{(q-1)0} + B^{k+} (A = Ne, Ar, Kr, Xe; q = 2-11; B = H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈; k = 1-5)
growth
0.15 - 3 keV/amu
- 84E54 Havener, C.C. Rouze, N. Westerveld, W.B. Risley, J.S.
Experimental determination of the current density of the H(n=3) state produced in electron-transfer collisions of H⁺ on He.
Phys. Rev. Letters 53 1049-1052 1984 E
H⁺ - He → H(n=3)
Balmer-alpha line as a function of transverse electric field
40 - 80 keV/amu
current distribution of H(n=3)
- 84E19 Heckman,V. Martin,S.J. Jakacky,J. Pollack,E.
Electron capture in H⁺ + H₂
Phys. Rev. A 30 2261-2263 1984 E
H⁺ + H₂ → H(1s) + H₂⁺(²Σ_g⁺)
TOF method
1 - 3 keV/amu
probability as a function of scattered angle
- 84E20 Howald,A.M. Miers,R.E. Allen,J.S. Anderson,L.W. Lin,C.C.
Charge-changing cross sections for 1 - 25 keV H(1s) incident on a Na-vapor target
Phys. Rev. A 29 1083-1087 1984 E
H(1s) + Na → H⁺, H
growth
1 - 25 keV/amu
total cross section
- 84E21 Huber,B.A. Kahlert,H.J.
On the importance of metastable Ne²⁺(¹D₂) ions in charge-changing Ne²⁺ - Xe collisions
J. Phys. B 17 L69-74 1984 E
Ne²⁺ + Xe → Ne⁺ + Xe⁺; Ne⁺ + Xe²⁺ + e
energy-loss/-gain spectroscopy
2x10⁻², 5x10⁻² keV/amu
- 84E22 Huber,B.A. Kahlert,H.J. Wiesemann,K.
Study of electron capture reactions by means of double translational spectroscopy
J. Phys. B 17 2883-2895 1984 E
Ar²⁺, Ar³⁺ + Ar → Ar²⁺ + Ar⁺
double translational spectroscopy
0.015 keV/amu

- 84E23 Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Matsumoto, A., Ohtani, S., Okuno, K., Takagi, S., Tawara, H., Tsurubuchi, S.
The dependence on Q_c of cross sections for one-electron capture by S^{1+} , S^{12+} and Kr^{q+} ($q=7-25$) ions from He
J. Phys. B 17 195-99 1984 E
 S^{1+} , S^{12+} , Kr^{q+} ($q=7-25$) + He \rightarrow S^{10+} , S^{12+} , $Kr^{(q-1)+}$ + He^+ + ΔE
translational energy spectroscopy
1xq keV
total cross sections vs. crossing radius
- 84E24 Jolly, A., Wolner, K., Chetoui, A., Rozet, J.P., Stephan, C., Dube, L.J.
Total charge transfer cross sections for 400 MeV bare Fe^{26+} ions colliding with He, N_2 , Ne and Ar targets
J. Phys. B 17 235-242 1984 E
 Fe^{26+} + He, N_2 , Ne, Ar \rightarrow Fe^{25+}
Lyman x-rays
7140 keV/amu
total cross section
- 84E25 Justiniano, E., Cocke, C.L., Gray, T.J., DuBois, R., Can, C., Waggoner, W., Schuch, R., Schmidt-Bocking, H., Ingwersen, H.
Total cross sections for electron capture and transfer ionization by highly stripped, slow Ne, Ar, Kr and Xe projectiles on helium
Phys. Rev. A 29 1088-1095 1984 E
 Ne^{q+} , Ar^{q+} , Kr^{q+} , Xe^{q+} + He \rightarrow $Ne^{(q-1)+}$, $Ar^{(q-1)+}$, $Kr^{(q-1)+}$, $Xe^{(q-1)+}$ ($i=1-2$)
(0.25 - 1.0)xq keV
recoil ion sources ; total cross sections
- 84E26 Kamber, E.Y., Brenton, A.G., Beynon, J.H.
Single electron capture collisions of ground and metastable N^{2+} ions with atomic and molecular gases
J. Phys. B 17 4919-4933 1984 E
 N^{\pm} , N^{2+} + He, Ne, Ar, Kr, Xe, H_2 , N_2 \rightarrow Ne^+
translational energy spectroscopy
0.43 keV/amu
no cross sections given
- 84E27 Kamber, E.Y., Hasted, J.B.
Energy loss spectra for single electron capture in Ar^{1+} - He collisions
Vacuum 34 63-65 1984 E
 Ar^{1+} - He \rightarrow Ar^{2+} + H^+ + ΔE
energy loss spectroscopy
0.03 keV/amu
no cross section
- 84E28 Kase, M., Kikuchi, A., Yagishita, A., Nakai, Y.
Single- and double-electron capture cross sections for Ne^+ in He, Ne and Ar
J. Phys. B 17 671-677 1984 E
 Ne^+ + He, Ne, Ar \rightarrow Ne^+ , Ne^0
growth
25 - 150 keV/amu
total cross section
- 84E29 Katayama, I., Berg, G.P.A., Hulimann, W., Martin, S.A., Meissburger, I., Adelert, W., Rogge, M., Romer, J.G.M., Rain, J.L., Zambello, L., Gaul, G.
High energy electron capture and stripping in gas targets
J. Phys. B 17 L23-28 1984 E
 $^3He^{2+}$ + N_2 , Ne, Ar \rightarrow He
attenuation method
 $2 \times 10^4 - 4 \times 10^4$ keV/amu
- 84E49 Kheyrandish, H., Armour, D.G., Jones, E.J.
The measurement of charge transfer cross sections for a variety of ions on air and argon
Vacuum 34 269-273 1984 E
 $A^+ + B \rightarrow A$ ($A = Sb, As, In, P, N_2, O_2, N, O, Ge, Cr, Fe; B = air, Ar$)
growth
0.08 - 2.9 keV/amu
- 84E56 Koizumi, T., Okuno, K., Kaneko, Y.
Drift tube study of one-electron capture reactions between doubly-charged ions and rare gas atoms
J. Phys. Soc. Japan 53 567 - 573 1984 E
 Kr^{2+} + Ne \rightarrow Kr^+ + Ne^+ Xe^{2+} + Ar \rightarrow Xe^+ + Ar^+
drift tube technique
 $1 \times 10^7 - 10^4$ keV/amu

- 84E31 McCullough, R.W., Wilkie, F.G., Gilbody, H.B.
State-selective electron capture by slow C^{2+} and C^{3+} ions in atomic hydrogen
J. Phys. B 17 1373-1382 1984 E
 $C^{2+} + H \rightarrow C^+ + H^+$; $C^{3+} + H \rightarrow C^{2+}((2s3p)^2S, (2s3p)^2P^o, (2p)^2^1S, (2p)^2^1D) + H^+$
energy-loss/gain spectroscopy
 5×10^{-2} - 1.5 keV/amu
- 84E32 Newcomb, J., Dillingham, T.R., Hall, J., Varghese, S.L., Pepmiller, P.L., Richard, P.
Electron capture by metastable projectiles on He and Ne
Phys. Rev. A 29 82-91 1984 E
 $F^{7+}(1s2s^2^1S) + He, Ne \rightarrow F^{6+}$
Auger electron
315 - 789 keV/amu
- 84E33 Nielsen, E.H., Andersen, L.H., Barany, A., Cederquist, H., Hvelplund, P., Knudsen, H., MacAdam, K.B., Sorensen, J.
Energy-gain spectroscopy measurements of single-electron capture by Ar^{6+} in Ne and Ar
J. Phys. B 17 L139-144 1984 E
 $Ar^{6+} + Ne, Ar \rightarrow Ar^{5+}(nl)$
energy-gain spectroscopy
0.0025 - 0.025 keV/amu
total and partial cross section
- 84E34 Nikulin, V.K., Dijkkamp, D., Gordeev, Yu.S., Samoylov, A.V., de Heer, F.J.
Electron capture into excited projectile states in 6 - 100 keV Ne^{6+} - Ne collisions
J. Phys. B 17 L721-725 1984 E
 $Ne^{6+} + Ne \rightarrow Ne^{5+}(2p^2, nl); Ne^{6+}(2p^2, nl^2)$
0.25 - 6.25 keV/amu
- 84E35 Ohtani, S.
One-electron capture by highly stripped ions from helium atoms
Electronic and Atomic Collisions (eds. 1984 E
Eichler, J., Hertel, I.V., Stollerfoht, N.
 $C^{8+}, N^{7+}, O^{8+} + He \rightarrow C^{(q-1)+}, N^{(q-1)+}, O^{(q-1)+} + He^+$
energy-loss/-gain
- 84E36 Peterson, J.R., Bae, Y.K.
Product states of H_3^+ , H_2^+ and O_2^+ electron capture in Cs
Phys. Rev. A 30 2807-2810 1984 E
 $D_2^+; D_3^+; O_2^+ + Cs \rightarrow$ dissociative charge transfer
energy analysis
0.3 keV/amu
- 84E37 Roncin, P., Barat, M., Laurent, H., Pommier, J., Dousson, S., Hitz, D.
Transfer ionization and two-electron capture processes in Ne^{6+} - He collisions at 3 - 34 keV energies
J. Phys. B 17 L521-525 1984 E
 $Ne^{6+} + He \rightarrow Ne^{5+}$ ($n=3,4$)
energy-gain spectroscopy
0.1 keV/amu
angular dependence of energy-gain spectra; contribution of two-electron capture and transfer ionization
- 84E38 Schmeissner, C., Cocke, C.L., Mann, R., Meyeroth, W.
Energy-gain spectroscopy studies of electron capture from helium by slow multiply charged neon ions
Phys. Rev. A 30 1661-1671 1984 E
 $Ne^{q+} + He \rightarrow Ne^{(q-1)+}$ ($q=3-8$)
energy-loss/-gain
 3.5×10^{-3} - 2.6×10^{-2} keV/amu
- 84E39 Sorensen, J., Andersen, L.H., Hvelplund, P., Knudsen, H., Lijebj, L., Nielsen, E.H.
Cross sections $\hat{\sigma}^{\infty}(nl)$ for electron capture collisions between medium velocity, highly charged ions and molecular hydrogen
J. Phys. B 17 4743-4756 1984 E
 $Ar^{8+} + H_2 \rightarrow Au^{(q-1)+}(nl) + H_2^+$ ($q=12-18$)
photon emission spectroscopy
100 keV/amu
- 84E40 Szucs, S., Karemera, M., Terao, M., Brouillard, F.
Experimental study of the mutual neutralization of H^+ and H^- between 5 and 2000 eV
J. Phys. B 17 1613-1622 1984 E
 $H^+ + H^- \rightarrow H + H$
merging beam technique
 5×10^{-3} - 2 keV/amu

- 84E41 Tanis, J.A., Bernstein, E.M., Graham, W.G., Stockli, M.D., Clark, M., McFarland, R.H., Morgan, T.J., Berkner, K.H., Schlachter, A.S., Stearns, J.W.
Resonant electron transfer and excitation in two- three- and four electron Cq^{n+} and Vq^{n+} ions colliding with helium
Phys. Rev. Letters 53 2551-2554 1984 E
 $Ca^{q+}(q=16-18)$, $V^{q+}(q=19-21) + He \rightarrow Ca^{(q-1)+}$, $C^{(q-1)+}$
RITE
2500 - 9000 (Ca), 3530 - 9000 (V) keV/amu
- 84E42 Tawara, H., Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Matsumoto, A., Ohtani, K., Takagi, S., Tsurubuchi, S.
Energy-spectroscopy studies of electron-capture processes of low-energy, highly stripped F and Ne ions in collisions
Phys. Rev. A 29 1529-1532 1984 E
 $Fe^{n+} + He \rightarrow Fe^{(q-1)+} + He^+(q=6,7,8)$; $Ne^{n+} + He \rightarrow Ne^{(q-1)+} + He^+(q=7,8,9)$
energy-loss/gain spectroscopy
1 xg/M keV/amu
- 84E43 Varghese, S.L., Waggoner, W., Cocke, C.L.
Electron capture from lithium by protons and helium ions
Phys. Rev. A 29 2453-2456 1984 E
 H^+ , He^+ , $He^{2+} + Li \rightarrow H^0$, He^0 , He^+
growth
0.257 - 3.85 (H), 0.06 - 2 (He) keV/amu
- 84E44 Waggoner, W., Cocke, C.L., Varghese, S.L., Stockli, M.
Experimental cross sections for electron capture from lithium by slow, highly charged, rare-gas projectiles
Phys. Rev. A 29 2457-2462 1984 E
 Ne^{q+} , Ar^{q+} , Kr^{q+} , $Xe^{q+} + Li \rightarrow Ne^{(q-1)+}$, $Ar^{(q-1)+}$, $Kr^{(q-1)+}$, $Xe^{(q-1)+}$ (q=2-10)
Li-oven
(0.1 - 1.0) xq keV
- 84E45 Watts, M.F., Angel, G.C., Dunn, K.F., Gilbody, H.B.
Charge transfer and ionization in collisions between Li^+ ions
J. Phys. B 17 1631-1635 1984 E
 $Li^+ + Li^+ \rightarrow Li^+ + Li^{2+} + e$; $Li^0 + Li^{2+}$
crossed beam technique
0.053 - 0.24 keV/amu
- 84E46 Williams, I.D., Geddes, J., Gilbody, H.B.
Electron capture, loss and excitation in collisions of H^+ , $H(1s)$, $H(2s)$ and H^- in atomic oxygen
J. Phys. B 17 1547-1558 1984 E
 $H^+ + B \rightarrow H^0$ (total, 2s); $H(1s) + B \rightarrow H^+$, $H^0(2s)$, H^- ; $H(2s) + B \rightarrow H^+$, H^- (B = O, O_2)
growth
2.5 - 25 keV/amu
Ir tube furnace
- 84E47 Wohrer, K., Chetoui, A., Rozet, J.P., Jolly, A., Stephan, C.
K-K transfer cross sections in near-symmetric Fe^{26+} ion-atom collisions at intermediate velocity
J. Phys. B 17 1575-1587 1984 E
 $Fe^{26+} + B \rightarrow Fe^{25+}(1s) + B(1s^{-1})$ (B = Ar, Kr, Zr, Ag, Sn)
x-ray spectroscopy
7142 keV/amu
- 84E48 Woods, C.J., Sofield, C.J., Cowern, N.E.B., Murrell, M., Draper, J.
Comparison of charge-changing cross sections in gaseous and solid targets
J. Phys. B 17 867-878 1984 E
 $C^{3+} + B \rightarrow C^{(q+1)+}$ (q=4-6; i=1,2; B=carbon foil, CH_4 , C_2H_6 , C_2H_4 , C_2H_2)
growth
3000 keV/amu
- 84T 1 Aberg, T., Blomberg, A., Tulkke, J., Goscinski, O.
Maximum entropy theory of recoil charge distributions in electron capture collisions
Phys. Rev. Letters 52 1207-1210 1984 T
maximum entropy theory

- 84T 2 Amundsen, P.A. Jakubassa-Amundsen, D.H.
Charge transfer to a fast projectile in the presence of a nuclear resonance
Phys. Rev. Letters 53 222-225 1984 T
 $H^+ + Ni, C \rightarrow H^0$
strong potential Born approximation
3110 - 3200 keV/amu (Ni) ; 350 - 550 keV/amu (C)
- 84T 3 Amundsen, P.A. Jakubassa-Amundsen, D.H.
Charge transfer at large scattering angles in the strong-potential Born approximation
J. Phys. B 17 2671-2686 1984 T
 $H^+ + C, Ni \rightarrow H(1s)$
strong-potential Born approximation
 $3 \times 10^3 - 20 \times 10^3$ keV/amu
angular distribution
- 84T 4 Andriamonje, S. Chemin, J.F. Roturier, J. Saboya, B. Schuerer, J.N. Gayet, R. Salin, A. Laurent, H. Aguer, P. Briand, J.P.
Production of projectile and target KX-rays by single and multiple electron capture in collisions of Si^{4+} and Si^{3+} ions with argon atoms at 4.5 and 5.5 MeV/amu
Z. Phys. A 317 251-265 1984 T
 $Si^{q+} + Ar \rightarrow Si^{(q-1)+}, Si^{(q-2)+}, Si^{(q-3)+}$ ($q=14, 13$)
T : molecular model ; E : x-ray coincidence
4000 - 5450 keV/amu
- 84T 5 Banyard, K.E. Shircliffe, G.W.
Electron capture from hydrogen atoms by fast $Li^+(1s^2), Li^{2+}(1s)$ and Li^{3+} ions
Phys. Rev. A 30 604-606 1984 T
 $Li^+(1s^2), Li^{2+}(1s), Li^{3+} + H \rightarrow Li(1s^2, nl), Li^+(1s, nl), Li^{2+}(nl)$
continuum intermediate state approximation
28 - 1428 keV/amu
- 84T 7 Bienstock, S. Dalgarno, A. Heil, T.G.
Charge transfer of N^{3+} ions in collisions with atomic hydrogen
Phys. Rev. A 29 2239-2241 1984 T
 $N^{3+} + H \rightarrow N^{2+}(n,l,n'l'n''l'') + H^+$
CC (MO) with unitarized, multichannel distorted-wave approximation
 $0.278 \times 10^3 - 5$ keV/amu
- 84T60 Bienstock, S. Heil, T.G. Dalgarno, A.
Distorted-wave theory of heavy-particle collisions at intermediate energies.
Phys. Rev. A 29 503 - 508 1984 T
 $O^{2+} + He \rightarrow O^+(2p^3 \ ^2p^0 \ ^3D^0)$
DWA
 $10^3 - 5$ keV/amu
- 84T 6 Bienstock, S. Heil, T.G. Dalgarno, A.
Distorted-wave theory of heavy-particle collisions at intermediate energies
Phys. Rev. A 29 503 - 508 1984 T
 $C^{3+} + H \rightarrow C^{2+}(nl) + H^+; O^{2+} + H \rightarrow O^+(nl) + H^+$
CC (MO)
0 - 5 keV/amu
Quantum-mechanical treatment in close-coupling and unitarized distorted-wave approximation
- 84T 8 Bonnet, J.J.
Photon emission spectroscopy of lightly charged ions following low energy charge exchange collisions
Ann. Phys. (Fr.) 9 629-639 1984 T
review
classical one electron model ; Landau-Zener model
- 84T 9 Bransden, B.H. Ermolaev, A.M. Shingai, R.
One- and two-electron models for electron capture by He^+ ions from Li^0 at intermediate energies
J. Phys. B 17 4515-4521 1984 T
 $He^+(1s) + Li(2s, 1s) \rightarrow He(1s^2)$
two-center AO
0.25 - 100 keV/amu
- 84T10 Burgdorfer, J. Dube, L.J.
Multiple scattering approach to coherent excitation in electron-capture collisions
Phys. Rev. Letters 52 2225-2228 1984 T
 $H^+ + He \rightarrow H(n=3) + He^+$
first Born approximation; multiple scattering theory (CDW)
9.4 - 500 keV/amu

- 84T11 Casaubon, J.I. Piancettini, R.D.
Charge exchange by fully stripped lithium ions on metastable and ground state hydrogen atoms at low energies
J. Phys. B 17 1623-1630 1984 T
 $\text{Li}^{2+} + \text{H}(1s), \text{H}(2s) \rightarrow \text{Li}^{2+}(\text{nl})$
OEDM + Landau-Zener method
0.02 - 2.57 keV/amu
- 84T12 Crothers, D.S.F. McCann, J.M.
A second-order continuum distorted-wave theory of charge transfer at high energy
J. Phys. B 17 1177-184 1984 T
 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(1s)$
second-order CDW
10000, 50000 keV/amu
angular differential cross sections
- 84T13 Datta, S. Mandal, C.R. Mukherjee, S.C.
Charge transfer in $\text{H}^+ - \text{He}^+(1s)$ collisions
Can. J. Phys. 62 307-311 1984 T
 $\text{H}^+ + \text{He}^+(1s) \rightarrow \text{H}(1s, 2s, 2p, 3s, 3p, 3d) + \text{He}^{2+}$
CIS
50 - 10000 keV/amu
- 84T14 Deco, G.R. Maidagan, J.M. Rivarola, R.D.
Electron capture by proton and alpha particle impact on helium atoms
J. Phys. B 17 L707-711 1984 T
 $\text{H}^+, \text{He}^{2+} + \text{He}(1s^2) \rightarrow \text{H}(\text{nl}), \text{He}^+(\text{nl})$
symmetric eikonal approximation
25 - 1000 keV/amu (H) ; 25 - 2500 keV/amu (He)
- 84T15 Ermolaev, A.M.
Charge transfer in collisions between protons and lithium atoms
J. Phys. B 17 1069-1081 1984 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}(\text{nlm}); \text{H}^+ + \text{Li} \rightarrow \text{H}(\text{nl})$
TCAE with translational factors
15 - 145 keV/amu (H) ; 0.5 - 109 keV/amu (Li)
- 84T16 Ermolaev, A.M. Bransden, B.H.
Charge transfer in $\text{He}^{2+} + \text{Li}$ collisions
J. Phys. B 17 1083-1092 1984 T
 $\text{He}^{2+} + \text{Li} \rightarrow \text{He}^+(\text{nl}) + \text{Li}^+$
CC (24-AO)
0.475 - 400 keV/amu
- 84T17 Feagin, J.M. Briggs, J.S. Reeves, T.M.
Simultaneous charge transfer and excitation
J. Phys. B 17 1057-1068 1984 T
 $\text{A}^{(s-1)+} + \text{B}^{(s-1)+} \rightarrow \text{A}^{(s-2)+}(\text{nl}, \text{n'l}') + \text{B}^{2+}$
strong-potential Born approximation
- 84T61 Dube, L.J.
Multiple scattering approaches to the electron transfer process : I. some calculable approximations.
J. Phys. B 641 - 658 641 - 658 1984 T
general hydrogenic states
strong potential Born, Impulse Approx. continuum-distorted-wave approximation.
- 84T64 Feickert, C.A. Blint, R.J. Surratt, G.T. Watson, W.D.
Quantal calculations of charge transfer in collisions between N V and atomic hydrogen.
Astrophys. J. 286 371 - 376 1984 T
 $\text{N}^{4+} + \text{H} \rightarrow \text{N}^{3+}(3p, 3d) + \text{H}^+$
Quantal calculation
 $10^3 - 10^4$ keV/amu
3d capture is dominant at low energies.
- 84T64 Devi, K.R.S. Garcia, J.D.
Coriolis coupling effects in time-dependent Hartree-Fock calculations of ion-atom collisions
Phys. Rev. A 30 600-603 1984 T
 $\text{He}^{2+} + \text{He} \rightarrow \text{He}^+, \text{He}^0$
time-dependent Hartree-Fock calculation
7.5, 62.5 keV/amu

- 84T19 Fritsch, W.
Atomic-basis study of electron transfer in $H^+ + Na$ and $H^+ + K$ collisions
Phys. Rev. A 30 1135-1138 1984 T
 $H^+ + Na, K \rightarrow H^0(nl)$
atomic-orbital expansion method
0.2 - 20 keV/amu
total and partial cross section
- 84T20 Fritsch, W.
Determination of high-n partial transfer cross sections in bare-nucleus-hydrogen-atom collisions
Phys. Rev. A 30 3324-3327 1984 T
 $C^{6+}, N^{7+}, O^{8+} + H \rightarrow C^{5+}, N^{6+}, O^{7+}(n, l)$
semi-classical close-coupling with AO basis
4 - 25 keV/amu
partial cross section (n, l)
- 84T21 Fritsch, W., Lin, C.D.
Atomic-basis study of electron transfer into $C^{3+}(nl)$ orbitals in $C^{6+} + H$ and $C^{6+} + Li$ collisions
J. Phys. B 17 3271-3278 1984 T
 $C^{6+} + H \rightarrow C^{3+}(nl) + H^+$; $C^{6+} + Li \rightarrow C^{3+}(nl) + Li^+$
CC (AO)
0.1 - 20 keV/amu
- 84T18 Fritsch, W., Lin, C.D.
Atomic-orbital-expansion studies of electron transfer in bare-nucleus Z ($Z=2, 4-8$)-hydrogen-atom collisions
Phys. Rev. A 29 3039-3051 1984 T
 $Z^{2+} + H \rightarrow Z^{(Z-1)+}(nl) + H^+$ ($Z=2, 4-8$)
CC (AO)
0.133 - 25 keV/amu
- 84T22 Gerratt, J.
R-matrix theory of charge transfer
Phys. Rev. A 30 1643-1660 1984 T
R-matrix theory formalisms
- 84T23 Ghosh, M., Datta, S., Mukherjee, S.C.
Calculation of cross sections for electron capture between arbitrary hydrogenic states of target and projectile
Phys. Rev. A 30 1307-1310 1984 T
 $H^+ + H(2l) \rightarrow H(3l') + H^+$
continuum intermediate state approximation
25 - 1000 keV/amu
arbitrary $(nlm) \rightarrow (n'l'm')$
- 84T24 Gonzales, A.D., Miraglia, J.E.
Comparison between the mechanical and radiative electron capture processes at high energies
Phys. Rev. A 30 2292-2296 1984 T
 $H^+ + H(1s), C^{3+}(1s), He(1s^2) \rightarrow H^0$
CDW
1000 - 200000 keV/amu
- 84T25 Grozdanov, T.P.
A model for final-state mixing following electron capture in slow collisions of fully stripped, multicharged ions and hydrogen atoms
Phys. Scripta 30 194-197 1984 T
 $C^{6+} + H(1s) \rightarrow C^{3+}(4l) + H^+$
MO with Stark mixing
0.05 - 20 keV/amu
- 84T26 Hanssen, J., Gayet, R., Hartel, C., Salin, A.
Electron capture by C^{4+}, N^{5+} and O^{6+} from atomic hydrogen in the keV/amu energy range
J. Phys. B 17 L323-328 1984 T
 $C^{4+}, N^{5+}, O^{6+}(1s^2) + H \rightarrow C^{3+}, N^{4+}, O^{5+} + H^+$
Molecular approximation
0.25 - 25 keV/amu
total cross section
- 84T27 Humphries, W.J., Moisewitsch, B.L.
Relativistic second Born approximation for electron capture
J. Phys. B 17 2655-2669 1984 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
relativistic second Born approximation
 $1 \times 10^3 - 1 \times 10^8$ keV/amu

- 84T28 Jakubassa-Amundsen, D.H., Hippler, R., Betz, H.D.
Radiative electron capture in fast ion-atom collisions
J. Phys. B 17 3943-3949 1984 T
 $S^{16+} + C \rightarrow S^{15+}(1s)$
E: x-ray spectroscopy; T: strong-potential Born approximation
3900 keV/amu
- 84T29 Janev, R.K., Joachain, C.J., Nedelkovic, N.N.
Resonant electron transfer in slow collisions of protons with Rydberg hydrogen atoms
Phys. Rev. A 29 2463-2478 1984 T
 $H^+ + H(n) \rightarrow H(n) + H^+$ ($n=10-50$)
under- and over-barrier model
 $10^5 - 10^2$ keV/amu
- 84T30 Janev, R.K., McDowell, M.R.C.
Electron removal from H and He atoms in collisions with C^{4+} , N^{5+} and O^{6+} ions
Phys. Letters 102A 405-408 1984 T
 $A^{q+} + H, He \rightarrow A^{(q-1)+} + H^+, He^+$; $A^{q+} + H^+, He^+ + e$
CTMC
50, 100 keV/amu
scaling for electron removal; total cross section
- 84T31 Kimura, M., Iwai, T., Kaneko, Y., Kobayashi, N., Matsumoto, A., Ohtani, S., Okuno, K., Takagi, S., Tawara, H., Tsurubuchi, S.
Landau-Zener model calculations of one-electron capture from He atoms by highly stripped ions at low energies
J. Phys. Soc. Japan 53 2224-2232 1984 T
 $C^{3+}, N^{5+}, O^{6+}, F^{7+}, Ne^{8+}$ ($q=4-9$), K^{11+} ($q=10-25$) + He $\rightarrow A^{(q-1)+}$ (n)
multichannel Landau-Zener
1xq keV
total and partial(n) cross sections
- 84T32 Kimura, M., Olson, R.E.
Electron capture to (nl) states in collisions of C^{4+} and C^{6+} with He
J. Phys. B 17 L713-719 1984 T
 $C^{4+} + He \rightarrow C^{3+}, C^{5+} + He$; $C^{6+} + He \rightarrow C^{5+}, C^{7+} + He$
PSS with ETF
20 keV/amu
- 84T33 Koebach, L., Briggs, J.S.
Theory of electron capture by fast projectiles scattered through large angles
J. Phys. B 17 3255-3270 1984 T
 $H^+ + Ne \rightarrow H^0$
IP
200 - 550 keV/amu
capture probabilities as a function of scattering angle
- 84T34 Larsen, O.G., Taulbjerg, K.
Theory of electron capture by partially stripped ions in slow collisions with atomic hydrogen
J. Phys. B 17 4523-4542 1984 T
 $A^{q+} + H(1s) \rightarrow A^{(q-1)+}$ ($A = Ar, Cr, Mg$)
CC with ETF
0.015 - 4 keV/amu
- 84T35 Maidagan, J.M., Rivarola, R.D.
A symmetric eikonal-type approximation for electron capture in ion-atom collisions
J. Phys. B 17 2477-2487 1984 T
 $H^+ + H(1s), He(1s) \rightarrow H(1s)$; $H^+ + He^+(1s) \rightarrow H(1s)$
symmetric eikonal approximation
500 - 100000 keV/amu
K-K total and partial (in angle) cross sections
- 84T36 Mandial, C.R., Datta, S., Mukherjee, S.C.
Electron capture from atomic hydrogen by fully stripped ions of $Be^{4+}, B^{5+}, C^{6+}, N^{7+}$ and O^{8+} in the continuum intermediate-state approximation
Phys. Rev. A 30 1104-1106 1984 T
 $A^{Z+} + H \rightarrow A^{(Z-1)+} + H^+$ ($A = Be, B, C, N, O$)
continuum-intermediate state approximation
47 - 1111 keV/amu
total cross sections

- 84T37 McDowell, M.R.C. Janev, R.K.
Electron capture, ionisation and transfer-ionisation in fast $Au^{q+} + He$ collisions
J. Phys. B 17 2295-2305 1984 T
 $Au^{q+} + He \rightarrow Au^{(q-1)+} + He^e$; $Au^{(q-1)+} + He^{2+} + e$ ($q = 6-25$)
CTMC
20 - 300 keV/amu
n-distribution
- 84T38 McGuire, J.H., Stockli, M., Cocke, C.L., Pedersen, E.H., Sil, N.C.
Study of the Thomas peak in electron capture
Phys. Rev. A 30 89-94 1984 T
 $H^+ + H, He \rightarrow H^0$
T. strong potential Born approximation; E. growth
2820 - 3000 keV/amu
 H_2 instead of H in experiment; angular differential cross sections
- 84T39 Miraglia, J.E.
Electron capture in asymmetric collisions
Phys. Rev. A 30 1721-1726 1984 T
 $H^+ + C(1s), O(1s) \rightarrow H(1s)$
peaking impulse approximation
200 - 4000 keV/amu
- 84T40 Morrison, H.G., Opik, U.
An impact-parameter method for heavy-particle collisions involving one electron, II.
Attempts to improve the accuracy, and results on $He^{2+} - H$ collisions
J. Phys. B 17 857-865 1984 T
 $H^+ + H, He \rightarrow H(2s, 2p) + H^+, He^{2+}; He^{2+} + H \rightarrow He^e(\text{total}, 2s, 2p) + H^+$
new impact-parameter method
25 (H^+), 19.4, 25, 41.7, 50 (He^{2+}) keV/amu
- 84T41 Olson, R.E., Kimura, M., Sato, H.
Molecular-state cross section calculations for $H + Cs \rightarrow \leftarrow H + Cs^+$
Phys. Rev. A 30 1692-1696 1984 T
 $H + Cs(6s, 6p, 5d) \rightarrow H + Cs^+$
pseudo-potential molecular-structure calculation
0.1 - 10 keV/amu
- 84T42 Presnyakov, L.P., Uskov, D.B.
Ionization and charge exchange in atom collision with multicharged ion
Sov. Phys. JETP 59 515-522 1984 T
 $A^{q+} + H \rightarrow A^{(q-1)+}(nl) + H^+$; $A^{q+} + H^+ + e$ ($q \geq 3$)
Keldysh quasi-classical method
10 - 400 keV/amu
analytic expression for (n, l) distribution
- 84T63 Riera, A.
Practical criterion for the determination of translational factors.
Phys. Rev. A 30 2304 - 2310 1984 T
translation factor in MO model
- 84T43 Rittby, M., Elander, N., Brandas, E., Barany, A.
Resonance structure in charge transfer cross sections; an application to the $N^{3+} + H \rightarrow N^{2+} + H^+$ reaction
J. Phys. B 17 L677-681 1984 T
 $N^{3+} + H \rightarrow N^{2+}(3s) + H^+$
 $10^8 - 10^3$ keV/amu
rich resonance
- 84T44 Rivarola, R.D.
Resonant electron capture in $H^+ + H(1s)$ collisions
Phys. Rev. A 30 1122-1124 1984 T
 $H^+ + H(1s) \rightarrow H(1s)$
CDW
10000 keV/amu
- 84T45 Rivarola, R.D., Salin, A.
K-shell one-electron capture in asymmetric collisions at intermediate and high energies
J. Phys. B 17 659-669 1984 T
 $H^+ + He^+, Ne^{2+}, Ar^{17+} \rightarrow H(1s)$; $H^+ + He, C, Ne \rightarrow H(1s)$
CDW
400 - 20000 keV/amu
differential (in angle) cross sections

- 84T46 Rivarola, R.D., Salin, A., Stockli, M.P.
Differential electron-capture cross sections in high energy ion-atom collisions; comparison of experiment and theory for the Thomas peak
J. Physique Letters 45 L259-264 1984 T
 $H^+ + H_2, He \rightarrow H^0$
CDW
2820 - 7400 keV/amu
- 84T47 Salin, A.
Intrashell mixing following electron capture from atomic hydrogen targets by slow ions. I - Fully stripped projectiles
J. de Physique 45 671-680 1984 T
 $C^{6+} + H \rightarrow C^{5+}(4l) + H^+; O^{8+} + H \rightarrow O^{7+}(5l) + H^+; Ne^{10+} + H \rightarrow Ne^{9+}(6l) + H^+$
PSS
1 - 16 keV/amu
- 84T48 Shimakura, N., Inoue, H., Watanabe, T.
Differential cross sections for $Li^+ - Li$ collisions using molecular bases; quantum effect
J. Phys. B 17 2687-2694 1984 T
 $Li^+ + Li(2s) \rightarrow Li(2s) + Li^+; Li(2p) + Li^+$
JWKB
0.07 - 0.14 keV/amu
angular distribution
- 84T58 Sidis, V., de Bruijn, D.P.
Theory of near-resonant charge exchange in atom-molecule collisions. dissociate NRCE in the $H_2^+ + Mg$ collision
Chem. Phys. 85 201-214 1984 T
 $H_2^+ + Mg \rightarrow H_2^+$
IPM
0.75 - 3.75 keV/amu
- 84T49 Spruch, L., Shakeshaft, R.
Simple heuristic derivation of some charge transfer probabilities at asymptotically high incident velocities
Phys. Rev. A 29 2283-2285 1984 T

- 84T50 Stollberg, M.T., Lee, H.W.
Charge transfer in low-energy collisions of He^{2+} and Li^{3+} with various neutral atoms
Phys. Rev. A 29 2448-2452 1984 T
 $He^{2+} + Li, Be, B, C, Na, Mg, K, Cs \rightarrow He^+(n); Li^{3+} + H, He, Li, Be, B, C, Ne, Na, Mg, K, Ar, Cs \rightarrow Li^{2+}(n)$
Landau-Zener model
0.05 - 5.18 keV/amu
- 84T51 Suzuki, H., Kajikawa, Y., Toshima, N., Ryufuku, H., Watanabe, T.
Electron-capture cross sections from He in collision with bare nuclear ions
Phys. Rev. A 29 525-528 1984 T
 $A^{q+} + He \rightarrow A^{(q-1)+} + He^+ (A = H^+, Li^{3+}, Be^{4+}, C^{6+}, O^{8+})$
UDWA
 $1 - 10^3$ keV/amu
total cross section
- 84T52 Suzuki, H., Toshima, N., Watanabe, T., Ryufuku, H.
Exponential distorted-wave approximation for charge transfer in collisions of multicharged ions with atomic hydrogen
Phys. Rev. A 29 529-535 1984 T
 $A^{q+} + H \rightarrow A^{(q-1)+} + H^+ (A = He^{2+}, Li^{3+}, Be^{4+}, B^{5+}, C^{6+})$
exponential UDWA
0.1 - 1000 keV/amu
total cross section
- 84T53 Suzuki, R., Nakamura, H., Ishiguro, E.
Semiclassical scattering theory based on the dynamical state representation; application to the $Li^+ + Na$ and $Li + Na^+$ collisions
Phys. Rev. A 29 3060-3070 1984 T
 $Na^+ + Li(2s) \rightarrow Na(3s); Li^+ + Na(3s) \rightarrow Li(2s, 2p) + Na^+$
semiclassical theory
0.25 - 5 keV/amu
- 84T54 Thorson, W.R., Choi, J.H.
Long-range secondary couplings in $X^{z+} - H(1s)$ charge transfer collisions
Phys. Rev. A 30 743-749 1984 T
 $A^{z+} + H(1s) \rightarrow A^{(z-1)+}(nl)$
molecular state CC + long-range dipole and quadrupole coupling
15 - 20 keV/amu
no cross section given

- 84T55 Wada, K. Murai, T.
Close-coupling calculation for charge transfer in $\text{Be}^{4+} + \text{H}(1s)$ collisions at low energies
J. Phys. B 17 1363-367 1984 T
 $\text{Be}^{4+} + \text{H}(1s) \rightarrow \text{Be}^{3+}$
CC (11)
0.1 - 25 keV/amu
- 84T56 Winter, T.G. Lin, C.D.
Triple-center treatment of electron transfer and excitation in p - H collisions
Phys. Rev. A 29 567-582 1984 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}^0(2s, 2p) + \text{H}^+$
triple-center AO
1.5 - 15 keV/amu
- 84T57 Yenen, O. Jaacks, D.H. Macek, J.
Two-state charge transfer calculation in $\text{H}^+ - \text{H}_2$ collisions
Phys. Rev. A 30 597-599 1984 T
 $\text{H}^+ + \text{H}_2 \rightarrow \text{H}^0$
Denkov model
1 - 50 keV/amu
- 85E 6 Alvarez, J. Cisneros, C. Morales, A. Morgan, T.J.
H formation in $\text{H}^0 + \text{Mg}$ collisions
Phys. Letters 109A 268-270 1985 E
 $\text{H}^0 + \text{Mg} \rightarrow \text{H}$
growth
1.0 - 5.0 keV/amu
- 85E 1 Andrews, M.C. McDaniel, F.D. Duggan, J.L. Miller, P.D. Pepmiller, P.L. Krause, H.F. Rossee, T.M. Rayburn, L.A. Mehara, R. Lapicki, G.
M-shell electron capture and direct ionization of gold by 25 MeV carbon and 32 MeV oxygen ions
Nucl. Instr. Meth. in Phys. 10/11 186-189 1985 E
Res. B
 $\text{C}^{6+}, \text{O}^{8+} + \text{Au} \rightarrow \text{C}^{5+}, \text{O}^{7+} + \text{Au}^+$ (3l⁻¹)
x-ray coincidence
2000 keV/amu
- 85E 2 Andriamonje, S. Chemin, J.F. Rofurier, J. Saboya, B. Schenrer, J.N. Belkic, Dz. Gayet, R. Solin, A. Laurent, H. Schapira, J.P.
Electron capture from the krypton M-shell by MeV protons
J. Physique 46 349-353 1985 E
 $\text{H}^+ + \text{Kr} \rightarrow \text{H}^0(1s) + \text{Kr}^+(3l^{-1})$
E : x-ray coincidence ; T : CDW
2000 - 3000 keV/amu
- 85E 4 Aumayr, F. Lakits, G. Husinsky, W. Winter, H.
Inelastic $\text{H}^+ - \text{Li}(2s)$ collisions (2-20 keV) ; III. electron capture into the H(2s) subshell
J. Phys. B 18 2493-2501 1985 E
 $\text{H}^+ + \text{Li}(2s) \rightarrow \text{H}(2s)$
photon spectroscopy
2 - 20 keV/amu
- 85E 3 Aumayr, F. Winter, H.
Total single-electron capture cross sections for impact of $\text{H}^+, \text{H}_2^+, \text{He}^+, \text{He}^+$, and Ne^+ (2-20 keV) on Li
Phys. Rev. A 31 67-71 1985 E
 $\text{A}^+ + \text{Li}(2s) \rightarrow \text{A}^0$ (A = H, H₂, He, Ne)
growth
2 - 20 (H) keV/amu ; 0.1 - 1 keV/amu
total cross section
- 85E 5 Aumayr, F. Winter, H.
Excitation by impact of He^+ (2-20 keV) on Li(2s)
J. Phys. B 18 L741-746 1985 E
 $\text{He}^+ + \text{Li}(2s) \rightarrow \text{He}(\text{total}, 2p, 3p)$
photon spectroscopy
0.5 - 5 keV/amu
- 85E 7 Bae, Y.K. Coggiola, M.J. Peterson, J.R.
Charge transfer of 50 eV - 4 keV $\text{H}^+, \text{H}_2^+, \text{H}_3^+, \text{N}^+$ and N_2^+ in Cs ; absolute cross sections
Phys. Rev. A 31 3627-3632 1985 E
 $\text{A}^+ + \text{Cs} \rightarrow \text{A}^0$ (A = H, H₂, H₃, N, N₂)
attenuation method
0.05 - 4 keV/amu (H) ; 0.025 - 0.28 keV/amu
attenuation cross sections dominated by single electron capture

- 85E 9 Baltayan, P, Pebay-Feyroula, J.C. Sadeghi, N.
Determination of the rate constants for population of the individual Cd^{+} levels in thermal Penning and charge transfer reactions of $He^{+}(2^3S_1)$ and He^{+} with cadmium. *J.Phys.B* 18 3615 - 3628 1985 E
 $He^{+} + Cd \rightarrow He + Cd^{+}(j)$
flowing-afterglow method
cross sections and rate coefficients at thermal energies
- 85E 8 Barany,A, Astner,G, Cederquist,H, Danard,H, Huldtt,S, Hvelplund,P, Johnson,A, Knudsen,H, Liljeby,L, Rensfelt,K,G.
Absolute cross sections for multi-electron processes in low energy $Ar^{+} - Ar$ collisions; comparison with theory
Nucl. Instr. Meth. in Phys. 9 397-399 1985 E
Res. B
 $Ar^{+} + Ar \rightarrow Ar^{(q)2+} + Ar^{(k+n)+}$ ($q=4-8$; $k=1-5$; $n=0-3$)
coincidence technique
0.045xq keV/amu
- 85E10 Bliman,S, Bonnet,J.J, Bordenave-Montesquieu,A, Dousson,S, Druetta,M, Hitz,D, Mayo,M.
Radiative decay following low energy charge exchange collisions at the AGRIPPA facility
Nucl. Instr. Meth. in Phys. 9 371-376 1985 E
Res. B
 $Ne^{8+}, O^{8+}, Al^{8+} + H_2 \rightarrow Ne^{7+}(nl), O^{7+}(nl), Al^{7+}(nl)$
x-ray, VUV photon spectroscopy
1.56 - 3.84 keV/amu
grazing incidence spectrometer; crystal spectrometer
- 85E11 Bonnet,J.J, Fleury,A.F, Bonnefoy,M, Politis,M.F, Chassevent,M, Bliman,S, Dousson,S, Hitz,D.
Electron capture into different (nl) states in slow collisions of Ne^{8+} projectiles on He and H_2 targets
J. Phys. B 18 L23-27 1985 E
 $Ne^{8+} + He, H_2 \rightarrow Ne^{7+}(nl) + He^{+}, H_2^{+}$
photon emission spectroscopy
1 - 4 keV/amu
- 85E13 Bordenave-Montesquieu,A, Benoit-Cattin,P, Gleizes,A, Marrakchi,A.I, Dousson,S, Hitz,D.
Experimental cross sections for two-electron capture into nitrogen autoionising states in $N^{6+}(q=6,7)$ on He and H_2 collisions at 10.5 q keV
Nucl. Instr. Meth. in Phys. 9 389-391 1985 E
Res. B
 $N^{6+,7+} + H_2, He \rightarrow N^{4+,5+}(nl, n'l'; n=2,3,4)$
electron spectroscopy
0.75xq keV/amu
- 85E12 Bordenave-Montesquieu,A, Boenit-Cattin,P, Gleizes,A, Dousson,S, Hitz,D.
One-electron capture into Li-like autoionizing $N^{+}(1s2ln'l')$ configurations by metastable $N^{3+}(1s2s^3S)$ multicharged ions in collisions with He and H_2 , observed by electron spectroscopy at 3.4 keV/amu
J. Phys. B 18 L195-199 1985 E
 $N^{3+} + He, H_2 \rightarrow N^{+}(1s2ln'l')$
electron spectroscopy
3.42 keV/amu
- 85E14 Brazuk,A, Winter,H, Dijkkamp,D, de Heer,F.J, Drenje,A,G.
Subshell-selective electron capture from lithium by slow multiply charged ions
Nucl. Instr. Meth. B 9 442-447 1985 E
 $C^{+} + Li(2s) \rightarrow C^{+}(n,l)$
1.67 - 6.67 keV/amu
- 85E15 Can,C, Gray,T.J, Varghese,S.L, Hall,J.M, Tunnel,L,N.
Electron-capture cross sections for low-energy highly charged neon and argon ions from molecular and atomic hydrogen
Phys. Rev. A 31 72-83 1985 E
 $Ne^{q+}(q=2-7), Ar^{q+}(q=2-10) + H, H_2 \rightarrow Ne^{(q-1)+}, Ar^{(q-1)+}$
H-oven
(0.4 - 1.25)xq keV
- 85E16 Cederquist,H, Andersen,L,H, Barany,A, Hvelplund,P, Knudsen,H, Nielsen,E,H, Pedersen,J,O,K, Sorensen,J.
State-selective single- and double-electron capture processes in slow $C^{+} + He, Ne, Ar$ and Xe collisions
J. Phys. B 18 3951-3969 1985 E
 $C^{+} + Ne, Ar, Xe \rightarrow C^{3+} + Ne^{+}, Ar^{+}, Xe^{+}; C^{+} + He, Ne \rightarrow C^{2+} + He^{2+}, Ne^{2+}$
energy-loss/gain
0.0416 keV/amu

85E17 Chetoui,A. Rozet,J.P. Vernhet,D. Wohrer,K. Bouisset,P. Tonati,A. Stephan,C.
Charge exchange process with low energy multicharged ions; n,l populations
Nucl. Instr. Meth. in Phys. 240 488-491 1985 E
Res. A
Al¹²⁺ + He, H₂ -> Al¹¹⁺(n,l)
photon spectroscopy
10xq/27 (keV/amu)
Lyman spectra observed; Si(Li) used; relative intensities

85E18 Chetoui,A. Wohrer,K. Rozet,J.P. Vernhet,D. Stephan,C.
High velocity capture process in excited states of multicharged ions
Nucl. Instr. Meth. in Phys. 10/11 134-137 1985 E
Res. B
Ar¹⁸⁺ + N₂ -> Ar¹⁷⁺(np); Fe²⁶⁺ + He, N₂ -> Fe²⁵⁺(np)
6250 keV/amu (Ar); 7140 keV/amu (Fe)
n-distribution

85E20 Ciric,D. Brazuk,A. Dijkkamp,D. de Heer,F.J. Winter,H.
State-selective electron capture in C⁴⁺ - H, H₂ collisions (0.7 - 4.6 keVamu⁻¹) studied
by photon spectroscopy
J. Phys. B 18 3629-3639 1985 E
C³⁺ + H, H₂ -> C²⁺ + H⁺, H₂
photon emission spectroscopy
0.7 - 4.6 keV/amu

85E21 Ciric,D. Dijkkamp,D. Vlieg,E. de Heer,F.J.
Selective electron capture into He II (n,l) subshells in collisions of He²⁺ with atomic
and molecular hydrogen
J. Phys. B 18 4745-4762 1985 E
He²⁺ + H, H₂ -> H⁺(n,l)
photon spectroscopy
1.25 - 10 keV/amu

85E19 Ciric,D. Dijkkamp,D. Vlieg,E. de Heer,F.J.
Subshell-selective electron capture cross sections in collisions of He²⁺ and C⁴⁺ with
atomic hydrogen
J. Phys. B 18 L17-22 1985 E
C⁴⁺ + H -> C³⁺(nl) + H⁺(n=3,4) ; He²⁺ + H -> He⁺(2p) + H⁺
photon emission spectroscopy
1 - 7 (C⁴⁺-H), 1 - 10 (He²⁺-H) keV/amu

85E22 Clark,M. Brandt,D. Swenson,J.K. Shafroth,S.M.
Non-resonant electron transfer and projectile K-electron excitation in ion-atom
collisions
Phys. Rev. Letters 54 544-546 1985 E
Si¹¹⁺ + He -> Si¹⁰⁺
growth
469 - 2940 keV/amu

85E71 Clark,M. Shafroth,S.M.
Resonant transfer and excitation(RTE) and non-resonant transfer and excitation(NTE)
in Si¹¹⁺ on He collisions
Nucl. Instr. Meth. in Phys. 10/11 124-127 1985 E
Res. B
Si¹¹⁺ + He -> Si¹⁰⁺
coincidence with x-ray and charge changed projectile
535 - 3571 keV/amu

85E23 Coggiola,M.J. Bae, Y.K. Peterson,J.R.
Single-electron-capture cross sections for 1-10 keV Li⁺ ions in alkaline-earth vapors
Phys. Rev. A 32 784-788 1985 E
Li⁺ + Mg, Ca, Sr, Ba -> Li⁰
attenuation method
0.14 - 1.4 keV/amu
total cross section

85E24 Cotte,P.H. Druetta,M. Martin,S. Denis,A. Desesquelles,J. Hitz,D. Dousson,S.
UV spectroscopy of charge exchange collisions between N²⁺ ions and H₂, He
Nucl. Instr. Meth. in Phys. 9 743-46 1985 E
Res. B
N²⁺ + H₂, He -> N⁴⁺(1sⁿl)
UV spectroscopy
0.8 - 3.57 keV/amu

85E28 Dijkkamp,D. Boellaard,A. de Heer,F.J.
Single electron capture in slow He²⁺ - Li collisions
Nucl. Instr. Meth. in Phys. 9 377-381 1985 E
Res. B
He²⁺ - Li -> He⁺(n,l)
VUV spectroscopy
0.55 - 10 keV/amu

- 85E25 Dijkkamp,D. Ciric,D. de Heer,F.J.
Total capture and line-emission cross sections for C^{6+} , N^{7+} , O^{8+} - H collisions in the energy range
Phys. Rev. Letters 54 1004-1007 1985 E
 C^{6+} , N^{7+} , O^{8+} - H \rightarrow $C^{5+}(nl)$, $N^{6+}(nl)$, $O^{7+}(nl)$
VUV spectroscopy
3 - 7.5 keV/amu
- 85E29 Dijkkamp,D. Ciric,D. de Heer,F.J. Vlieg,E.
(n,l)-subshell electron capture cross sections in collisions of C^{4+} , N^{5+} and O^{6+} with atomic hydrogen
Nucl. Instr. Meth. in Phys. 9 403-407 1985 E
Res. B
 C^{4+} , N^{5+} , O^{6+} + H \rightarrow $C^{3+}(n,l)$, $N^{4+}(n,l)$, $O^{5+}(n,l)$
VUV spectroscopy
1 - 7 keV/amu
- 85E27 Dijkkamp,D. Ciric,D. Vlieg,E. de Boer,A. de Heer,F.J.
Subshell-selective electron capture in collisions of C^{4+} , N^{5+} , O^{6+} with H, H₂ and He
J. Phys. B 18 4763-4793 1985 E
 C^{4+} , N^{5+} , O^{6+} + B \rightarrow C^{3+} , N^{4+} , $O^{5+}(nl)$
photon spectroscopy
0.5 - 12 keV/amu
- 85E26 Dijkkamp,D. Gordееv, Yu.S. Brazuk,A. Drentje,A.G. de Heer,F.J.
Selective single-electron capture into (n,l) subshells in slow collisions of C^{6+} , N^{6+} , O^{6+} and Ne^{6+} with He, H₂, and Ar
J. Phys. B 18 737-756 1985 E
 C^{6+} , N^{6+} , O^{6+} , Ne^{6+} + He \rightarrow $C^{5+}(nl)$, $N^{5+}(nl)$, $O^{6+}(nl)$, $Ne^{5+}(nl)$ + He⁺; C^{6+} , N^{6+} , O^{6+} + H₂ \rightarrow $C^{5+}(nl)$, $N^{5+}(nl)$, $O^{5+}(nl)$ + H₂⁺; O^{6+} + Ar \rightarrow $O^{5+}(nl)$ + Ar⁺
photon emission spectroscopy
0.56 - 6.25 keV/amu
- 85E31 Druetta,M. Mayo,M. Bliman,S. Martin,S. Hitz,D. Dousson,S. Deresquelles,J.
Etude spectroscopique de la collision d'echange de charge entre Ne^{6+} et He
J. de Phys. Letters 46 L869-873 1985 E
 Ne^{6+} + He \rightarrow Ne^{5+} , Ne^{6+}
VUV spectrometer
2.4 - 4 keV/amu
emission cross section
- 85E30 Druetta,M. Mayo,M. Cotte,P.H. Martin,S. Dousson,S. Hitz,D. Tran Cong,K.
Absolute cross sections for electron capture into (n,l) subshells of N VI by VUV spectroscopic study of the N^{6+} - He collision
Phys. Letters 108A 338-339 1985 E
 N^{6+} + He \rightarrow $N^{5+}(n,l)$
VUV spectrometer
4,2 keV/amu
- 85E32 DuBois,R.D. Toburen,L.H.
Electron capture by protons and helium ions from lithium, sodium and magnesium
Phys. Rev. A 31 3603-3611 1985 E
 H^+ , He^+ + B \rightarrow H^0 , He^0 ; He^{2+} + B \rightarrow He^+ , He^0 (B = Li, Na, Mg)
growth
2 - 100 keV/amu (H); 1.3 - 66.7 keV/amu (He)
- 85E33 DuBois,R.D.
Charge transfer and ionization of lithium by protons and helium ions
Phys. Rev. A 32 3319-3323 1985 E
 H^+ , He^+ , He^+ + Li \rightarrow H^0 , He^+ , He^0
growth
15 - 200 keV/amu
differentials in Li charge states
- 85E34 Graham,W.G. Berkner,K.H. Bernstein,E.M. Clark,M. McFarland,R.H. Morgan,T.J. Schlachter,A.S. Stearns,J.W. Stockli,M.P. Tanis,J.A.
Charge state dependence of single electron capture and loss cross sections for highly stripped V ions in He at 8.55 MeV/amu
J. Phys. B 18 2503-2508 1985 E
 $V^{21+}(q=18-23)$ + He \rightarrow $V^{(q-1)+}$
growth
8550 keV/amu
total cross sections
- 85E35 Hall,J. Richard,P. Pémiller,P.L. Gregory,D.C. Miller,P.D. Moak,C.D. Jones,C.M. Alton,G.D. Bridwell,L.B. Sofield,C.J.
Energy systematics of single- and double- K-shell vacancy production in titanium bombarded by chlorine ions
Phys. Rev. A 33 914-920 1985 E
 Cl^{18+} + Ti \rightarrow $Cl^{(q-1)+}$, $Cl^{(q-2)+}$ + $Ti^+(1s^{-1})$, $Ti^{2+}(1s^{-2})$
x-ray spectroscopy
7 - 15 x10³ keV/amu

85E36 Hippler, R. Faust, M. Wolf, R. Kleinpoppen, H. Lutz, H.O. Polarization studies of H(2p) charge-exchange excitation; $H^+ + Ar$ collisions Phys. Rev. A 31 1399-1404 1985 E
 $H^+ + Ar \rightarrow H(2p) + Ar^+$
linear and circular polarizar
1.5 - 3 keV
polarization at scattering angle of 0.5 - 3.5

85E37 Hüber, B.A. Kahler, H.J. Vibrational excitation of H_2^+ in electron capture collisions of Xe^{2+} and Ar^{2+} with H_2 J. Phys. B 18 491-498 1985 E
 $Xe^{2+} + H_2 \rightarrow Xe^+ + H_2^+(v)$; $Ar^{2+} + H_2 \rightarrow Ar^{2+}(nl) + H_2^+(v)$
energy-gain/loss
 4.6×10^{-3} , 2.3×10^{-4} (Xe^{2+}); 1.5×10^{-1} , 0.75 (Ar^{2+}) keV/amu

85E38 Hvelplund, P. Andersen, L.H. Barany, A. Cederquist, H. Heinemeier, J. Knudsen, H. Macadam, K.B. Nielsen, E.H. Sørensen, J. Energy-gain spectroscopy studies of state-selective electron capture for multiply charged Ar recoil ions; comparison with the extended classical barrier model Nucl. Instr. Meth. in Phys. 9 421-425 1985 E
Res. B
 Ar^{1+} ($q=6-10$) + Ne, Ar, Xe $\rightarrow Ar^{q+1+}(nl)$
energy gain spectroscopy-energy defect
0.025 keV/amu

85E39 Jellen-Wutte, U. Schweitzer, J. Vanek, W. Winter, H. Scattering-angle-dependent translational energy spectroscopy for electron capture by double charged ions J. Phys. B 18 L779-785 1985 E
 Ar^{2+} , Kr^{2+} , Xe^{2+} + He, Ne, Ar $\rightarrow Ar^+$, Kr^+ , Xe^+
translational energy spectroscopy
identification of various reaction channel

85E40 Jones, M.L. Doughty, B.M. Dillingham, T.R. Jones, T.A. Electron capture by 20 - 150 keV protons on hydrogen gases Nucl. Instr. Meth. in Phys. 10/11 142-145 1985 E
Res. B
 $H^+ + CO$, CH_4 , C_2H_6 , $C_3H_8 \rightarrow H^0$
growth
20 - 150 keV/amu

85E42 Kamber, E.Y. Brenton, A.G. Beynon, J.H. Hasted, J.B. Single-electron capture spectra for collisions of O^{2+} on He, N_2 and H_2 J. Phys. B 18 933-941 1985 E
 $O^{2+} + He$, N_2 , $H_2 \rightarrow O^{+}(nl)$
translational spectroscopy
0.125 - 0.38 keV/amu

85E41 Kamber, E.Y. Horrmis, W.G. Brenton, A.G. Hasted, J.B. Baynon, J.H. Double electron capture by Ar^{2+} from rare-gas atoms J. Phys. B 18 117-124 1985 E
 $Ar^{2+} + He$, Ne, Ar, Kr $\rightarrow Ar^+ + He^{2+}$, Ne^{2+} , Ar^{2+} , Kr^{2+}
energy-loss/gain
0.2 keV/amu

85E75 Kelbch, S. Ullrich, J. Mann, R. Richard, P. Schmidt-Bocking, H. Cross sections for the production of highly charged argon and xenon recoil ions in collisions with high velocity uranium projectiles. J. Phys. B 20 323 - 336 1985 E
 U^{91+} ($q = 65 - 75$) + Ar, Xe $\rightarrow U^{(q+)+}$ ($l=1-18$), Xe^{i+} ($i=1-33$)
scattered projectile-recoil ion coincidence technique
3600 - 15500 keV/amu
partial (r,i) cross sections given

85E43 Lee, A.R. Williams, D.G. Butcher, E.C. Isotope effect in electron capture by protons into the 2s-state of hydrogen Phys. Letters 107A 218-220 1985 E
 $H^+ + H_2$, $D_2 \rightarrow H(2s)$
photon measurement
8 - 16 keV/amu
no isotope effect found

85E44 Lembo, L.J. Danzmann, K. Stoller, Ch. Meyerhof, W.E. Hansch, T.W. Observation of polarized optical radiation following electron capture into slow, highly ionized neon Phys. Rev. Letters 55 1874-1876 1985 E
4 keV $Ne^{8+} + Na \rightarrow Ne^{7+}(nl)$
0.2 keV/amu

- 85E46 Maro, M., Hitz, D., Druetta, M., Dousson, S., Desciaux, J.P., Blümann, S.
Spectroscopy of Al VIII produced by low energy charge changing collisions
Phys. Rev. Letters 54 317-319 1985 E
Al¹⁸⁺ + H₂ → Al¹⁷⁺
optical spectroscopy
3 keV/amu
- 85E45 Mathur, D., Badrinathan, C., Rajgara, F.A., Rafaja, U.T.
Electron capture collisions of Kr²⁴(³P) in H₂
J. Phys. B 18 4795-4804 1985 E
Kr²⁴(³P) + H₂ → Kr⁺
growth + energy loss spectroscopy
0.012 - 0.06 keV/amu
- 85E47 McAfee, K.B., Hozack, R.S.
Charge and energy transfer in symmetric doubly charged Ar²⁺ + Ar collisions
Phys. Rev. A 32 810-814 1985 E
Ar²⁺(¹S) + Ar → Ar + Ar²⁺(³P)
translational energy spectroscopy
0.006 keV/amu
energy spectra only
- 85E48 McDaniel, F.D., Totten, A., Bhalla, R.P., Lapicki, G.
Carbon K-shell vacancy production and K-K electron capture cross sections for 0.4 -
1.5 MeV H⁺ ions incident on CH₄ targets
Nucl. Instr. Meth. A24 492-497 1985 E
H⁺ + C → H(1s) + C⁺(1s⁻¹)
Auger electron coincidence
400 - 1500 keV/amu
- 85E49 Meyer, F.W., Howald, A.M., Havener, C.C., Phaneuf, R.A.
Observation of low-energy Z oscillations in total electron capture cross sections for
bare projectiles colliding with H and H₂
Phys. Rev. Letters 54 2663-2666 1985 E
A^{z+} + H, H₂ → A^{(z-1)+} (A = C, N, O, F, Ne)
growth
0.3 - 3.0 keV/amu
total cross section
- 85E50 Meyer, F.W., Howald, A.M., Havener, C.C., Phaneuf, R.A.
Low-energy total electron capture cross sections for fully stripped and H-like
projectiles incident on H and H₂
Phys. Rev. A 32 3310-3318 1985 E
A^{z+, (z-1)+} + H, H₂ → A^{(z-1)+, (z-2)+} (A = C, N, O, F, Ne)
H-oven
0.18 - 8.5 keV/amu
- 85E51 Meyerhof, W.E., Anholt, R., Eichler, J., Gould, H., Mungler, Ch., Alonso, J.,
Thieberger, P., Wegner, H.E.
Atomic collisions with relativistic heavy ions. III. electron capture
Phys. Rev. A 32 3291-3301 1985 E
Xe^{q+} + B → Xe^{(q-1)+} (q=52-54; B=Be-Au; i=1-3)
solid target
82000 - 200000 keV/amu
- 85E52 Nakamura, T., Kobayashi, N., Kaneko, Y.
Ion-energy-loss spectroscopy of Kr²⁺-He and -Ne collisions II. one-electron capture
processes
J. Phys. Soc. Japan 54 1743-1749 1985 E
Kr²⁺(³P, ¹D₂, ¹S₀) + He, Ne → Kr⁺
energy-loss spectroscopy
0.006 - 0.018 keV/amu
- 85E53 Nielsen, E.H., Andersen, L.H., Barany, A., Cederquist, H., Heinemeier, J., Hvelplund, P.,
Knudsen, H., MacAdam, K.B., Sorensen, J.
Energy-gain spectroscopy of state-selective electron capture for multiply charged Ar
recoil ions
J. Phys. B 18 1789-1808 1985 E
Ar^{q+} + Ne, Ar, Xe → Ar^{(q-1)+} (q=6-10)
energy-gain/loss spectroscopy
1x10⁻² - 5x10⁻² keV/amu
- 85E54 Peart, B., Bennett, M.A., Dolder, K.
New measurements of the mutual neutralization of H⁺/H⁻ and He⁺/H⁻ ions
J. Phys. B 18 L439-444 1985 E
H⁺ + H⁻ → H + H; He⁺ + H⁻ → He + H
crossed beam technique
0.03 - 2 keV/amu (H⁺); 0.1 - 3 keV/amu (He⁺)

- 85E73 Pepmiller, P.L. Richard, P. Newcomb, J. Hall, J. Dillingham, T.R.
Formation of doubly excited two-electron ions during F^{8+} , He , F^{6+} , Ne and F^{6+} + Ar collisions.
Phys. Rev. A 31 734-743 1985 E
 $F^{8+}(1s) + He, Ne, Ar \rightarrow F^{7+}(2p^2, 2s2p)$
photon spectroscopy
684 - 1630 keV/amu
- 85E55 Phaneuf, R.A. Kimura, M. Sato, H. Olson, R.E.
Electron capture by slow Al^{10+} ions colliding with hydrogen
Phys. Rev. A 31 2914-2917 1985 E
 $Al^{10+}(q=2-10) + H, H_2 \rightarrow Al^{9+,10+}$
E. growth; T. MO expansion
0.02 - 0.12 keV/amu
total cross section; laser source
- 85E56 Puerta, J. Huber, B.A.
Single electron capture by state-prepared Ar^{2+} projectiles in Ar
J. Phys. B 18 4445-4453 1985 E
 $Ar^{2+} + Ar \rightarrow Ar^+$
translational energy spectroscopy
0.01 keV/amu
metastable fraction
- 85E57 Puerta, J. Kahlert, H.J. Koslowski, H.R. Huber, B.A.
Single electron capture by state-selected multiply charged Ar^{q+} ions ($q=3,4$)
Nucl. Instr. Meth. in Phys. 9 415-420 1985 E
Res. B
 $Ar^{3+,4+} + He, Ne, Ar, Kr \rightarrow Ar^{2+}, Ar^{3+}$
translational energy spectroscopy
0.02 keV/amu
forward angles (theta - 0±0.7)
- 85E58 Rinn, K. Melchert, F. Salzborn, E.
Measurements of charge transfer in $H^+ - He^+$ collisions
J. Phys. B 18 3783-3795 1985 E
 $H^+ + He^{6+} \rightarrow H^0 + He^{2+}$
crossed beam technique
8 - 100 keV/amu
- 85E59 Rozet, J.P. Chevallerier, P. Legagneux-Piquerna, P. Chetroui, A. Stephan, C.
Capture cross sections in highly excited P states of Ar^{17+} in high velocity collisions of 250 MeV Ar^{18+} on N
J. Phys. B 18 943-948 1985 E
 $Ar^{18+} + N_2 \rightarrow Ar^{17+}$ (np, n≤10)
x-ray spectroscopy
6250 keV/amu
 $1/n^3$ distribution
- 85E60 Rudd, M.E. Goffe, T.V. Itoh, A.
Ionization cross sections for 10 - 300 keV/U and electron capture cross sections for 5 - 150 keV/U $^3He^{2+}$ ions in gases
Phys. Rev. A 32 2128-2133 1985 E
 $He^{2+} + B \rightarrow He^+, He^0$ (B = He, Ne, Ar, Kr, H₂, N₂, CO, O₂, CH₄, CO₂, H₂O)
condenser plate
1.67 - 50 keV/amu
total cross section
- 85E61 Rudd, M.E. Itoh, A. Goffe, T.V.
Cross sections for ionization, capture and loss for 5 - 450 keV He^+ on water vapor
Phys. Rev. A 32 2499-2500 1985 E
 $He^+ + H_2O \rightarrow He^0, He^{2+}$
condenser plate
1.25 - 112.5 keV/amu
- 85E62 Scheurer, J.N. Baker, O.K. Meyerhof, W.E.
Large angle scattering and nuclear resonance effect in electron capture in $H^+ + C$ and $H^+ + N$ collisions
J. Phys. B 18 L85-89 1985 E
 $H^+ + C, N \rightarrow H^0$
350 - 1000 keV/amu (C), 1050 - 1065 keV/amu (N)
theta = 30, 150
- 85E74 Serenkov, I.T. Illin, R.N. Sakharov, V.I.
Detachment of an electron from hydrogen, chlorine, or titanium ions colliding with argon, sodium or magnesium.
Sov. Phys.-JETP 61 243-248 1985 E
 $H^+ + B \rightarrow H$ (B = Na, H₂); $Cl^- + B \rightarrow Cl$ (B = Ar, Na, Mg); $Ti^+ + B \rightarrow Ti$ (B = Ar, Na, Mg)
growth
0.2 - 5 keV/amu

- 85E63 Shafroth,S.M., Aways, Y., Kase, M., Kambara, T., Kumagai, H., Nishida, M., Shibata, H., Tawara, H.
Angular distribution of REC for Ar⁴⁺ on C at 1 MeV/amu
Nucl. Instr. Meth. in Phys. 240 546-548 1985 E
Res. A
Arⁿ⁺ + C -> Ar^{q+1+}(1s) + h ν + C⁺
x-ray spectroscopy
1000 keV/amu
angular distribution
- 85E64 Shah, M.B., Elliott, D.S., Gilbody, H.B.
Ionization and charge transfer in collisions of H⁺ and He²⁺ with lithium
J. Phys. B 18 4245-4258 1985 E
H⁺, He²⁺ + Li -> H⁰, He⁺
growth method
22 - 2100 keV/amu
Li-oven
- 85E72 Tanis, J.A., Bernstein, E.M., Oglesby, C.S., Graham, W.G., Clark, M., McFarland, R.H., Morgan, T.J., Stockli, M.P., Berkner, K.H., Schlachter, A.S., Sterns, J.W., Johnson, B.M., Jones, K.W., Meron, M.
Resonant-transfer and excitation for highly charged ions (16 ≤ Z ≤ 23)
Nucl. Instr. Meth. in Phys. 10/11 128-233 1985 E
Res. B
S¹³⁺, Ca¹⁶⁺ - ¹⁸⁺, V¹⁹⁺ - ²¹⁺ + He -> S¹²⁺, Ca¹⁵⁺ - ¹⁷⁺, V¹⁸⁺ - ²⁰⁺ + He⁺
coincidence
469 - 6250 (S); 2500 - 9000 (Ca); 3529 - 9020 (V) keV/amu
- 85E65 Tawara, H., Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Matsumoto, A., Ohtani, K., Takagi, S., Tsurubuchi, S.
Electron capture in F⁷⁺(q=10-41) + He collisions at low energies
Nucl. Instr. in Phys. Res. B 9 432-434 1985 E
F⁷⁺(q=10-41) + He -> F⁶⁺¹⁺
energy gain spectroscopy
0.08 - 0.3 keV/amu
cross sections vs. q and crossing radius
- 85E66 Tawara, H., Iwai, T., Kaneko, Y., Kimura, M., Kobayashi, N., Matsumoto, A., Ohtani, S., Okuno, K., Takagi, S., Tsurubuchi, S.
Electron capture processes of F⁷⁺ ions with very high charge state (41 ≤ q ≤ 10) in collisions with He atoms
J. Phys. B 18 337-350 1985 E
F⁷⁺ + He -> F^{q+1+} + He⁺ (q=10-41)
energy-loss/gain
6x10⁻² - 0.73 keV/amu
- 85E67 van Wijngaarden, A., Patel, J., Becker, K., Drake, G.W.F.
Charge-exchange processes of hydrogen ions with Hg atoms at keV energies
Phys. Rev. A 32 2150-2157 1985 E
H⁺ + Hg -> H⁰; H⁺ + Hg -> H⁰
growth
23.8 - 134.2 keV/amu
- 85E68 Varghese, S.L., Bissinger, G., Joyce, J.M., Laubert, R.
Atomic total electron-capture cross sections from C, O, F, and S bearing molecular gases for -MeV/u H⁺ and He⁺ projectiles
Phys. Rev. A 31 2202-2209 1985 E
H⁺, He⁺ + B = H⁰, He⁰ (B = C, O, F, S compound gas)
growth
800 - 3000 keV/amu (H); 800 keV/amu (He)
- 85E69 Verthet, D., Chetoui, A., Wohrer, K., Rozet, J.P., Piquemal, P., Hiiz, P., Dousson, S., Salin, A., Stephan, C.
Alignment of Ne⁸⁺ nP states produced by collisions of Ne⁸⁺ with H₂ at 4 keV/amu
Phys. Rev. A 32 1256-1259 1985 E
Ne⁸⁺ + H₂ -> Ne⁸⁺ (J=nl)
4 keV/amu
- 85E70 Wilkie, F.G., Yousif, F.B., McCullough, R.W., Geddes, J., Gilbody, H.B.
Total and state-selective capture by slow N²⁺ ions in atomic and molecular hydrogen
J. Phys. B 18 479-489 1985 E
N²⁺ + H -> N⁺(2p²) + H⁺; N²⁺ + H, H₂ -> N⁺ + H⁺, H₂
energy-gain/-loss
4.28x10⁻² - 14.3 keV/amu

- 85T59 Abramov, V.A., Lisitsa, V.S., Pigarov, A.Yu.
Changes in effective charge-exchange cross sections in a plasma
JETP Letters 42 356-358 1985 T
enhancement of cross sections due to excited atoms in a plasma
- 85T 1 Allan, R.J., Hanssen, J.
Quasimolecular treatment of Na - Na⁺, Li - Li⁺, Li - Na⁺ and Na - Li⁺ collisions with a common translation factor
J. Phys. B 18 1981-1997 1985 T
Li⁺ + Li(2s), Na(3s) -> Li⁰; Na⁺ + Li(2s), Na(3s) -> Na⁺
CC with ETF
0.06 - 3.4 keV/amu
- 85T60 Anholt, R.
Atomic collisions with relativistic heavy ions II. light-ion charge states.
Phys. Rev. A 31 3579 - 3592 1985 T
C⁶⁺, Ne¹⁰⁺, Ar¹⁸⁺ + B -> C⁵⁺, Ne⁹⁺, Ar¹⁷⁺ (non-radiative) (B= Al, Ni, Cu, Ag, Ta, Au)
four state model
1.4x10⁵ - 2.1x10⁶ keV/amu
- 85T 2 Anholt, R., Eichler, I.
Eikonal calculations of electron capture by relativistic projectiles
Phys. Rev. A 31 3505-3508 1985 T
C⁶⁺, Ne¹⁰⁺, Ar¹⁸⁺ + B -> C⁵⁺, Ne⁹⁺, Ar¹⁷⁺ (B = Al-U)
eikonal
140000 - 2100000 keV/amu
- 85T64 Bendahman, M., Bliman, S., Dousson, S., Hitz, D., Gayet, R., Hanssen, J., Harel, C., Salin, A.
Electron capture from atomic hydrogen by multiply charged ions in low energy collisions
J. de Phys. 46 561-572 1985 T
A^{q+} + H -> A^{(q-1)+} + H⁺ (A = B, C, N, O, F, Ne; q= 4-10)
0.25 - 50 keV/amu
molecular calculation with translational factor
- 85T 3 Burgdörfer, J., Dube, L.J.
Population of Rydberg states by electron capture in fast-ion-atom collisions
Phys. Rev. A 31 634-640 1985 T
z⁺ + H(1s) -> H(n=10, 1, m) + H⁺
CDW
25 - 10000 keV/amu
- 85T 4 Burgdörfer, J.
Final state angular momentum distributions in charge transfer collisions at high energies
Nucl. Instr. Meth. in Phys. A240 519-526 1985 T
Res.
A^{Z+} + B(1s) -> A^{(z-1)+}(nlm) + B⁺
Born, CDW, PCI, quasi-resonant over barrier model
30 - 500 keV/amu
- 85T 5 Chatterjee, I., Bhattacharyya, B.
Quantum electrodynamic study of electron capture by light stripped ions
Phys. Scripta 32 504-506 1985 T
Li³⁺ + H -> Li²⁺
relativistic QED
14 - 285 keV/amu
- 85T 6 Chatterjee, S.N., Roy, B.N.
Modified BEA calculations of He²⁺ impact double electron capture cross sections of atoms
J. Phys. B 18 4283-4293 1985 T
He²⁺ + He, Li, Ar, Kr -> He⁰
BEA
10 - 250 keV/amu
- 85T 9 Crother, D.S.F., McCann, J.F.
Exact two-channel variational continuum distorted-wave theory; results for symmetric resonant exchange
J. Phys. B 18 2907-2913 1985 T
H⁺ + H(1s) -> H(1s) + H⁺
CDW, travelling AO
1 - 500 keV/amu

85T 7 Crothers,D.S.F.
First-order continuum-distorted-wave double-scattering nlm transitions
J. Phys. B 18 2879-2892 1985 T
 $A^{Z+} + B^{e-1} (1s) \rightarrow A^{e-1} (nlm)$
first-order CDW double scattering

85T 8 Crothers,D.S.F.
Second-order continuum-distorted-wave double scattering nlm transitions
J. Phys. B 18 2893-2906 1985 T
 $A^{Z+} + B^{e-1} (1s) \rightarrow A^{e-1} (nlm)$
second-order CDW double scattering

85T10 Deco,G.R. Rivarola,R.D.
A second-order symmetric eikonal approximation for electron capture at high energies
J. Phys. B 18 2283-2293 1985 T
 $H^+ + H(1s) \rightarrow H(1s)$
symmetric eikonal approximation, CDW
500 - 200000 keV/amu

85T11 Dewangan,D.P. Eichler,J.
Boundary conditions and the strong potential Born approximation for electron capture
J. Phys. B 18 165-69 1985 T
strong potential Born approximation

85T13 Dubé,L.J. Burgdörfer,J.
Electron capture into Rydberg states in collisions between multiply charged ions and hydrogen
Nucl. Instr. Meth. in Phys. 9 392-396 1985 T
Res. B
 $C^{6+} + H(1s) \rightarrow C^{5+} (nlm) + H^+$
CDW, CDW-PCI
25 - 900 keV/amu
multiple scattering effect ; partial cross section

85T12 Dubé,L.J. Eichler,J.
Structural and asymptotic properties of the eikonal approximation for electron capture
J. Phys. B 18 2467-2483 1985 T
eikonal approximation
formulation

85T14 Dubé,L.J. Will,U. Bruch,R. Trabert,E. Heckmann,P.H.
Theory and experiment of electron capture in collisions of multiply charged projectiles with light targets
Nucl. Instr. Meth. in Phys. 9 408-412 1985 T
Res. B
 $C^{4+} + H_2, He \rightarrow C^{3+} (1s^2nl)$
T : CDW, B1 ; E : photon spectroscopy
166 - 417 keV/amu

85T15 Eichler,J.
Relativistic eikonal theory of electron capture
Phys. Rev. A 32 112-121 1985 T
 $Ne^{6+} + B^{e-1} \rightarrow Ne^{5+} (1s) + B^{Z+}$
relativistic eikonal
10000 - 100000000 keV/amu
analytic expression

85T16 Errea,L.F. Gomez-Llorente,J.M. Mendez,L. Riera,A.
Practical criterion for the determination of translation factors. II. Application to $He^{2+} + H(1s)$ collisions
Phys. Rev. A 32 2158-2165 1985 T
 $He^{2+} + H \rightarrow He^+(nl) + H^+$
CC (MO) with ETF
0.25 - 25 keV/amu

85T17 Errea,L.F. Mendez,L. Riera,A. Yonez,M. Hansen,J. Harel,C. Salin,A.
Charge exchange in $Li^{2+} (1s) + H(1s)$ collisions. A molecular approach including two-electron translation factors
J. de Physique 46 719-726 1985 T
 $Li^{2+} (1s) + H(1s) \rightarrow Li^+(1s2s), Li^+(1s2p), Li^+(total)$
8 MO expansion method with ETF
0.5 - 25 keV/amu

85T18 Fritsch,W. Lin,C.D.
Close-coupling study of K-shell vacancy production in near-symmetric collisions
Phys. Rev. A 31 1164-1167 1985 T
 $F^{8+} + Ne \rightarrow F^{7+} + Ne^+(1s^4) ; S^{15+} + Ar \rightarrow S^{14+} + Ar^+(1s^4)$
modified AO
231 - 520 keV/amu (F); 500 - 2800 keV/amu (S)

- 85T19 Gargaud, M. McCarroll, R.
Charge transfer in low-energy collisions of N^{3+} , C^{4+} and N^{3+} with H and H_2
J. Phys. B 18 463-477 1985 T
 N^{3+} , C^{4+} , N^{3+} + H, $H_2 \rightarrow N^{2+}$, C^{3+} , N^{4+} + H^+ , H_2^+
CC(MO)
1.0 keV/amu
- 85T20 Gayet, R., Hamssen, J., Harel, C., Salin, A.
Electron capture from atomic hydrogen in the keV/amu energy range
Nucl. Instr. Meth. in Phys. 9 413-414 1985 T
Res. B
 C^{4+} , N^{3+} , O^{6+} + H \rightarrow C^{3+} , N^{4+} , O^{5+} + H^+
Molecular calculation
0.25 - 25 keV/amu
- 85T21 Ghosh, M., Mandal, C.R., Mukherjee, S.C.
Single and double electron capture from lithium by fast alpha particles
J. Phys. B 18 3797-3804 1985 T
 He^{2+} + Li \rightarrow $He^+(nl)$ + Li; He^0 + Li^{2+}
CDW approximation
200 - 500 keV/amu
- 85T22 Gorzdanov, T.P., Janev, R.K., Lazar, V., Yu.
Two-electron exchange in slow ion-atom collisions
Phys. Scripta 32 64-68 1985 T
 A^{2+} + A \rightarrow A + A^{2+} (A = Ne, Ar, Kr, Xe)
asymptotic expansion
 3.8×10^{-3} - 0.25 keV/amu
total cross section
- 85T61 Horbatsch, M., Dreizler, R.M.
Semiclassical description of electron loss in fast U^{6+} / U^{7+} - Ar collisions.
Phys. Letters 113A 251 - 253 1985 T
 U^{6+} , U^{7+} + Ar \rightarrow Ar $^{+}$
quantum statistical, semiclassical, independent particle model
3600 - 15000 keV/amu
total cross sections.
- 85T23 Humphries, W.J., Moiseiwitsch, B.L.
Third Born approximation for electron capture at relativistic energies
J. Phys. B 18 1209-1222 1985 T
 A^{Z+} + $B^{(Z-1)+} \rightarrow A^{(Z-1)+}$ + B^{Z+}
third Born approximation
analytic expression; no cross sections given
- 85T24 Humphries, W.J., Moiseiwitsch, B.L.
Total cross sections for electron capture at relativistic energies
J. Phys. B 18 2295-2301 1985 T
 A^{Z+} + $B^{(Z-1)+}(1s) \rightarrow A^{(Z-1)+}(1s)$ + B^{Z+} (A = C, Ne, Ar; B = Al, Cu, Ag)
relativistic second Born approximation
140000 - 1050000 keV/amu
- 85T26 Jakubassa-Amundsen, D.H.
Nonadiabatic sliding model for rearrangement collisions
Phys. Rev. A 32 2166-2174 1985 T
 O^{8+} + C \rightarrow O^{7+} + C + hv; S^{16+} + Ne \rightarrow S^{15+} + Ne $^+$ + hv (REC)
sliding model
- 85T27 Jakubassa-Amundsen, D.H.
Radiative electron capture accompanying resonant nuclear scattering
Z. Phys. A 322 191-197 1985 T
 $^{16}O^{8+}$, $^{20}Ne^{10+}$ + He \rightarrow O^{7+} , Ne^{9+}
1187 - 1250 keV/amu (O), 885 - 887 keV/amu (Ne)
- 85T25 Jakubassa-Amundsen, D.H., Amundsen, P.A.
Exact relativistic second Born approximation for electron capture
Phys. Rev. A 32 3106-3108 1985 T
relativistic second Born approximation
scaling at asymptotic region, $(\ln E)^2/E$
- 85T28 Jakubassa-Amundsen, D.H., Amundsen, P.A.
Electron capture across a nuclear resonance in the strong potential Born approximation
J. Phys. B 18 757-774 1985 T
 H^+ + ^{22}Ne , ^{28}Si , $^{36}Ni \rightarrow H^0$; He^{2+} + ^{16}O , ^{20}Ne , $^{28}Si \rightarrow He^+$
strong potential Born approximation
1000 - 5500 keV/amu

- 85T29 Janev, R.K., Nedeljkovic, N.N.
Quasi-stationary spectrum of Rydberg atoms in the field of a highly charged ion
J. Phys. B 19 1809-1825 1985 T
 $A^{Z+} + B(n \gg 1) \rightarrow A^{(Z-1)+} + B^+$ ($A \gg B$)
Tunneling theory
- 85T32 Kimura, M.
Molecular-state treatment of excitation and charge transfer processes in $H^+ + He(1s^2)$ collisions
Phys. Rev. A 31 2158-2161 1985 T
 $H^+ + He(1s^2) \rightarrow H(nl) + He^+(1s)$; $H^+ + He(1s, 2l)$
MO expansion with IP
1 - 30 keV/amu
- 85T33 Kimura, M.
Charge transfer in ion-molecule collisions at keV energy region; Study of $H^+ + H_2$ collisions by the electron-translational-factor-modified molecular-orbital-expansion method
Phys. Rev. A 32 802-809 1985 T
 $H^+ + H_2 \rightarrow H(1s) + H_2$
MO expansion with ETF
0.2 - 20 keV/amu
cross section ratios between H and H_2 targets
- 85T34 Kimura, M., Lin, C.D.
Unified treatment of slow atom-atom and ion-atom collisions. II. Applications to $H^+ + H$ and $C^{6+} + H$ collisions
Phys. Rev. A 32 357-1362 1985 T
 $H^+ + H \rightarrow H + H^+$; $C^{6+} + H \rightarrow C^{5+} + H^+$
unified treatment (matching method)
1 - 15 (H), 0.1 - 10 (C^{6+}) keV/amu
- 85T31 Kimura, M., Lin, C.D.
Unified treatment of slow atom-atom and ion-atom collisions
Phys. Rev. A 31 590-592 1985 T
 $H^+ + He^+ \rightarrow H + He^{2+}$; $H^+ + He^{2+} + e$
MO (at inner region) + AO (at large nuclear distance)
2 - 5 keV/amu
no cross sections given for charge transfer
- 85T30 Kimura, M., Olson, R.E.
Electron capture in pseudo-two-electron systems; $Ar^{6+} + He$
Phys. Rev. A 31 489-491 1985 T
 $Ar^{6+} + He \rightarrow Ar^{7+}(nl) + He^+$
PSS (MO) with two electron ETF
0.02 - 10 keV/amu
- 85T35 Kimura, M., Olson, R.E.
Electron capture in $O^{8+} - He$ collisions
J. Phys. B 18 2729-2735 1985 T
 $O^{8+} + He \rightarrow O^{7+} + He^+$
MO expansion with ETF
0.2 - 50 keV/amu
total cross section
- 85T36 Kimura, M., Olson, R.E.
Slow ion-atom collisions
Nucl. Instr. Meth. in Phys. 10/11 207-213 1985 T
 $H^+ + H \rightarrow H^0$; $He^{2+} + Li \rightarrow He^+$; $Ti^{4+} + H \rightarrow Ti^{3+}$; $C^{4+} + He \rightarrow C^{3+}$; $C^{5+} + He > C^{3+}(nl)$; $H^+ + Cs \rightarrow H^0$
MO
review; partial cross section for $C^{6+} + He \rightarrow C^{5+}(nl)$; total cross section for others
- 85T37 Kobayashi, K., TOSHIMA, N., Ishihara, T.
Eikonal approximation for proton-helium electron capture processes
Phys. Rev. A 32 1363-1368 1985 T
 $H^+ + He \rightarrow H + He^+$
eikonal approximation
 $10^2 - 10^4$ keV/amu
total and angle-differential cross sections
- 85T38 Kocbach, L., Taulbjerg, K.
On the theory of electron capture from inner shells in intermediate and high-energy collisions
J. Phys. B 18 L79-83 1985 T
IA
no absolute cross sections given

- 85T39 Macek, J.
Treatment of divergent terms in the strong potential Born approximation
J. Phys. B 18 L71-74 1985 T
strong potential Born approximation
modified Coulomb Green's function to avoid divergence
- 85T40 Martiarena, M.L. Garibotti, C.R.
Radiative electron capture to the continuum
Phys. Letters 113A 307-310 1985 T
radiative electron capture to continuum in $H^+ + He$; $Ne^{10+} + He$; $Ar^{16+} + He$
first Born
RECC spectra in Ne^{10+} , $Ar^{17+} + He$ collisions
- 85T41 McCann, J.F.
Continuum distorted-wave theory of relativistic electron capture
J. Phys. B 18 L569-573 1985 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$; $H^+ + B^{4+}(1s) \rightarrow H(1s) + B^{4+}$
relativistic CDW theory
 $10^3 - 10^8$ keV/amu
- 85T42 McDowell, M.R.C. Janev, R.K.
Charge exchange and ionisation in collisions of fast partially stripped ions of iron
with hydrogen
J. Phys. B 18 L295-301 1985 T
 $Fe^{8+} + H \rightarrow Fe^{q-1+} + H^+$; $Fe^{q+} + H^+ + e$ ($q=12-18$)
CTMC
10 - 400 keV/amu
Scaling laws for the cross sections as a function of q
- 85T43 McGuire, J.H. Kletke, R.E. Sil, N.C.
Strong-potential Born calculations for 1s-1s electron capture from atoms by protons
Phys. Rev. A 32 815-821 1985 T
 $H^+ + B \rightarrow H + B^*(1s^{-1})$ ($B = H, He, C, Ne, Ar, Xe$)
strong potential Born approximation
200 - 100000 keV/amu
angle-differential cross sections
- 85T44 Miraglia, J.E.
Radiative electron capture in proton-hydrogen collisions
Phys. Rev. A 32 2702-2706 1985 T
 $H^+ + H \rightarrow H^0 + H^+ + hv$
Born, CDW
 $10 - 10^4$ keV/amu
- 85T45 Miraglia, J.E. Garibotti, C.R. Gonzalez, A.D.
Photon spectrum associated with radiative electron capture processes
Phys. Rev. A 32 250-253 1985 T
 $Ne^{10+} + He, Ne \rightarrow Ne^{8+}; Ar^{17+} + He \rightarrow Ar^{16+}$
first Born approximation
7000 keV/amu (Ne), 7200 keV/amu (Ar)
- 85T62 Newby, C.W.
Charge transfer calculations using switching functions.
J. Phys. B 18 1781 - 1788 1985 T
 $He^{2+} + H(1s) \rightarrow He^+(2s, n=2) + H^+$
AO with translation factor
0.25 - 200 keV/amu
- 85T47 Olson, R.E. Kimura, M.
Molecular-state cross section calculations for $H + Na \rightarrow \leftarrow H + Na^+$
Phys. Rev. A 32 3092-3094 1985 T
 $H + Na \rightarrow H^+ + Na^+$; $H + Na^+ \rightarrow H + Na$ (3s, 3p, 4s)
pseudo potential MO
0.1 - 5 keV/amu
- 85T44 McGuire, J.H.
Non-orthogonality in the strong potential Born approximation
J. Phys. B 18 L75-77 1985 T
strong potential Born approximation

- 85T63 Opradole, L., McCarroll, R., Valion, P.
Charge transfer of Si^{4+} with helium.
Astron. Astrophys. 148 229 - 233 1985 T
 $\text{Si}^{4+} + \text{He} \rightarrow \text{Si}^{3+}(2p^3 3p)2P, (2p^3 3s)2S + \text{He}^+$; $\text{Si}^{3+} + \text{He}^+ \rightarrow \text{Si}^{4+} + \text{He}$
molecular quantum treatment
 $4 \times 10^{-7} - 3.5 \text{ keV/amu}$
rates given
- 85T48 Peach, G., Willis, S.L., McDowell, M.R.C.
The classical theory of charge transfer and ionization processes in collisions between complex atomic ions
J. Phys. B 18 3921-3937 1985 T
classical theory
general theory
- 85T49 Saha, G.C., Datta, S., Mukherjee, S.C.
Electron capture from multielectron atoms by fast ions in the continuum intermediate-state approximation
Phys. Rev. A 31 3633-3638 1985 T
 $\text{H}^+ + \text{C}, \text{N}, \text{O}, \text{Ne}, \text{Ar} \rightarrow \text{H}^0$
continuum-intermediate-state approximation
 $500 - 20000 \text{ keV/amu}$
- 85T50 Shingal, R., Bransden, B.H., Flower, D.R.
Neutralization in $\text{H}^+ + \text{H}$ collisions
J. Phys. B 18 2485-2491 1985 T
 $\text{H}^+ + \text{H}^+ \rightarrow \text{H}(1s) + \text{H}(nl)$
two-center AO expansion method
 $8 - 50 \text{ keV/amu}$
- 85T51 Sidorovich, V.A., Nikolaev, V.S., McGuire, J.H.
Calculation of charge-changing cross sections in collisions of H^+ , He^{2+} and Li^{3+} with He atoms
Phys. Rev. A 31 2193-2201 1985 T
 $\text{A}^{Z+} + \text{He} \rightarrow \text{A}^{(Z-1)+}(1s), \text{A}^{(Z-2)+}(1s^2)$
independent-electron model
 $25 - 4000 \text{ keV/amu}$
also single and double ionization of He; ionization with electron capture into ground state
- 85T52 Stallcop, J.R., Partridge, H.
 $\text{N}^+ - \text{N}$ long-range interaction energies and resonance charge exchange
Phys. Rev. A 32 639-642 1985 T
 $\text{N}^+ + \text{N} \rightarrow \text{N} + \text{N}^+$
self-consistent field method
 $7 \times 10^{-5} - 7 \times 10^{-3} \text{ keV/amu}$
- 85T53 Stich, W., Lüdde, H.J., Dreizler, R.M.
TDHF calculations for two-electron systems
J. Phys. B 18 1195-1207 1985 T
 $\text{H}^+ + \text{He}(1s^2) \rightarrow \text{H}; \text{He}^{2+} + \text{He}(1s^2) \rightarrow \text{He}^+, \text{He}^0; \text{Li}^{3+} + \text{He}(1s^2) \rightarrow \text{Li}^{2+}; \text{He}^+(2s) + \text{H}(1s), \text{He}^+(2s) \rightarrow \text{He}$
TDHF
 $7 \times 10^{-5} - 7 \times 10^{-3} \text{ keV/amu}$
- 85T54 Thyrlwe, K.E., Barany, A.
A semiclassical analysis of orbiting resonances in slow charge transfer processes
Nucl. Instr. Meth. in Phys. 9 435-437 1985 T
Res. B
 $\text{N}^{3+} + \text{H} \rightarrow \text{N}^{2+}$
semiclassical
 $10^{-5} - 10^{-2} \text{ keV/amu}$
total cross sections
- 85T55 Toepfer, A., Lüdde, H.J., Jacob, B., Dreizler, R.M.
Many-electron aspects in ion-atom collisions; $2p-2s$ vacancy transfer in the $\text{Ne}^+ + \text{Ne}$ system
J. Phys. B 18 1969-1980 1985 T
 $\text{Ne}^+ + \text{Ne} \rightarrow \text{Ne}(2p) + \text{Ne}^+(2s)$
IP
 $0.25 - 25 \text{ keV/amu}$
- 85T56 van Hemert, M.C., van Dishoeck, E.F., van der Hart, J.A., Koike, F.
Quantum-mechanical and impact-parameter treatment of $\text{He}^{2+} - \text{H}$ collisions
Phys. Rev. A 31 2227-2243 1985 T
 $\text{He}^{2+} + \text{H} \rightarrow \text{He}^+(\text{ln}) + \text{H}^+$
CC (AO-MO)
 $5 \times 10^{-3} - 1.25 \times 10^{-1} \text{ (quantum)}, 2.5 \times 10^{-2} - 2.5 \text{ (semiclassical) keV/amu}$

- 85T57 Wada, K., Murai, T.
Charge transfer in $\text{Be}^{4+} + \text{H}(1s)$ collisions; convergence and oscillatory structure of the total cross sections
J. Phys. B 18 4259-4269 1985 T
 $\text{Be}^{4+} + \text{H}(1s) \rightarrow \text{Be}^{3+}$
MO close-coupling method
2.0 - 25.0 keV/amu
- 85T58 Willis, S.L., Peach, G., McDowell, M.R.C., Banerji, J.
Charge transfer and ionization processes in collisions involving atoms and ions of hydrogen and helium
J. Phys. B 18 3939-3950 1985 T
 $\text{He}^+ + \text{H} \rightarrow \text{He} + \text{H}^+; \text{He}^+ + \text{H}^+ + e; \text{He}^+ + \text{He}^+ \rightarrow \text{He} + \text{He}^{2+}; \text{He}^+ + \text{He}^{2+} + e$
classical theory

86E69 Afrosimov, V.V. Basalnev, A.A. Panov, M.N. Samoilov, A.V.
Electron capture from helium atoms into various electronic states by multiply charged argon ions.
Sov. Phys.-JETP 64 273-279 1986 E
 $Ar^{q+}(q = 3-8) + He \rightarrow Ar^{(q-1)+}(nl), Ar^{(q-2)+}(n'l, n'l')$; $Ar^{(q-1)+} + He^{2+}$
translational energy spectroscopy + ion coincidence technique
0.12 - 0.47 keV/amu

86E70 Andersen, L., H. Jensen, K.E. Knudsen, H.
High velocity behavior ($v \gg e^2/h/2\pi$) of electron capture to the continuum in H^+ , He^+ + He collisions.
J. Phys. B 19 L161-166 1986 E
 $H^+, He^2+ + He \rightarrow H^+, He^2+ + e + He^+$
electron spectroscopy
 $10^3 - 2.6 \times 10^3$ keV/amu (H); $0.4 - 2 \times 10^3$ keV/amu (He)

86E71 Anholt, R. Meyerhof, W.E.
Atomic collisions with relativistic heavy ions VI: the state of ions in matters.
Phys. Rev. A 33 1556-1568 1986 E
 $Xe^{52+}, Xe^{44+} + Be, U \rightarrow Xe^{51+}, Xe^{34+}$
photon spectroscopy
 $8.2 \times 10^4 - 1.97 \times 10^5$ keV/amu
also K X-ray production, K-REC cross sections given

86E72 Anholt, R. Stoller, Ch. Mollitoris, J.D. Spooner, D.W. Morenzoni, E. Andriamonje, S.A. Meyerhof, W.E.
Atomic collisions with relativistic heavy ions VI: radiative process.
Phys. Rev. A 33 2270-2280 1986 E
 $Xe^{54+} + Be, Ni, Ta \rightarrow Xe^{53+} + REC; La^{57+} \rightarrow La^{56+}; U^{92+} + Be, Ni, U \rightarrow U^{91+}$
photon spectroscopy
 $8 \times 10^4 - 1.8 \times 10^5$ keV/amu (Xe); 1.7×10^5 keV/amu (La); 4×10^5 keV/amu (U)
primary bremsstrahlung

86E 1- Aumayr, F. Lakits, G. Winter, H.
Electron capture from Li (2s) by doubly charged ions (5-40 keV)
Phys. Rev. A 33 846-850 1986 E
 $A^{2+} + Li(2s) \rightarrow A^+ + Li^+$ (A = N, Ne, Ar, Kr, Xe)
growth
0.04 - 2.9 keV/amu

86E12 Bendati, N. Duong, H.T. Juncar, P. Saint Jalme, J.M. Vialle, J.L.
 Na^+ - Na charge exchange processes studied by collinear laser spectroscopy
J. Phys. B 19 233-238 1986 E
 $Na^+ + Na(3s) \rightarrow Na(3s, 3p) + Na^+$
collinear laser spectroscopy
0.2 keV/amu
no cross sections given, density-dependence

86E 4 Bischof, G. Linder, F.
Crossed beam study of $He^+ - O_2$ charge transfer reactions in the collision energy range 0.5 - 200 eV
Z. Phys. D 1 303-320 1986 E
 $He^+ + O_2 \rightarrow He + O + O^+$
crossed beam technique
 $1.25 \times 10^{-4} - 0.05$ keV/amu

86E73 Bilman, S. Bonnet, J.J. Bonnefoy, M. Dousson, S. Fleury, A. Hitz, D. LuDac, T. Mayo, M.
X-UV spectroscopy of low energy charge exchange collisions.
J. de Phys. (colloq.) 47(C-6) 41-46 1986 E
 $Ne^{8+} + He \rightarrow Ne^{7+}(1s^2nl)$ ($nl = 3s, 3p, 4s, 4p, 4d, 3d+4f$)
photon spectroscopy
1.56 - 4 keV/amu

86E15 Bruijn, D.P.de
Dissociation of H_2 products of electron capture
Electronic and Atomic Collisions 697-704 1986 E
(North-Holland)
 $H_2^+ + B \rightarrow H_2^+(B = Ar, Mg, Na, Cs)$
translational spectroscopy
0.75 - 3.3 keV/amu
dissociation mechanisms studied

86E16 Bruijn, D.P.de Neuteboom, J. Govers, T.R. Los, J.
Dissociative decay of $n=3$ levels in H_2 , I, populated in charge exchange of H_2^+ with Cs
Phys. Rev. A 34 3847-3854 1986 E
 $H_2^+ + Cs \rightarrow H_2(n=3) \rightarrow H(1s) + H(2l)$
position-/time-sensitive detector
1.25 - 5 keV/amu
no cross sections given

- 86E13 Claeys, W., Cornet, A., Lorent, V., Jureta, J., Fussen, D.
Electron capture by 1.6 - 5 keV metastable hydrogen atoms in the inert gases and H₂
J. Phys. B 19 2955-2958 1986 E
H(2s) + B -> H + B* ; H(1s) + B -> H + B* (B = H₂, He, Ne, Ar, Kr, Xe)
growth method
1.6 - 5 keV
Cs-neutralized H beam
- 86E14 Cornille, M., Dubau, J., Bely-Dubau, F., Bliman, S., Hitz, D., Mayo, M., Bonnet, J. J.,
Boninefoy, M.
Spectroscopy of doubly excited Ne VII produced in low energy charge exchange
collisions
J. Phys. B 19 L393-397 1986 E
Neⁿ⁺ + He -> Ne⁶⁺ (n = 2, 3, 4)
photon spectroscopy
2.4 - 4 keV/amu
no cross section given
- 86E18 Dubois, R. D.
Charge transfer leading to multiple ionization of neon, sodium and magnesium
Phys. Rev. A 34 2738-2745 1986 E
H⁺, He⁺, He²⁺ + B -> H, He, He⁺ + B⁺; H, He, He⁺ + B⁺ + (i-1)e; H⁺, He⁺, He²⁺ +
B⁺ + He; He²⁺ + B -> He + B²⁺; He + B⁺ + (i-2)e (i=1-4, B = Ne, Na, Mg)
coincidence
2 - 50 keV/amu
total cross sections
- 86E19 Elliott, D. S., Shah, M. B., Gilbody, H. B.
Ionization and charge transfer in collisions of H⁺ and He²⁺ with potassium
J. Phys. B 19 3277-3286 1986 E
H⁺ + K -> H + K⁺ + (i-1)e (i=1-4); He²⁺ + K -> He⁺ + K⁺ + (i-1)e; He + K⁺ + (i-
2)e (i=1-4)
coincidence
38 - 2070 keV/amu
total cross sections
- 86E20 Fournier, P. G., Aouchiche, H., Lorent, V., Baudon, J.
Energy distribution of H⁺ ions produced by double capture in proton - H₂ collisions
Phys. Rev. A 34 3743-3748 1986 E
H⁺ + H₂, D₂ -> H + H₂⁺, D₂⁺
translational energy spectroscopy
3 - 9 keV/amu
no cross section given
- 86E21 Giese, J. P., Cooke, C. L., Waggoner, W., Tunnel, L. N., Varghese, S. L.
Energy-gain spectroscopy of electron-capture collisions between low-energy Ar and
Ne projectiles and atomic and molecular targets
Phys. Rev. A 34 3770-3781 1986 E
Ar^{q+} (q=4-8), Ne^{q+} (q=4-7) + D₂ -> Ar^{q-1+}, Ne^{q-1+} (n,1)
translational-energy spectroscopy
- 0.05 keV/amu
- 86E13 Claeys, W., Cornet, A., Lorent, V., Jureta, J., Fussen, D.
Electron capture by 1.6 - 5 keV metastable hydrogen atoms in the inert gases and H₂
J. Phys. B 19 2955-2958 1986 E
H(2s) + B -> H + B* ; H(1s) + B -> H + B* (B = H₂, He, Ne, Ar, Kr, Xe)
growth method
1.6 - 5 keV
Cs-neutralized H beam
- 86E22 Clark, M. W., Bernstein, E. M., Tanis, J. A., Graham, W. G., McFarland, R. H.,
Morgan, T. J., Johnson, B. M., Jones, K. W., Meron, M.
Electron capture and loss for 2.5 - 200 MeV S¹³⁺ + He collisions
Phys. Rev. A 33 762-764 1986 E
S¹³⁺ + He -> S¹²⁺, S¹⁴⁺
growth
78 - 6250 keV/amu
- 86E14 Cornille, M., Dubau, J., Bely-Dubau, F., Bliman, S., Hitz, D., Mayo, M., Bonnet, J. J.,
Boninefoy, M.
Spectroscopy of doubly excited Ne VII produced in low energy charge exchange
collisions
J. Phys. B 19 L393-397 1986 E
Neⁿ⁺ + He -> Ne⁶⁺ (n = 2, 3, 4)
photon spectroscopy
2.4 - 4 keV/amu
no cross section given
- 86E74 Courbin, C., Sidis, V., Wahnon, P.
Theoretical study of the alignment and orientation of n=2 levels in the Li⁺ + He
collision.
Ann. de Phys. (France) 11(C-3) 113 - 124 1986 E
Li⁺ + He -> Li⁺(2²P) + He⁺
photon spectroscopy
0.07 - 3 keV/amu
also Li⁺ + He⁺(2¹P) excitation.
- 86E17 Druetta, M., Bouchama, T., Martin, S.
Single electron capture into Ne⁶⁺(n,l) shells in Ne⁷⁺ + H₂ collisions
J. Phys. B 19 L723-726 1986 E
Ne⁷⁺ + H₂ -> Ne⁶⁺(n,l)
VUV spectroscopy
3.5 keV/amu
emission cross sections given

- 86E10 Graham, W.G., Bernstein, E.M., Clark, M.W., Tanis, J.A., Berkner, K.H., Gohil, P., McDonald, R.J., Schlachter, A.S., Stearns, J.W., McFarland, R.H., Morgan, T.J., Muller, A.
Structure in the energy dependence of high energy electron capture cross sections
Phys. Rev. A 33 3591-3594 1986 E
 $\text{Ca}^{9+} + \text{H}_2 \rightarrow \text{Ca}^{8+} + \text{H}$ ($q=16-19$)
growth method
2425 - 9200 keV/amu
two bumps near 200 - 300 MeV
- 86E23 Havener, C.C., Rouze, N., Westervelt, W.B., Risle, J.S.
Experimental determination of the density matrix describing collisionally produced H($n=3$) atoms
Phys. Rev. A 33 276-293 1986 E
 $\text{H}^+ + \text{He} \rightarrow \text{H}(n=3)$
Balmer-alpha intensity as a function of axial and transverse electric field
40 - 80 keV/amu
density matrix
- 86E24 Hippler, R., Harbich, W., Faust, M., Lutz, H.O., Dube, L.J.
Alignment of H(2p) following $\text{H}^+ - \text{He}$, Ar charge-changing collisions
J. Phys. B 19 1507-1514 1986 E
 $\text{H}^+ + \text{He}$, Ar $\rightarrow \text{H}(2p) + \text{He}^+$, Ar⁺
Lyman-alpha measurement
0.5 - 5 ; 35 - 300 keV/amu
integral alignment factor A_{20}
- 86E25 Hird, B., Abbas, I.A., Bruyere, M.
Single- and double-electron detachment cross sections for O collisions with rare gas atoms
Phys. Rev. A 33 2315-2319 1986 E
 $\text{O} + \text{B} \rightarrow \text{O}^+, \text{O}^{2+}$ (B = He, Ne, Ar, Kr, Xe)
growth method
0.6 - 7 keV/amu
- 86E26 Hornis, W.G., Hasted, J.B., Kamber, E.Y., Brenton, A.G., Beynon, J.H.
Single electron capture by Ar³⁺ from rare gas atoms
Int. J. Mass Spec. Ion Phys. 70 153-162 1986 E
translational energy spectroscopy
0.23 keV/amu
no cross sections given. only spectra with state identifications
- 86E8 Hornis, W.G., Kamber, E.Y., Hasted, J.B.
Differential N²⁺ - He collisions with capture
Int. J. Mass Spectr. Ion Processes 69 211-216 1986 E
 $\text{N}^{2+} + \text{He} \rightarrow \text{N}^+$
translational energy spectroscopy
0.07 keV/amu
no cross section
- 86E75 Guyon, P.M., Goves, T.R., Baer, T.
State selected ion-molecule reactions; a summary of experimental and theoretical analysis on the system $\text{N}_2^+(v) + \text{Ar}^+ \rightarrow \text{N}_2^+(v') + \text{Ar}^+$.
Z. Phys. D 4 89 - 101 1986 E
 $\text{N}_2^+(v) + \text{Ar} \rightarrow \text{N}_2^+(v') + \text{Ar}^+$; $\text{Ar}^+(^3P_1) + \text{N}_2 \rightarrow \text{Ar} + \text{N}_2^+(v)$
photoionization + TOF
 $5 \times 10^{-4} - 1.4 \times 10^{-2}$ keV/amu
- 86E22 Haggmann, S., Kalch, S., Cooke, C.L., Richard, P., Skutlartz, A., Schmidt-Bocking, H., Schuch, R., Johnson, B., Meron, M., Jones, K.
Recoil charge state - target K-Auger electron coincidences : a technique to study excitation patterns in K-K charge transfer
Phys. Rev. A 34 2897-2910 1986 E
 F^{8+} , $\text{F}^{9+} + \text{Ne} \rightarrow \text{F}^{7+}$, $\text{F}^{8+} + \text{Ne}^+(\text{K}^{-1})$
Auger-electron / recoil ion coincidence
230 - 530 keV/amu
no cross sections
- 86E76 Hall, J., Richard, P., Penmiller, P.L., Gregory, D.C., Miller, P.D., Moak, C.D., Jones, C.M., Alton, G.D., Bridwell, L.B., Sofield, C.J.
Energy systematics of single and double K-shell vacancy production in titanium bombarded by chlorine ions.
Phys. Rev. A 4 914 - 920 1986 E
 $\text{Cl}^{17+} + \text{Ti} \rightarrow \text{Cl}^{16+}$, $\text{Cl}^{15+} + \text{Ti}^+(\text{K}^{-1}, \text{K}^{-2})$
photon spectroscopy
 $5 \times 10^2 - 1.5 \times 10^3$ keV/amu
Single and double K-shell ionization cross sections ; K-K and KK-KK transfer cross sections

- 86E28 Horsdal, E., Jensen, B., Nielsen, K.O.
Critical angle in electron capture
Phys. Rev. Letters 57 1414-1416 1986 E
 $H^+ + He \rightarrow H + He^+$; $H + He^{2+} + e$
coincidence
200 - 500 keV/amu
angle-differential cross sections
- 86E27 Horsdal, E., Jensen, B., Nielsen, K.O.
Experimental study of charge transfer near a nuclear scattering
Phys. Rev. Letters 57 675-678 1986 E
 $Ne(H^+, H^0)$ nuclear reaction
1955 keV/amu
- 86T38 Kimura, M.
Theoretical treatment of electron capture and excitation in two-electron system ion-atom, atom-atom collisions at low to intermediate energy.
Electronic and Atomic Collisions 431 - 444 1986 E
(1986, Elsevier, North-Holland)
review
- 86E29 Kimura, M.
Electron capture by slow and highly stripped iodine ions from helium atoms
Electronic and Atomic Collisions 471-478 1986 E
(North-Holland)
 $I^q + He \rightarrow I^{(q-1)+}$ ($q=10-40$)
short review
- 86E30 Knudsen, H., Andersen, L.H., Jensen, K.E.
The double-differential cross sections for electron capture to the continuum in the strong interaction region: fast, highly charged ions on helium atoms
J. Phys. B 19 3341-3352 1986 E
 $C^{6+}, O^{8+}, Cl^{11+}, Au^{11+} + He \rightarrow ECC$
electron spectroscopy
100 - 2000 keV/amu
ECC
- 86E31 Kusakabe, T., Horiuchi, T., Nagai, N., Hanaki, H., Konomi, I., Sakisaka, M.
Charge transfer of multiply charged slow argon, krypton and xenon ions on atomic and molecular targets. single-charge transfer cross sections
J. Phys. B 19 2165-2174 1986 E
 $Ar^{q+}(q=2-7) + He, H_2 \rightarrow Ar^{(q-1)+}$; $Kr^{q+}(q=2-9), Xe^{q+}(q=2-11) + B \rightarrow Kr^{(q-1)+}, Xe^{(q-1)+}$
($B = He, Ne, Ar, Kr, Xe, H_2, N_2, CO_2, CH_4, C_2H_6, C_3H_8$)
growth
- 0.3 keV/amu
scaling law proposed. recoil ions used. total cross sections given.
- 86E32 Larsen, P.H., Elford, M.T.
The mobilities of Xe ions in Xe and the derived charge transfer cross section for Xe^+ ($^2P_{3/2}$) ions in Xe
J. Phys. B 19 449-461 1986 E
 $Xe^+(^2P_{3/2}) + Xe \rightarrow Xe + Xe^+$
drift tube technique
 $2 \times 10^{-6} - 3 \times 10^{-5}$ keV/amu
- 86E62 Leeuw, P.E., van der Tip, A., Kouot, W., Kleyn, A.W., Los, J.
Differential cross sections for collisional neutralization of H by rare gases
Chem. Phys. 101 183-199 1986 E
 $He + He, Ar, Xe \rightarrow He^0$
position sensitive detection (E), impulse approximation (T)
0.12 - 0.5 keV/amu
relative angle-differential cross sections
- 86E33 Liao, C.L., Ng, C.Y.
Vibrational state distributions of $H_2^+(v')$ resulting from the electron transfer reactions $H_2^+(v=0,1) + H_2(v=0) \rightarrow H_2^+(v') + H_2^+(v')$ in the energy range of 2-16 eV
J. Chem. Phys. 84 197-200 1986 E
 $10^{-3} - 10^{-2}$ keV/amu
- 86E35 Liao, C.L., Shao, J.D., Xu, R., Flesch, G.D., Li, Y.G., Ng, C.Y.
A state-to-state study of the electron transfer reactions $Ar^+(^2P_{3/2,1/2}) + N_2(X, v=0) \rightarrow Ar^+(^1S_0) + N_2^+(X, v')$
J. Chem. Phys. 85 3874-3890 1986 E
 $Ar^+(^2P_{3/2,1/2}) + N_2(v=0) \rightarrow Ar^+(^1S_0) + N_2^+(v')$
crossed-beam / photo ionization
 $6 \times 10^{-6} - 1 \times 10^{-3}$ keV/amu

- 86E34 Liao, C.L., Xu, R., Ng, C.Y.
 Fine structure effect on the charge transfer reaction $\text{Ar}^+(\text{P}_{3/2,1/2}) + \text{N}_2(\text{X } ^1\Sigma_g^+, \nu=0)$
J. Chem. Phys. 84 1948-1950 1986 E
 $\text{Ar}^+(\text{P}_{3/2,1/2}) + \text{N}_2(\text{X } ^1\Sigma_g^+, \nu=0) \rightarrow \text{Ar}^+(\text{S}_0) + \text{N}_2^+(\text{X } ^2\Sigma_g^+, \nu')$
 $2.5 \times 10^{-4} - 1 \times 10^{-2} \text{ keV/amu}$
- 86E36 Liao, C.L., Xu, R., Ng, C.Y.
 A state-to-state study of the electron transfer reactions $\text{N}_2^+(\text{X}, \nu=0-2) + \text{Ar}^+(\text{S}_0) \rightarrow \text{N}_2(\text{X}, \nu) + \text{Ar}^+(\text{P}_{3/2,1/2})$
J. Chem. Phys. 85 7136-7145 1986 E
 $\text{N}_2^+(\text{X}, \nu=0-2) + \text{Ar}^+(\text{S}_0) \rightarrow \text{N}_2(\text{X}, \nu) + \text{Ar}^+(\text{P}_{3/2,1/2})$
 crossed beam / photo ionization
 $1 \times 10^{-4} - 0.02 \text{ keV/amu}$
- 86E9 Liljeby, L., Astner, G., Barany, A., Cederquist, H., Danared, H., Hultdt, S., Hvelplund, P., Johnson, A., Knudsen, H., Rensfelt, K.G.
 Absolute cross sections for multielectron processes in slow $\text{Ar}^{n+} + \text{Ne}, \text{Ar}, \text{Kr}$ collisions
Phys. Scripta 33 310-320 1986 E
 $\text{Ar}^{n+} + \text{B} \rightarrow \text{Ar}^{(n-1)+} + \text{B}^+$ ($q=1-8$; $r=0-8$; $s=1-6$; $\text{B}=\text{Ne}, \text{Ar}, \text{Kr}$)
 TOF + coincidence
 0.045 xq keV/amu
- 86E37 MacAdam, K.B.
 Failure of classical scaling in low-velocity charge transfer from Rydberg atoms
Phys. Rev. A 34 2767-2770 1986 E
 scaling to $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(\text{all}) + \text{H}^+$
- 86E38 Mann, R.
 Total one-electron capture cross sections for Ar^{n+} and I^{n+} ions in slow collisions on H_2 and He
Z. Phys. D 3 85-90 1986 E
 $\text{Ar}^{n+}(q=4-15), \text{I}^{n+}(q=5-27) + \text{B} \rightarrow \text{Ar}^{(q-1)+}, \text{I}^{(q-1)+}$ ($\text{B} = \text{H}_2, \text{He}$)
 growth
 $0.02 - 0.07 \text{ keV/amu (Ar)}; 0.008 - 0.04 \text{ keV/amu (I)}$
 recoil ions by 2 GeV U^{7+} (I^{6+} : observed), total cross sections given
- 86E40 Mathur, D., Badarinarayan, C., Rajgara, F.A., Raheja, U.T.
 Translational energy loss spectroscopy of molecular dications from methane
Chem. Phys. 103 447-459 1986 E
 $\text{CH}_n^+(n=1-5) + \text{B} \rightarrow \text{CH}_n^{2+}$ ($\text{B} = \text{Kr}, \text{CH}_4, \text{N}_2, \text{air}$)
 translational spectroscopy
 $0.03 - 0.4 \text{ keV/amu}$
 no cross section given
- 86E39 Mathur, D., Kingston, R.G., Harris, F.M., Beynon, J.H.
 State-diagnosed electron capture collisions of $\text{Cs}_2^{n+}(q=2,3)$ with atomic and molecular targets
J. Phys. B 19 L575-580 1986 E
 $\text{Cs}_2^{n+}(q=2,3) + \text{B} \rightarrow \text{Cs}_2^{(q-1)+}$
 translational energy spectroscopy
 $0.02 - 0.03 \text{ keV/amu}$
 no cross sections given, reaction window
- 86E41 Matsuo, T., Kobayashi, N., Kaneko, Y.
 Study of low energy charge transfer reactions of $\text{Ar}^+ + \text{N}_2$ and $\text{Ar}^+ + \text{O}_2$ by Time-of-Flight technique
J. Phys. Soc. Japan 55 3045-3053 1986 E
 $\text{Ar}^+ + \text{B} \rightarrow \text{Ar} + \text{B}^+$ ($\text{B} = \text{N}_2, \text{O}_2$)
 TOF technique
 $2.5 \times 10^{-7} - 2 \times 10^{-6} \text{ keV/amu}$
 angular distribution ($0 - 2^\circ$)
- 86E59 McFarland, J.A., Bernstein, E.M., Clark, M.W., Graham, W.G., Mueller, D.W., Muller, A., Stockli, M.P., Berkner, K.H., Gohil, P., McDonald, R.J., Schlachter, A.S., Stearns, J.W.
 Resonant transfer and excitation: dependence on projectile charge state and target-electron momentum distribution
Phys. Rev. A 34 2543-2546 1986 E
 $\text{Ca}^{8+} + \text{H}_2, \text{He} \rightarrow \text{Ca}^{(q-1)+}$ ($q=10-19$)
 X-ray/scattered particle coincidence
 $2500 - 9250 \text{ keV/amu}$
- 86E42 Morenzoni, E., Anholt, R., Meyerhof, W.E.
 Separated projectile and target K X-ray production in symmetric heavy ion collisions as a function of the target thickness
Z. Phys. D 4 133-140 1986 E
 $\text{A}^{q+} + \text{A} \rightarrow \text{A}^{(q-1)+}(1s) + \text{A}^+(\text{K}^{-1})$ ($\text{A} = \text{Ni}, \text{Cu}, \text{Nb}, \text{A}$)
 X-ray yield over thickness dependence
 $1000 - 1500 \text{ keV/amu}$

- 86E11 Muller, A., Schuch, B., Groh, W., Salzborn, E., Beyer, H.F., Mokler, P.H., Olson, R.E.
Multiple electron capture and ionization in collisions of highly stripped ions with Ar atoms
Phys. Rev. A 33 3010-3017 1986 E
 $Fe^{q+}(q=5, 10, 12, 15, 20, 25)$, $U^{q+}(q=44)$ + Ar \rightarrow $Fe^{(q-i)+}$, $U^{(q-i)+}(i=0-5)$ + $Ar^{r+}(r=1-14)$
E: recoil ion-projectile ion coincidence; T: CTMC
1400 keV/amu
- 86E43 Nagata, T., Kuribara, M.
Cross sections for formation of H(2p) and H(2s) atoms on H-alkali atom charge transfer collisions
J. Phys. Soc. Japan 55 500-506 1986 E
 $H^+ + B \rightarrow H(2p, 2s)$ (B = Na, K, Rb, Cs)
growth
0.006 - 5 keV/amu
- 86E78 Noll, M., Toennies, J.P.
Vibrational state resolved measurements of differential cross sections for $H^+ + O_2$ charge transfer collisions.
J. Chem. Phys. 85 3313 - 3325 1986 E
 $H^+ + O_2(v=0) \rightarrow H + O_2^+(v'=0 - 5)$
TOF method
scattering angle = 0 - 11 deg.
- 86E44 Okuno, K.
Charge transfer of Ar^{2+} and Kr^{2+} in their own gases studied by the beam guide technique
J. Phys. Soc. Japan 55 1504-1515 1986 E
 $A^{2+} + A \rightarrow A^+, A^0$ (A = Ar, Kr)
octopole ion-beam guide technique
 $10^{-3} - 0.01$ keV/amu (Ar); $3 \times 10^{-4} - 0.01$ keV/amu (Kr)
total cross sections
- 86E82 Okuno, K., Kaneko, Y.
Low energy collision experiments using the beam-guide technique-charge transfer cross sections of Ar^{3+} and Kr^{3+} in their own gases (in Japanese)
Mass Analysis (Shitsuryo-Bunseki- 34 351 - 365 1986 E
Japanese Journal)
 $A^{3+} + A \rightarrow A^{2+}, A^+, A^0$ (A=Ar, Kr)
beam-guide technique
 $4 \times 10^{-6} - 0.02$ keV/amu
- 86E45 Panev, G.S.
Total charge transfer cross sections in collisions of Ca^+ ions with Mg and Sr atoms
Phys. Letters 115A 338-339 1986 E
 $Ca^+ + Mg, Sr \rightarrow Ca$
cross beam technique
0.002 - 0.025 keV/amu
total cross sections
- 86E46 Peart, B., Bennett, M.A.
Measurement of one-electron transfer between $^3He^+$ and H ions
J. Phys. B 19 L321-324 1986 E
 $^3He^+ + H \rightarrow He^+ + H$
crossed beam technique
0.03 - 2.6 keV/amu
- 86E47 Peart, B., Wilkins, P.M.
Measurement of charge transfer between B^{2+} - H and 3^+ - H
J. Phys. B 19 L515-517 1986 E
 $B^{2+} + H \rightarrow B^+ + H$; $C^{3+} + H \rightarrow C^{2+} + H$
crossed beam technique
0.4 - 2.4 keV/amu
- 86E 3 Rice, J.E., Marmor, E.S., Terry, J.L., Kallne, E., Kallne, J.
Observation of charge-transfer population of high n-levels in Ar^{16+} from neutral hydrogen in the ground and excited states in a Tokamak plasma
Phys. Rev. Letters 56 50-53 1986 E
 $Ar^{17+} + H, H(n) \rightarrow Ar^{16+}$
photon spectroscopy
 4×10^{-2} keV/amu (maxellian)
- 86E49 Roncin, P., Barat, M., Laurent, H.
Differential cross sections for one- and two-electron capture by highly charged ions ($N^{7+}, O^{7+}, Ne^{8+}, Ne^{9+}$) at low keV energies
Europhys. Letters 2 371-377 1986 E
 $A^{8+} + He \rightarrow A^{7+,6+}$; $A^{7+} + He \rightarrow A^{3+,6+}$ (A = N, O, Ne)
translational energy spectroscopy
- 0.5 keV/amu
relative differential cross sections

- 86E48 Roncin, P., Gaboriaud, M.N., Laurent, H., Barati, M.
Transfer excitation in low-energy (keV/amu) multiply charged ion-atom collisions
J. Phys. B 19 L691-695 1986 E
Ne⁷⁺ + He → Ne⁶⁺
translation spectroscopy/position-sensitive detector
0.5 keV/amu
relative differential cross sections (angle)
- 86E50 Rozet, J.P., Chetoui, C., Bouisset, P., Vernhet, D., Wohrer, K., Touati, A.,
Stephan, C., Gradin, J.P.
Anomalous population of deep capture states of fast ions emerging from solid foils
Phys. Rev. Letters 58 337-340 1986 E
Kr³⁶⁺ + B → Kr³⁵ (B=C, Ne, Al, Si, Ar, Cr, Cu, Zr, Sr, Sb)
thickness-dependence
3.3x10⁴ keV/amu
K-, L-shell capture cross sections
- 86E51 Sasao, M., Sato, K., Maizumoto, A., Nishizawa, A., Takagi, S., Amemiya, S.,
Masuda, T., Tsurita, T., Fukuzawa, F., Haruyama, S., Kanamori, Y.
Electron capture cross sections in high energy He²⁺ + Li collisions
J. Phys. Soc. Japan 55 102-105 1986 E
He²⁺ + Li → He⁺, He
growth technique
200 - 500 keV/amu
- 86E52 Schoenfeldt, W.A., Mokler, P.H., Hoffmann, D.H.H., Warczak, A.
Resonant electron transfer and L-shell excitation at 3.6 MeV/u Sm¹⁶⁺ → Xe collisions
at q=34-52
Z. Phys. D 4 161-176 1986 E
Sm¹⁶⁺ + Xe → Sm^{(q)15+} (q=34-52)
X-ray/scattered particle coincidence
3600 keV/amu
- 86E54 Scott, D., Champion, R.L., Doverspike, L.D., Hug, M.S.
Collisions of Cs⁺ with atoms and molecules
J. Phys. B 19 3991-4006 1986 E
Cs⁺ + B → Cs + B + e; Cs + B⁺ (B = He, Ne, Ar, Kr, Xe, D₂, N₂, O₂, CO, CO₂,
SO₂, N₂O, CH₄, SF₆)
parallel-plate technique
7x10⁴ keV/amu
- 86E53 Scott, D., Hug, M.S., Champion, R.L., Doverspike, L.D.
Alkali-negative ion-molecule collisions
Phys. Rev. A 33 170-177 1986 E
A + B → A + B⁻, A + B + e (A = Na, K; B = H₂, D₂, N₂, O₂, CO, CO₂, CH₄)
parallel-plate technique
threshold - 7x10⁻³ keV/amu
- 86E79 Sharma, S., Hasted, J.B., Mathur, D.
Energy loss spectra of N²⁺ ions with Kr and Xe gases.
Ind. J. Phys. B 60(B) 508 - 516 1986 E
N²⁺ + Kr, Xe → N⁺(nl)
translational energy spectroscopy
0.5 keV/amu
Peak assignment; no cross sections given
- 86E55 Stolterfoht, N., Havener, C.C., Phaneuf, R.A., Swenson, J.K., Shafroth, S.M.,
Meyer, F.W.
Evidence for correlated double-electron capture in low energy collisions of O⁶⁺ with
He
Phys. Rev. Letters 57 74-77 1986 E
O⁶⁺, C⁴⁺ + He → O⁴⁺, C³⁺
Auger electron spectroscopy at zero degree
3.75/3.33 keV/amu
no cross sections given
- 86E77 Suzuki, Y., Kaneko, T., Sakisaka, M.
An apparatus for measuring collisional dissociation and electron capture of molecular
ions.
Nucl. Instr. Meth. in Phys. Res. B 16 397 - 402 1986 E
CO⁺ + Ar → C⁺ + O + Ar; O⁺ + C + Ar; C⁺ + O + Ar + e; C + O + Ar⁺; CO + Ar⁺;
CO⁺ + Ar⁺ + e; H₂⁺ + Ar → H⁺ + H + Ar; H⁺ + H⁺ + Ar + e; H + H + Ar⁺; H₂ + Ar⁺;
H₂⁺ + Ar⁺ + e
position-sensitive ion-atom coincidence method
0.29 - 0.43 keV/amu (CO⁺); 4 - 6 keV/amu (H₂⁺)
- 86E56 Suzuki, Y., Kaneko, T., Torrita, M., Sakisaka, M.
Dissociation and electron capture of H₂ ions in collisions with He, Ne and Ar atoms
J. Phys. Soc. Japan 55 3037-3044 1986 E
H₂⁺ + B → H⁺ + H + B; H⁺ + H⁺ + B; H + H + B⁺; H₂ + B²⁺; H₂⁺ + Y⁺ (B = He,
Ne, Ar)
scattered ion/recoil ion coincidence
2 - 8 keV/amu

- 86E57 Swenson, J.K., Yamazaki, Y., Miller, P.D., Krause, H.F., Dittner, P.F., Pempiller, P.L., Datz, S., Stolterfoht, N.
Observation of resonant transfer and excitation to specific LS-coupled states in $O^{2+} + He$ collisions by high resolution, 0° Auger-electron spectroscopy
Phys. Rev. Letters 57 3042-3045 1986 E
 $O^{2+} + He \rightarrow O^+$
Auger spectroscopy
312 - 1562 keV/amu
- 86E58 Tang, S.Y., Wang, D.P., Neynaber, R.H.
Ion pair production in Li - Cs collisions
J. Phys. B 19 L831-836 1986 E
Li + Cs \rightarrow Li⁺ + Cs⁺
Merging beam technique
0.14 - 0.8 keV/amu
- 86E59 Tanis, J.A., Bernstein, E.M., Clark, M.W., Graham, W.G., McFarland, R.H., Morgan, T.J., Mowat, J.R., Mueller, D.W., Müller, A., Stockli, M.P.
Resonant transfer and excitation ; dependence on projectile charge state and target-electron momentum distribution.
Phys. Rev. A 34 2543 - 2546 1986 E
 $Ca^{2+}(q = 10 - 19) + H_2, He \rightarrow Ca^{(q-1)+}$
photon spectroscopy
- 86E60 Terao, M., Szucs, S., Cherkani, M., Brouillard, F., Allan, R.J.
Experimental and theoretical study of electron transfer in the $He^{2+} + H$ collision
Europhys. Letters 1 123-128 1986 E
 $^3He^{2+} + H \rightarrow ^3He^+ + H$
merged beam + coincident product (E), OEDM + translation factor (T)
 $5 \times 10^2 - 2.25$ keV/amu
- 86E61 Tobita, K., Takeuchi, H.
One-electron loss cross section of helium in hydrogen gas
J. Phys. Soc. Japan 55 4231-4233 1986 E
 $He + H_2 \rightarrow He^+$
growth
0.5 - 4 keV/amu
- 86E 6 Ullrich, J., Bethge, K., Kelbch, S., Schadt, W., Schmidt-Böcking, H., Stiebing, K.E.
Absolute cross sections for projectile-charge-state-correlated multiple ionisation processes in Ne - Ne collisions
J. Phys. B 19 437-448 1986 E
 $Ne^{q+} + Ne \rightarrow Ne^{q+} + Ne^{q+}(q=2, 3 ; \tau=1-6)$
coincidence technique
75 - 360 keV/amu
- 86E81 Van Zyl, B., Gealy, M.W., Neumann, H.
Balmer-line emission from low-energy H^+ impact on rare atoms.
Phys. Rev. A 33 2333 - 2338 1986 E
 $H^+ + He, Ne, Kr, Xe \rightarrow H^+(n) + hv(n = 3, 4 \rightarrow n = 2)$
photon spectroscopy
1.25 - 2 keV/amu (He) ; 0.5 - 2 keV/amu (Ne) ; 0.04 - 2 keV/amu (Kr, Xe)
Balmer-alpha and -beta line emission cross section ; also polarization
- 86E63 Vogt, H., Schuch, R., Justiniano, E., Schulz, M., Schwab, W.
Experimental test of higher-order electron capture processes in collisions of fast protons with atomic hydrogen
Phys. Rev. Letters 57 2256-2259 1986 E
 $H^+ + H(1s) \rightarrow H + H^+$
atomic hydrogen
2800 - 5000 keV/amu
angle-differential cross section ($\theta = 0.005 - 0.8$ mrad)
- 86E64 Wang, H. Y., Church, D.A.
Electron transfer from H_2 to N^{3+} near 0.1 eV/amu
J. Phys. B 19 L799-801 1986 E
 $N^{3+} + H_2 \rightarrow N^{2+}$
trapped ion
 10^{-4} keV/amu
- 86E65 Warczak, A., Liesen, D., Liu, B.
Strong influence of electron capture on the characteristic X-ray emission following close heavy-ion-atom collisions
J. Phys. B 19 3975-3990 1986 E
U + Sn ; Pb + Ag
impact parameter/X-ray coincidence
1400 keV/amu

- 86E66 Watts, M.F., Dunn, K.F., Gilbody, H.B.
Redetermination of cross sections for charge transfer and ionization in $H^+ - He^+$ collisions
J. Phys. B 19 L355-359 1986 E
 $He^+ + He^+ \rightarrow H + He^{2+}$
crossed beam technique
0.05 - 0.14 keV/amu
- 86E67 Watts, M.F., Hopkins, C.J., Angel, G.C., Dunn, K.F., Gilbody, H.B.
Charge transfer and ionization in collisions of protons with Al^+ , Ga^+ , In^+ and Tl^+ ions
J. Phys. B 19 3739-3747 1986 E
 $H^+ + B^+ \rightarrow H + B^{2+}$ (B = Al, Ga, In, Tl)
Crossed beam
50 - 600 keV/amu
Ionization + charge transfer cross sections given
- 86E 5 Wilkie, F.G., McCullough, R.W., Gilbody, H.B.
State-selective electron capture by slow C^{3+} and N^{3+} ions in H and H_2
J. Phys. B 19 239-251 1986 E
 $C^{3+} + H \rightarrow C^{2+}(2s3d \ ^1D, \ ^3D) ; 2s3p \ ^1P, \ ^3P ; 2s3s \ ^3S ; 2p^2 \ ^1S, \ ^3D) + H^+$
translational energy spectroscopy + H-oven
0.125 - 1 keV/amu
only energy gain spectra for $C^{3+} + H_2 ; N^{3+} + H, H_2$ collisions
- 86E68 Williams, D.G., Lee, A.R., Butcher, E.C.
Differential cross sections for transfer into the 2s state of hydrogen : $H^+ + H_2, H^+ + D_2$
J. Phys. B 19 4007-4016 1986 E
 $H^+ + H_2, D_2 \rightarrow H(2s)$
3.3 - 24 keV/amu
angle-differential cross sections
- 86T 6 Allan, R.J.
Charge transfer in $H^+ - Ni^0$ collisions; molecular orbital calculations
J. Phys. B 19 321-334 1986 T
 $H^+ + Na(3s) \rightarrow H(nl) + Na^+$
PSS with ETF
- 86T14 Allan, R.J.
 $He^+(1s) + He^+(1s)$ charge transfer collisions
J. Phys. B 19 L 683 - 689 1986 T
 $He^+(1s) + He^+(1s) \rightarrow He + He^{2+}$
SCF/CI with translation factor
5 - 70 keV/amu
- 86T 9 Allan, R.J., Shingal, R., Flower, D.R.
Charge transfer in $H^+ - Na(3p)$ collisions; a possible ultraviolet laser mechanism
J. Phys. B 19 L251-256 1986 T
 $H^+ + Na(3p) \rightarrow H(nl) + Na^+$
AO (>0.2 keV/amu) ; MO (<0.4 keV/amu)
0.02 - 10 keV/amu
- 86T64 Archirel, P., Levy, B.
A simple determination of the potential energy curves and couplings for long-range charge-transfer reactions: Application to the system $(ArN_2)^+$.
Chem. Phys. 106 51 - 68 1986 T
 $Ar + N_2(X, A, v) \rightarrow Ar^+ + N_2 ; Ar^+(^2P_{1/2}, ^2P_{3/2}) + N_2 \rightarrow Ar + N_2^+$
ab initio approach
 2×10^{-2} keV/amu
- 86T65 Baer, M., Nakamura, H., Ohsaki, A.
A quantum-mechanical study of chemical reaction and charge-transfer processes in the $(Ar+H_2)^+$ system.
Chem. Phys. Letters 131 468 - 474 1986 T
 $Ar^+ + H_2 (v_0 = 0, 1) \rightarrow Ar + H_2^+(v_f)$
reactive infinite-order sudden approx.
chemical reactions
- 86T15 Barany, A., Danared, H., Cederquist, H., Hveplund, P., Knudsen, H., Pedersen, J., O.K., Cocke, C.L., Tunnell, L.N., Waggoner, W., Giese, J.P.
Stueckelberg angular scattering oscillations in two electron capture by C^{4+} from He at low energies.
J. Phys. B 19 L427 - 431 1986 T
 $C^{4+} + He \rightarrow C^{2+} + He^{2+}$
Two state curve crossing model
0.025 - 0.125 keV/amu
Angle differential cross sections

- 86T16 Belkic,Dz, Gayet,R, Hansen,J, Salin,A.
The first Born approximation for charge transfer collisions
J. Phys. B 19 2945 - 2953 1986 T
 $H^+, He^2+, Li^{3+} + C \rightarrow H(1s), He^+(1s), Li^{2+}(1s) + C^+(K^{-1})$; $He^2+ + H \rightarrow He^+(1s)$; $H^+ + Ar \rightarrow H(1s), Ar^+(K^{-1})$
First Born approximation
100 - 2000 keV/amu
K-shell capture cross sections
- 86T66 Belkic, Dz, Saini, S, Taylor, H.S.
Electron capture by protons from the K-shell of H and Ar.
Z. Phys. D 3 59 - 67 1986 T
 $H^+ + H(1s) \rightarrow H(nlm) + H^+$; $H^+ + Ar \rightarrow H(nl) + Ar^+(K^{-1})$
T-matrix
25 - 125 keV/amu (H); $10^3 - 1.3 \times 10^4$ keV/amu (Ar)
angular distribution
- 86T 4 Bienstock,S, Dalgarno,A, Heil,T,G.
Charge transfer in $N^{2+} + H$ collisions at slow to intermediate velocities
Phys. Rev. A 33 2078-2080 1986 T
 $N^{2+} + H \rightarrow N + H^+$
CC + UDWA
 $5.4 \times 10^{-3} - 5.36$ keV/amu
- 86T17 Blanco,S.A, Falcon,C.A, Piancetti,R,D.
Electron capture from H(2s) by H^+ at low energies
J. Phys. B 19 3945 - 3950 1986 T
 $H^+ + H(2s) \rightarrow H(n=2) + H^+$
MO
0.06 - 2.25 keV/amu
The cross sections in table 1 should be multiplied by a factor of 10 (see J.Phys.B 21 (1988) L49)
- 86T67 Braga, J.P, Knowles, D.B, Murrel, J.N.
A theoretical study of the non-adiabatic charge transfer process $Ar^{2+}(^2P) + He(^1S) \rightarrow Ar^+(^2P) + He^+(^3S)$.
Mol. Phys. 57 665 - 674 1986 T
 $Ar^{2+}(^2P) + H(^1S) \rightarrow Ar(^2P) + He(^3S)$
close-coupling calculation with C.I.
 $3 \times 10^{-5} - 3 \times 10^{-3}$ keV/amu
also angular differential cross sections; comparison with Landau-Zener calculation
- 86T68 Briggs, J.S.
Critical second-order scattering in three-body rearrangement and break-up processes.
J. Phys. B 19 2703 - 2714 1986 T
second-order T-matrix
- 86T18 Burgdorfer,J, Morgenstern,R, and Niehaus,A.
Angular momentum distribution in the classical over-barrier model for electron capture into highly charged slow projectiles.
J. Phys. B 19 L507 - 513 1986 T
 $O^{6+}, N^{5+} + H, H_2 \rightarrow O^{3+}, N^{4+}$
Modified classical over-barrier model
average angular momentum.
- 86T10 Burgdorfer,J, Taulbjerg,K.
Distorted-wave methods for electron capture in ion-atom collisions
Phys. Rev. A 33 2959-2969 1986 T
 $A^{Z+} + B^{(q-1)+} \rightarrow A^{(q-1)+} + B^{Z+}$
distorted-wave with strong potential Born; CDW
- 86T19 Cole,S,K, DePristo,A,E.
State-to-state differential cross sections from semiclassical energy conserving trajectory calculations; $H_2^+(v) + H_2(v=0) \rightarrow H_2(v'') + H_2^+(v')$
J. Chem. Phys. 85 1389 - 1395 1986 T
 $H_2^+(v) + H_2(v=0) \rightarrow H_2(v'')$ ($v = 0,2,5,8$)
semiclassical energy conserving trajectory calculation
 $4 \times 10^{-3} - 8 \times 10^{-3}$ keV/amu
- 86T20 Copper,D,L, Ford,M,J, Gerratt,J, Raimondi,M.
Calculation of potential energy curves for the process $C^{3+}(2l) + H(1s) \rightarrow C^{2+}(nlml'; l) + H^+$
Phys. Rev. A 34 1752 - 1756 1986 T
 $C^{3+}(2L) + H(1s) \rightarrow C^{2+}(nlml'; l) + H^+$
Spin-coupled valence-bond theory
potential energy curves only; no cross sections
- 86T69 Dakhnovskii, Yu.I, Ovchinnikov, A.A.
Adiabatic electron transfer in polar media: Quantum transition state theory.
Mol. Phys. 58 237 - 252 1986 T
general theory
transition state theory

- 86T21 Danared, H. Barany, A.
Semiclassical scattering effects in two electron capture by C^{4+} from He at low energies.
J. Phys. B 19 3109 - 3120 1986 T
 $C^{4+} + He \rightarrow C^{2+}$
Semiclassical/semiquantal methods
0.25 - 0.125 keV/amu
Angle-differential cross sections is oscillatory
- 86T22 Deco, G.R. Hanssen, J.Rivarola, R.D.
Application of a first-Born-type approximation for 2l electron capture in ion-atom collisions
J. Phys. B 19 L635 - 638 1986 T
 $H^+ + H(1s) \rightarrow H(2s, 2p)$; $H^+ + He(1s^2) \rightarrow H(2s, 2p)$
First-Born-approximation
25 - 1000 keV/amu
Total cross sections
- 86T24 Deco, G.R. Piancetti, R.D. Rivarola, R.D.
Symmetric eikonal theory for $n_l, m_l \rightarrow n_l, m_l$ electron capture ion-atom collisions.
J. Phys. B 19 3727 - 372 1986 T
General system
Symmetric eikonal approximation
- 86T23 Deco, G.R. Rivarola, R.D.
Relativistic continuum distorted-wave model for electron capture
J. Phys. B 19 1759 - 1770 1986 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
CDW model
 $5 \times 10^7, 5 \times 10^8$ keV/amu
Angular distribution
- 86T70 Devdariani, A.V. Ostrovskii, V.N.
Exothermic charge exchange with excitation of the ion : extrapolation of cross sections into the region of thermal collisions
Opt. Spectrosc. (USSR) 60 558 - 561 1986 T
 $He^+ + Cd \rightarrow He + Cd^{*}(441.5, 3250 \text{ \AA})$; $He^+ + Zn \rightarrow He + Zn^{*}(5894 \text{ \AA})$
Landau-Zener
rate coefficients at thermal energies
- 86T25 Dewangan, D.P. Eichler, J.
A first-order Born approximation for charge exchange with Coulomb boundary conditions.
J. Phys. B 19 2939 - 2944 1986 T
 $H^+ + Ar \rightarrow H + Ar^+(K^{-1})$
First order Born approximation
 $10^3 - 2 \times 10^4$ keV/amu
- 86T26 Eichler, J.
Relativistic eikonal theory of electron capture
Electronic and Atomic Collisions 257 - 262 1986 T (1986, Elsevier, North-Holland)
 $Ne^{10+} + A^{(z-1)+}(1s) \rightarrow Ne^{8+}(1s) + A^{2+}$; $Xe^{54+}, Xe^{52+} + B \rightarrow Xe^{53+}, Xe^{51+}$ (B = Be, Al, Cu, Au)
Eikonal approximation
 $10^4 - 10^8$ keV/amu
Total cross sections
- 86T28 Errea, L.F. Martin, F. Mendez, L., Riera, A. Yanez, M.
Molecular (Feshbach) treatment of charge exchange $Li^{3+} + He$ collisions II cross sections
J. Chem. Phys. 84 5422 - 5426 1986 T
 $Li^{3+} + He \rightarrow Li^{2+} + He$
MO with common translation factor approach
0.2 - 5 keV/amu
- 86T27 Errea, L.F. Mendez, L. Mo, O. Riera, A.
Non-adiabatic ionic-covalent transitions: exponential linear model for the charge exchange and neutralization $Na + H^+ \rightarrow Na^+ + H$
J. Chem. Phys. 84 147 - 151 1986 T
 $Na(3s) + H \rightarrow Na^+ + H^+$; $Na^+ + H^+ \rightarrow Na(3s, 3p, 4s) + H$
MO
0.16 - 5 keV/amu
- 86T1 Errea, L.F. Mendez, L. Mo, O. Riera, A.
Nonadiabatic ionic-covalent transitions exponential-linear model for the charge exchange and neutralization reactions $Na + H \rightarrow Na^+ + H$
J. Chem. Phys. 84 147 - 151 1986 T
 $Na(3s) + H(1s) \rightarrow Na^+ + H^+$; $Na^+ + H^+ \rightarrow Na(3s, 3p, 4s) + H(1s)$
5 MO with ETF
0.16 - 5.0 keV/amu

- 86T29 Friedrich, B. Píck, S. Hladek, L. Herman, Z. Nikitin, E. E. Reznikov, A. I. Umanskiĭ, S. Ya
Dynamics of charge transfer $Ar^{2+}(^1P) + He(^1S) \rightarrow Ar(^2P) + He(^2S)$ at low collision energies; comparison of experimental results with quasiclassical calculations of the differential cross sections.
J. Chem. Phys. 84 8001 - 8012 1986 T
 $Ar^{2+}(^3P) + He(^1S) \rightarrow Ar(^2P) + He(^2S)$
LZ
 $1.5 \times 10^{-3} - 4 \times 10^{-5}$ keV/amu
Angular distribution
- 86T30 Fritsch, W. Lin, C.D.
Atomic orbital expansion study for the (quasi) two electron collisions system $O^{6+} + He$ and $C^{6+} + He$.
J. Phys. B 19 2683 - 2694 1986 T
 $C^{6+}, O^{6+} + He \rightarrow C^{3+,3+}, O^{7+,3+} + Ne^{4+}$ (i=1-8)
AO
0.5 - 40 keV/amu
(n,l) partial cross sections given
- 86T7 Fussen, D. Kubach, C.
Theoretical study of mutual neutralization in $H^+ - H$ collisions at low energy (0.02-20 eV)
J. Phys. B 19 L31-34 1986 T
 $H^+ + H \rightarrow H + H$ (n=2, 3)
quantum close-coupling treatment
 $2 \times 10^{-4} - 2 \times 10^{-2}$ keV/amu
n=3 dominant, particularly at low energies
- 86T71 Godunov, A.L. Kunikeev, S.D. Senashenko, V.S.
Differential cross sections for electron capture by protons in hydrogen and helium.
Sov. J. Plasma Phys. 12 784 - 788 1986 T
 $H^+ + He, H \rightarrow H + He^+, H^+$
Faddeev equation with final state interaction
 $1 \times 10^2 - 7.4 \times 10^3$ keV/amu
- 86T31 Henne, A. Toepfer, A. Ludde, H.J. Dreizler, R.M.
Time-dependent Hartree-Fock calculations for the $He^+(1s) + He^+(1s)$ system
J. Phys. B 19 L361 - 365 1986 T
 $He^+(1s) + He^+(1s) \rightarrow He^{2+} + He$
Time-dependent Hartree-Fock
1 - 20 keV/amu
- 86T33 Horbatsch, M.
Semiclassical description of multiple electron capture and ionization in fast bare-nucleus-rare gas collisions I. $C^{6+} - Ca^{20+}$ on Ne at 1 MeV/amu
Z. Phys. D 1 337 - 345 1986 T
 $A^{z+} + Ne \rightarrow Ne^{i+}$ (A = C-Ca ; i = 1-8)
Quantum statistical semiclassical method
1000 keV/amu
- 86T11 Horbatsch, M.
Calculation of transfer ionization processes in ion-atom collisions
J. Phys. B 19 L193-198 1986 T
 $C^{6+}, O^{8+} + Ne \rightarrow C^{3+,3+}, O^{7+,3+} + Ne^{i+}$ (i=1-8)
quantum statistical time-dependent mean-field theory
1000 keV/amu
- 86T32 Horbatsch, M. Dreizler, R.M.
Semiclassical description of multiple electron capture and ionization in fast bare nucleus-rare gas collisions II. energy dependence of $C^{6+}, Mg^{12+}, Ca^{20+} - Ne$ collisions.
Z. Phys. D 2 183 - 191 1986 T
 $A^{z+} + Ne \rightarrow Ne^{i+}$ (A = C, Mg, Ca ; i = 1-10)
Semiclassical quantum statistical independent particle model
50 - 5000 keV/amu
- 86T34 Hsin, S.H. Lieber, M. Klatke, R.E. McGuire, J.H. Sie, N.C.
Strong-potential Born approximation calculations of 1s - 2p electron capture.
Phys. Rev. A 34 1772 - 1778 1986 T
 $H^+ + H(1s) \rightarrow H(n,l,m) + H^+$ (n = 1,2)
Strong-potential Born approximation
1000 - 200000 keV/amu
Also angle-differential cross sections
- 86T35 Jain, A. Lin, C.D. Fritsch, W.
Electron capture in $C^{6+} + He$ and $O^{8+} + He$ collisions at intermediate energies in the atomic orbital expansion method.
Phys. Rev. A 34 3676 - 3683 1986 T
 $A^{z+} + He \rightarrow A^{(z-1)+}(n,l,m)$ (A = C,O)
AO
10 - 2000 keV/amu

- 86T37 Janev,R.K. Krstic,P.S.
Non-adiabatic transitions between two groups of intersecting energy levels.
J. Phys. B 19 3695 - 3715 1986 T
Closed forms for transition probabilities.
- 86T36 Janev,R.K. Lazur,V.Yu. Grozdanov,T.P.
Dynamic autoionization widths for capture ionization in slow ion-atom collisions.
J. Phys. B 19 421 - 436 1986 T
Analytic expressions for dynamic autoionization in transfer ionization
- 86T72 Kern, K. Schlter,Ch.
Orbiting trajectories and the adiabatic approximation to the capture cross section.
Z. Phys. D 1 391 - 401 1986 T
average dipole orientation (ADO) theory; Monte Carlo calculation
- 86T40 Kimura,M.
Theoretical investigation of charge transfer in collisions of C^{6+} and N^{7+} ions with H and H_2 targets at low to intermediate energy
Phys. Rev. A 33 4440 - 4443 1986 T
 C^{6+} , N^{7+} + H, $H_2 \rightarrow C^{5+}$, N^{6+}
travelling MO
0.1 - 10 keV/amu
Total cross sections given
- 86T 5 Kimura,M. Chapman,S. Lane,N.F.
Electron capture in Ar^+ + H_2 collisions in the keV energy regime
Phys. Rev. A 33 1619-1625 1986 T
 Ar^+ + $H_2 \rightarrow Ar^0$ + H_2^+
MO with ETF
 7.5×10^{-3} - 0.25 keV/amu
- 86T42 Kimura,M. Lane,N.F.
Symmetric resonant charge transfer in H^+ + H and He^{2+} + He collisions at extremely low energies.
Phys. Rev. A 34 4421 - 4423 1986 T
 H^+ + H \rightarrow H^+H^+ ; He^{2+} + He \rightarrow He + He^{2+}
MO
 10^{-10} - 10^{-6} keV/amu
- 86T39 Kimura,M. Lane,N.F.
Theoretical study of alignment and orientation in Li^+ + He collisions
Phys. Rev. Letters 56 2160 - 2163 1986 T
 Li^+ + He \rightarrow $Li(2^3P)$
MO expansion method
0.14 - 3 keV/amu
Alignment and orientation
- 86T41 Kimura,M. Lin,C.D.
Charge transfer and excitation process in p-He collisions studied using a unified atomic orbital-molecular orbital matching method.
Phys. Rev. A 34 176 - 184 1986 T
 H^+ + He \rightarrow H ($2s,2p, total$) + He^+ ; H^+ He($2^1P,2^1S$)
MO - AO matching method
1 - 100 keV/amu
Impact parameter dependence
- 86T43 Kirby,K. Heil,T.G.
A molecular representation of Al^{3+} + H charge transfer reactions.
J. Chem. Phys 85 6220 - 6224 1986 T
 Al^{3+} + H \rightarrow Al^{2+}
MO expansion
0.014 - 14 keV/amu
Total cross section
- 86T73 Kobayashi, K. Ishihara, T.
Differential cross sections for electron capture in fast proton-hydrogen collisions.
Phys. Rev. A. 34 626 - 628 1986 T
 H^+ + H \rightarrow H + H^+
eikonal approx. with distortion by internuclear interaction
25 - 125 keV/amu
angular distribution over 0 - 3 mrad
- 86T74 Korsch, H.J. Mhlenkamp, R. Thyliwe, K.E.
Semiclassical complex energy theory of orbiting resonances in curve crossing systems.
J. Phys. B. 19 2151 - 2163 1986 T
 N^{3+} + H \rightarrow N^{2+} + H^+
semiclassical complex energy theory

- 86T44 Macek, J.
Electron capture mechanisms
Nucl. Instr. Meth. in Phys. Res. B 13 573 - 577 1986 T
review
- 86T46 Martin, F. Riera, A. Yanez, M.
Molecular (Feshbach) treatment of charge exchange $\text{Li}^{3+} + \text{He}$ collisions I. energies and couplings.
J. Chem. Phys. 84 5412 - 5421 1986 T
 $\text{Li}^{3+} + \text{He} \rightarrow \text{Li}^{2+} + \text{He}^+$
Feshbach projection operator formalism
Energy couplings
- 86T45 Martin, F. Riera, A. Yanez, Z.
Single and double charge transfer in $\text{Be}^{4+} + \text{He}$ collisions : a molecular (Feshbach) approach
Phys. Rev. A 34 4675 - 4681 1986 T
 $\text{Be}^{4+} + \text{He} \rightarrow \text{Be}^{3+}, \text{Be}^{2+}$
MO with translation factor
0.25 - 25 keV/amu
Total cross sections given
- 86T47 Men, F.K. Kimura, M. Olson, R.E.
Resonant charge transfer in symmetric alkali-ion-alkali-atom collisions.
Phys. Rev. A 33 3800 - 3806 1986 T
 $\text{A}^+ + \text{A} \rightarrow \text{A} + \text{A}^+$ ($\text{A} = \text{Li}, \text{Na}, \text{K}, \text{Rb}, \text{Cs}$)
MO expansion method with translation factor
0.01 - 5 keV/amu
total cross sections
- 86T48 Moisewitsch, B.L.
Relativistic symmetric eikonal approximation for electron capture.
J. Phys. B 19 3733 - 3738 1986 T
general formalism
eikonal approximation
- 86T49 Niehaus, A.
A classical model for multiple electron capture in slow collisions of highly charged ions with atoms.
J. Phys. B 19 2825 - 2937 1986 T
general system
modified over-barrier model
- 86T50 Nikitin, E.E. Reznikov, A.I. Umanskii, S.Ya.
Two-level model of charge exchange with Coulomb interaction in one of the channels; quantum and quasi-classical cross sections in the weak coupling limit.
Sov. Phys.-JETP 64 937 - 941 1986 T
 $\text{Ar}^{2+} + \text{He} \rightarrow \text{Ar}^+ + \text{He}^+$
DWA
 1×10^{-5} keV/amu
- 86T 2 Ojha, P.C. Girardean, M.D. Gilbert, J.D. Straton, J.C.
Fock-Tani transformation and a first-order theory of charge transfer
Phys. Rev. A 33 112-123 1986 T
 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(1s) + \text{H}^+$
Fock-Tani transformation of second-quantized Hamiltonian
2 - 800 keV/amu
angular distribution
- 86T51 Olson, R.E. Weimore, A.E. McKenzie, M.R.
Double electron transitions in collisions between multiply charged ions and helium atoms.
J. Phys. B 19 L629 - 634 1986 T
 $\text{A}^{q+} + \text{He} \rightarrow \text{A}^{q+} + \text{He}^+ + e$; $\text{A}^{q+} + \text{He}^{2+} + 2e$; $\text{A}^{(q-1)+} + \text{He}^+$; $\text{A}^{(q-1)+} + \text{He}^{2+} + e$; $\text{A}^{(q-2)+} + \text{He}^{2+}$ ($q = 1 - 50$)
classical trajectory Monte Carlo method
1000 keV/amu
total cross sections
- 86T52 Opratoice, L. Falcon, C. Casaubon, J.I.
Single electron capture by Li^{3+} from He in low energy collisions
J. Phys. B 19 2319 - 2329 1986 T
 $\text{Li}^{3+} + \text{H} \rightarrow \text{Li}^{2+}$
close-coupling technique
 2×10^{-2} - 6 keV/amu
Total cross sections

- 86T12 Reinhold, C.O. Falcon, C.A.
Classical ionization and charge transfer cross sections for H^+ + He and H^+ + Li^+ collisions with consideration of model interactions
Phys. Rev. A 33 3859 - 3866 1986 T
 H^+ + He \rightarrow H + He $^+$, H^+ + He $^+$ + e; H^+ + Li^+ \rightarrow H $^+$ + Li^{2+} , H^+ + Li^{2+} + e
Classical trajectory Monte Carlo
50 - 1000 keV/amu
total cross sections
- 86T13 Saha, G.C.
Electron capture in collisions of He $^+$ with Li atoms and of Li^{3+} , C $^{6+}$ and O $^{8+}$ with He atoms in the high energy region
Phys. Rev. A 34 2809 - 2821 1986 T
 He^{2+} + Li(1s) \rightarrow He $^+(nl)$; He^{2+} + Li(2s) \rightarrow He $^+(nl)$; Li^{3+} + He(1s) \rightarrow $Li^{2+}(nl)$; C $^{6+}$ + He(1s) \rightarrow C $^{5+}(nl)$; O $^{8+}$ + He \rightarrow O $^{7+}(nl)$
CDW approximation
200 - 4000 keV/amu
- 86T53 Saha, G.C. Datta, S. Mukherjee, S.C.
Electron capture in collisions of He $^{2+}$ with Li atoms and of Li^{3+} , C $^{6+}$ and O $^{8+}$ with He in the high energy region.
Phys. Rev. A 34 2809 - 2821 1986 T
 He^{2+} + Li(1s, 2s) \rightarrow He $^+(1s, 2s, 2p, 3s, 3p, 3d)$ + Li^+ ; Li^{3+} , C $^{6+}$, O $^{8+}$ + He \rightarrow Li^{2+} , C $^{5+}$, O $^{7+}$ (nl) + He(nl = 1 - 5)
CDW
200 - 4000 keV/amu
- 86T76 Saha, G.C. Mukherjee, S.C.
X-ray cross section in helium for electron capture into excited states by C $^{6+}$ and O $^{8+}$ ions in the continuum distorted-wave approximation.
Phys. Letters A 117 23 - 26 1986 T
C $^{6+}$, O $^{8+}$ + He \rightarrow C $^{5+}(n)$, O $^{7+}(n)$ + hv
CDW
(0.42 - 2.1) $\times 10^3$ keV/amu (C); (0.625 - 2.5) $\times 10^3$ keV/amu (O)
- 86T54 Salin, A.
Convergence of coupled-state calculations for electron capture by bare ions from atomic hydrogens,
Phys. Rev. A 34 4436 - 4437 1986 T
 N^{7+} + H(1s) \rightarrow N $^{6+}$ + H $^+$
MO (5, 25 states)
0.1 - 10 keV/amu
Total cross sections
- 86T 8 Shingal, R. Bransden, B.H. Ermolaev, A.M. Flower, D.R. Newby, C.W. Noble, C.J.
Charge transfer in H^+ - Na 0 collisions; atomic orbital calculations
J. Phys. B 19 309-320 1986 T
 H^+ + Na(3s) \rightarrow H(nl) + Na $^+(n=1,2,3)$; Na^+ + H(1s) \rightarrow Na(3l) + $H^+(l=0,1,2)$
two-center expansion in travelling AO
0.5 - 20 keV/amu
- 86T55 Shingal, R. Noble, C.J. Bransden, B.H. Flower, D.R.
Semiclassical calculations of charge exchange and excitation in Na^+ - Li and Li^+ - Na collisions using atomic orbital expansions.
J. Phys. B 19 3951 - 3964 1986 T
 Na^+ + Li \rightarrow Na(n,l) + Li; Li^+ + Na \rightarrow Li(n,l) + Na $^+$
travelling AO
0.25 - 49 keV/amu
Partial cross sections (n,l)
- 86T77 Shurygina, Ya.A. Senashenko, V.S. Teptlova, Ya.A.
Calculation of the one-electron charge transfer cross sections of H^+ , He $^{2+}$ and Li^{3+} nuclei in collisions with light atoms at medium and high energies.
Sov. Phys.-Tech. Phys. 31 897 - 903 1986 T
 H^+ , He $^{2+}$, Li^{3+} + C, N \rightarrow H, He $^+$, Li^{2+} ; H^+ + He \rightarrow H; He $^{2+}$ + H \rightarrow He $^+$
strong coupling equations
(0.2 - 2.5) $\times 10^3$ keV/amu (C); (0.15 - 5) $\times 10^3$ keV/amu (Ne); (20 - 5000) keV/amu analytical expressions for K-shell electron transfer
- 86T56 Sinha, C. Tripathi, S. Sii, N.C.
Charge transfer in the eikonal approximation.
Phys. Rev. A 34 1026 - 1030 1986 T
 H^+ + H \rightarrow H(1s) + H $^+$
Eikonal approximation
40 - 5000 keV/amu
- 86T75 Spalburg, M.R. Los, J. Devdariani, A.Z.
On the validity of simple two-state electronic transition models.
Chem. Phys. 103 253 - 263 1986 T
general theory
Landau-Zener-Demkov model
locations and widths of transition zones calculated

- 86T57 Taubjerg,K.
Reaction windows for electron capture by highly charged ions
J. Phys. B 19 L367 - 372 1986 T
General system
Landau-Zener
- 86T 3 Toshima,N. Watanabe,T.
Simplified distorted-wave treatment for asymmetric electron capture processes
Phys. Rev. A 33 1382-1384 1986 T
 $A^{+} + H(1s) \rightarrow A^{(n-1)+} + H^{+}$ (A = C, Ne)
DWBA
 $10^{-1} - 10^3$ keV/amu
- 86T58 Urbain,X. Giusti-Suzor,A. Fussen,D. Kubach,C.
Theoretical study of associative ionization in $H^{+} - H^{-}$ collisions at low energy (0.001 - 5 eV)
J. Phys. B 19 L273 - 277 1986 T
 $H^{+} + H^{-} \rightarrow H_2^{+} + e$
 $1 \times 10^{-6} - 5 \times 10^{-3}$ keV/amu
- 86T59 Waknon,P. Gala,S. Diro,M.C. Courbin-Gaussoygue,C. Sidis,V.
Theoretical study of population sharing between $n=2$ levels in the $Li^{+} + He$ collision.
J. Phys. B 19 611 - 628 1986 T
 $Li^{+} + He \rightarrow Li(n=2) + He^{+}$; $Li^{+} + He(n=2)$
Half-collision model
0.14 - 4.3 keV/amu
- 86T60 Wetmore,A.E. Cole,H.R. Olson,R.E.
Calculation of electron capture cross sections for collisions of Be^{2+} and B^{3+} on H.
J. Phys. B 19 1515 - 1525 1986 T
 $Be^{2+} + H \rightarrow Be^{+}$, $Be^{+}(2s)$, $Be^{+}(2p)$; $B^{3+} + H \rightarrow B^{2+}$
PSS with translation factor
2s, 2p total cross sections for Be^{2+} , total cross sections for B^{3+}
- 86T61 Winter,T.G.
Electron transfer and ionization in collisions between protons and the ions Li^{2+} and He^{+} studied with the use of a Sturmian basis.
Phys. Rev. A 33 3842 - 3852 1986 T
 $H^{+} + Li^{2+}$, $He^{+} \rightarrow H + Li^{3+}$, He^{2+} ; $H^{+} + Li^{3+}$, $He^{2+} + e$
Coupled state Sturmian approach
17.5 - 200 keV/amu
Total cross sections
- 86T62 Zaitman,D. Maor,D.
Heisenberg core in classical trajectory Monte Carlo calculation of ionization and charge exchange.
Phys. Rev. Letters 56 320 - 323 1986 T
 $H^{+} + He \rightarrow H + He^{+}$
Classical trajectory Monte Carlo method
20 - 200 keV/amu
- 86T63 Zygelman,B. Dalgarno,A.
Direct charge transfer of He^{+} in neon.
Phys. Rev. A 33 3853 - 3858 1986 T
 $He^{+} + Ne \rightarrow He + Ne^{+}$
Diabatic formulation
 $-10^{-4} - 2$ keV/amu
Total cross sections

- 87E 1 Afrosimov, V. V., Basalaeu, A. A., Lozhkin, K. O., Panov, M. N.
Filling of various electronic states in collisions of multiply charged argon ions with hydrogen atoms and molecules
JETP Letters 48 107-110 1987 E
 $Ar^{q+} + H, H_2 \rightarrow Ar^{r+}(4s, 4p, 4d, 4f, 5s, 5p) ; Ar^{q+} + H \rightarrow Ar^{s+}(3s^2 3p^4 s, 3s^2 3p^2 d, 3s 3p^4, 3s^2 3p^2 4p)$
translational energy spectroscopy
 $5 \times 10^{-2} - 2$ keV/amu
- 87E 2 Almeida, D. P., Castro Faria, N. V. de, Freire, F. L., Montenegro, E. C., Pinho, A. G. de
Collisional formation and destruction of fast negative hydrogen ions in He, Ne and Ar targets
Phys. Rev. A 36 16-25 1987 E
 $H + B \rightarrow H, H^+ ; H + B \rightarrow H^+ ; H^+ + B \rightarrow H^+ (B = He, Ne, Ar)$
growth method
300 - 2000 keV/amu
- 87E 3 Andriamonje, S., Chevallier, M., Cohen, C., Durat, J., Gaillard, M. J., Gémre, R., Hage-Ali, M., Kirsch, R., Mazuy, B., Mory, J., Moulin, J., Poizat, J. C., Remilleux, J., Schmaus, D., Toulemonde, M.
Observation of radiative electron capture into K, L, M shells of 25 MeV/u Xe^{58+} ions channeled in silicone
Phys. Rev. Letters 59 2271-2274 1987 E
 $Xe^{58+} + Si \rightarrow Xe^{57+} + hv$
X-ray spectroscopy
 2.5×10^4 keV/amu
no cross sections, only estimation for REC
- 87E 4 Anholt, R., Meyerhof, W. E., Xu, X. Y., Gould, H., Feinberg, B., McDonald, R. J., Wegner, H. E., Thiéberger, P.
Atomic collisions with relativistic heavy ions VIII. charge state studies of relativistic uranium ions
Phys. Rev. A 36 1586-1600 1987 E
 $U^{q+}(q=83-91), Xe^{q+}(q=52-54) + B \rightarrow U^{(q+k)+}(k=1-4) ; Xe^{(q+k)+}(k=1-3) (B = Al, Cu, Ag, Au)$
 $10^5 - 10^6$ keV/amu
ionization cross sections scaled with $1/Z_1^2$
- 87E 6 Aumayr, F., Laktis, G., Winter, H.
Charge transfer and target excitation in $H^+ - Na(3s)$ collisions (2 - 20 keV)
J. Phys. B 20 2025-2030 1987 E
 $H^+ + Na(3s) \rightarrow H^0 + Na^+ ; H^+ + Na(3p)$
photon spectroscopy technique
2 - 20 keV/amu
- 87E 18 Aumayr, F., Laktis, G., Winter, H.
Electron capture and target excitation in slow ion-alkali atom collisions : a systematic study.
Z. Phys. D 6 145 - 153 1987 E
 $A^+ + B \rightarrow A^0 + B^+ (A = He, Ne, Ar, C, N, O ; B = Li(2s), Na(3s))$
growth
0.25 - 5 keV/amu
also excitation cross section to $Li(2p)$ and $Na(3p)$ with interference filter.
- 87E 5 Aumayr, F., Winter, H.
 Ly -alpha emission in $H^+ - Na$ collisions (1 - 20 keV)
J. Phys. B 20 L803-807 1987 E
 $H^+ + Na(3s), Na^+(3p) \rightarrow H^+(2p)$
photon spectroscopy
1 - 20 keV/amu
- 87E 11 Baer, M., Dueren, R., Friedrich, B., Niedner, G., Noll, M., Toennies, J. P.
Dynamics of $H^+ + Kr$ and $H^+ + Xe$ elastic and charge transfer collisions : state-selected differential cross sections at low collision energies
Phys. Rev. A 36 1063-1072 1987 E
 $H^+ + Kr(^1S_0) \rightarrow H(n=1) + Kr(^2P_{3/2}, ^2P_{1/2}) ; H^+ + Xe(^1S_0) \rightarrow H(n=1,2) + Xe(^2P_{3/2}, ^2P_{1/2})$
TOF
0.03 - 0.05 keV/amu (c.m.)
angular distribution
- 87E 7 Baptist, R., Bonnet, J. J., Bonnefoy, M., Boursey, E., Brenac, A., Chassevent, M., Chareut, G., Dousson, S., Duff, Y., Le Fleury, A., Gargaud, M., Hitz, D.
Subshell-selective electron capture in collisions of C^{4+} (0.05 a.u. $< v < 0.40$ a.u.) with H and H_2
Nucl. Instr. Meth. in B23 123-127 1987 E
Phys. Res.
 $C^{4+} + H, H_2 \rightarrow C^{3+}(3s, 3p, 3d)$
VUV photon spectroscopy
0.05 - 3.3 keV/amu
ratios of subshell cross sections

- 87E8 Barat,M, Gaboriaud,M,N, Guillemot,L, Roncin,P, Laurent,H, Andriamonje,S.
Coincident energy gain spectroscopy of electron capture in multiply charged ions colliding with He, I₂ and heavy rare gas targets
J. Phys. B 20 5771 - 5783 1987 E
C⁶⁺, N⁷⁺, O⁸⁺ + He, H₂ → C⁵⁺, N⁶⁺, O⁷⁺; C⁶⁺, N⁷⁺ + Ar, Xe → C⁵⁺, N⁶⁺; N⁶⁺, O⁷⁺, Ne⁸⁺ + He → N⁵⁺, O⁶⁺, Ne⁸⁺; N⁶⁺ + Ar → N⁵⁺; O⁷⁺ + H₂ → O⁶⁺; Ne⁸⁺ + He, Ar → Ne⁷⁺; O⁶⁺ + He, Ne, H₂, Ar, Kr, Xe
energy gain spectroscopy
0.5 keV/amu
no cross sections, only n-distribution
- 87E9 Bernshtein,E,M, Clark,M,W, Taniis,J,A, Berkner,K,H, McDonald,R,J, Schlachter,A,S, Stearns,J,W, Graham,W,G, McFarland,R,H, Morgan,T,J, Mowat,J,R, Mueller,D,W, Stockli,M,P.
Resonant electron transfer and L-shell excitation for Nb³¹⁺ and La⁴⁰⁺ ions
J. Phys. B 20 L505-510 1987 E
A⁽ⁱ⁻³⁾⁺ + H₂ → A⁽ⁱ⁻²⁾⁺ + H₂ (A = Nb, La)
coincidence between X-rays and scattered particles
3240 - 5040 keV/amu (La); 2370 - 6450 keV/amu (Nb)
- 87E81 Binder, J. Huber, B.A, Koslowski, H.R, Wieseemann, K.
Near-threshold translational energy spectroscopy (NTTES).
J. Phys. B 20 2713 - 2721 1987 E
Ar^{3+(nl)} + Ar → Ar^{2+(n'l)} + Ar^{+(n''l')}
translational energy spectroscopy
variable electron energy for ionization in order to identify electronic states of ions
- 87E12 Bordenave-Montesquieu,A, Benoit-Cattin,P, Boudjerma,M, Gleizes,A, Bachau,H.
Angular momenta determination of N^{2+(3i3l')} capture states in N⁷⁺ - He collisions
J. Phys. B 20 L695-703 1987 E
N⁷⁺ + He → N^{2+(3i3l')}L + He²⁺
electron-spectroscopy
- 87E10 Bouchama,T, Desesquelles,J, Druetta,M, Farison,M, Martin,S.
Radiative two-electron capture and doubly excited state excitation in N²⁺ + He low energy collisions
J. Phys. B 20 L457-461 1987 E
N^{2+(1s²)} + He → N^{2+(1s²nl'n'l')}
0.357 - 4.28 keV/amu
emission cross sections for 2s² 1S - 2s2p ¹P transition
- 87E82 Burnside, R.G, Topley, C.A, Wickwar, V.B.
The O⁺-O collision cross sections : can it be inferred from aeronautical measurements
Annales Geophysicae 5(A) 343 - 350 1987 E
O⁺ + O → O + O⁺
the previous values should increase by a factor of 1.7(+0.7; -0.3)
- 87E13 Church,D,A, Kravis,S,D, Sellin,I,A, Lavrin,C,S, O.J.C, Short,R,T, Meron,M, Johnson,B,M, Jones,K,W.
Confined thermal multicharged ions produced by synchrotron radiation
Phys. Rev. A 36 2487-2490 1987 E
Ar^{q+(q=2-5)} + Ar → Ar^{(q-1)+} + Ar⁺
trapped ion
10⁻³ keV/amu
rate coefficients at 300K
- 87E14 Coggiola,M,J, Peterson,J,R, Huestis,D,L.
Angular scattering effects in D⁺ production by double electron capture of D⁺ in Cs
Phys. Rev. A 36 2008-2023 1987 E
D⁺ + Cs → D⁰, D⁺; D⁰ + Cs → D⁰, D⁺; D⁺ + Cs → D⁰
0.125 - 1 keV/amu
angular differential cross sections
- 87E16 Danared,H, Andersen,H, Astner,G, Defrance,P, Rachafi,S.
Absolute differential cross sections for high-charge low-energy Ar colliding with Ar
Phys. Scripta 36 756-764 1987 E
Ar^{q+} + Ar → Ar⁺ + Ar⁺ (q = 6-13)
recoil-scattered ion coincidence
0.27 (q=6) - 0.59 (q=13) keV/amu
total cross sections for q=6-13, differential cross sections for q=6-9,10
- 87E15 Danared,H, Andersson,H, Astner,G, Barany,A, Defrance,P, Rachafi,S.
Angular differential cross sections for high charge low energy Ar colliding with Ar
J. Phys. B 20 L165-170 1987 E
Ar^{q+} (q=8,9,11) + Ar → Ar⁺ + Ar⁺ (r = q-1, q-2, q-3)
translational energy spectroscopy
0.045xq keV/amu
relative cross sections

- 87E17 Dev,B. Boers,A.L.
Collision cross sections and the efficiency of a Bendix multiplier for 2-5 keV He, Ar and H₂ ions and neutrals
J. Phys. B 20 3463-3473 1987 E
A⁺ + A → A + A* (A = He, Ar, H₂)
growth
2 - 5 keV (for all ions)
- 87E80 Druetta,M. Martin,S. Bouchame,T. Harel,C. Jouin,H.
Spectroscopic study of the charge exchange collision between Ar²⁺ and He or H₂ at beam energies of 80, 40 and 8 keV
Phys. Rev. A 36 3071-3076 1987 E
Ar²⁺ + B → Arⁿ⁺(4l,5l) + B* (B = He, H₂)
X-ray spectroscopy (E), PSS (T)
0.5 - 2 keV/amu
emission cross sections, cross sections for (n,l) states
- 87E19 DuBois,R.D.
Ionization and charge transfer in He²⁺ - rare gas collisions II.
Phys. Rev. A 36 2583 - 2593 1987 E
He²⁺ + B → Heⁿ⁺ + B* + (k-1)e ; He⁰ + B* + (k-2)e (B = He, Ne, Ar, Kr)
projectile-recoil ion coincidence
50 - 500 keV/amu
- 87E20 Eibel,F. Salzborn,E.
Charge transfer of 0.2-5 keV protons and hydrogen atoms in sodium,potassium and rubidium vapor targets.
J. Phys. B 20 4531 - 4542 1987 E
H⁺ + B → H + B* ; H⁺ + B²⁺ : H + B → H⁺ + B + e ; H⁺ + B* (B = Na,K,Rb)
growth method
0.5 - 5 keV/amu
also secondary electron emission coefficients for SS,Cu
- 87E21 Eibel,M. Waitzel,R.
Luminescence of Ar⁺ ion emitted after electron capture of Ar²⁺ ions from K-atoms.
Z. Phys. D 7 171 -176 1987 E
Ar²⁺(3p⁴ 3P, 1D) + K → Ar⁺ + K⁺
optical attenuation method
0.1 keV/amu
- 87E22 Friedrich,B. Niedner,G. Noll,M. Toennies,J.P.
Vibrationally resolved inelastic and charge transfer scattering of H⁺ by H₂O.
J. Chem. Phys. 87 5256 - 5265 1987 E
H⁺ + H₂O → H⁰
TOF
0.03 - 0.05 keV/amu
probabilities given as a function of scattering angle.
- 87E83 Friedrich, B. Niedner, G. Noll, M. Toennies, J.P.
H⁺ + Xe low energy collisions : opposite phase oscillations of the elastic and charge transfer differential cross sections.
Z. Phys. D 6 49 - 53 1987 E
H⁺ + Xe → H⁺ + Xe ; H + Xe
TOF technique
4 - 6.6 keV/amu
angular distribution
- 87E84 Friedrich, B. Vancura, J. Herrman, Z.
Crossed-beam investigation of the single-electron charge transfer process Kr²⁺ + He -> Kr⁺ + He⁺ at sub-eV collision energies.
Int. J. Mass Spectro. 80 177 - 185 1987 E
Ion Phys.
Kr²⁺(¹D₂, ³S₀) + He → Kr⁺(²P_{3/2}, ²P_{1/2}) + He⁺
crossed-beam technique
3.8x10⁻⁴ - 6.2x10⁻⁶ keV/amu
total cross section ratios only
- 87E85 Futrell, J.M.
Crossed-molecular beam studies of the state-to-state reaction dynamics of charge transfer at low and intermediate energy.
Int. J. Quan. Chem. 31 133 - 159 1987 E
crossed-beam technique
review
- 87E23 Gealy,M.W. Van Zyl,B.
Cross sections for electron capture and loss I. H⁺ and H impact on H and H₂
Phys. Rev. A 36 3091 - 3099 1987 E
H⁺ + B → H ; H⁺ + B → H (B = H, H₂)
High temperature oven
0.06 - 2 keV/amu

- 87E33 Horrmis, W.G. Kamber, E.Y. Hasted, J.B. Brenton, A.G. Beynon, J.H.
State-selective electron capture by Xe^{q+} ions from rare gas atoms.
Int. J. Mass Spectrom. 76 263 - 276 1987 E
Ion Processes
Xe^{q+} (= 2 - 7) + B -> Xe^{(q-1)+}
translational energy spectroscopy
2x10⁻² x q (keV/amu)
total cross sections, various transfer channels determined.
- 87E34 Horsdal-Pedersen, E.
Probabilities for electron capture by protons from neon at large scattering angles.
J. Phys. B 20 785 - 792 1987 E
H⁺ + Ne -> H
400 - 1000 keV/amu
probabilities for electron capture (theta = 22.5 - 90)
- 87E87 Howard, S.L. Rockwood, A.L. Tarbton, W. Friedrich, B. Anderson, S.G.
Futrell, J.H.
Observation of finite-structure transitions in rare gas charge transfer at surprisingly low energies using a crossed molecular beam technique.
Chem. Phys. Letters 140 385 - 388 1987 E
Kr⁺(²P_{3/2}) + Kr⁺(¹S₀) -> Kr⁺(¹S₀) + Kr⁺(²P_{3/2}, ²P_{1/2})
crossed-beam technique
1x10⁻⁴ keV/amu
- 87E88 Howard, S.L. Rockwood, A.L. Traflet, W. Friedrich, B.F. Anderson S.G.
Futrell, J.H.
Differential cross section for the competing charge-transfer reactions Kr⁺(²P_{3/2}) + Kr⁺(¹S₀) -> Kr⁺(¹S₀) + Kr⁺(²P_{3/2}) and Kr⁺(²P_{3/2}) + Kr⁺(¹S₀) -> Kr⁺(¹S₀) + Kr⁺(²P_{1/2}).
Can. J. Phys. 65 1077 - 1081 1987 E
Kr⁺(²P_{3/2}) + Kr -> Kr⁺(¹S₀) + Kr⁺(²P_{3/2}, ²P_{1/2})
crossed-beam technique-translational energy spectroscopy
1.1x10⁻⁴ - 2.4x10⁻⁴ keV/amu
- 87E35 Huber, B.A.
Recent applications of translational energy spectroscopy in atomic collision processes.
Com. At. Mol. Phys. 21 15 - 39 1987 E
a review
- 87E36 Hvelplund, P. Barany, A.B. Cederquist, H. Pedersen, J.O.K.
Energy gain spectroscopy studies of electron capture by Xe^{q+} (10 ≦ q ≦ 20) in collisions with Ne, Ar and Xe.
J. Phys. B 20 2515 - 2529 1987 E
Xe^{q+} (q = 10 - 20) + B -> Xe^{(q-1)+}, Xe^{(q-2)+}, Xe^{(q-3)+}
energy gain spectroscopy
0.01 keV/amu
- 87E89 Jonaitan, P. Lee, A.R. Brenton, A.G. Beynon, J.H.
Capture dissociation of H⁺; in rare gases and small hydrocarbons.
Int. J. Mass Spectro. 79 101 - 113 1987 E
Ion Processes
H₂⁺ + B -> H₂⁺, H + H⁺, H + H, H⁺ + H⁺ (B = He, Ne, Ar, Kr, CH₄, C₂H₆, C₃H₈, C₂H₄, C₃H₆, C₄H₈)
translational energy spectroscopy
3 keV/amu
no cross sections given
- 87E90 Kambara, T. Aways, Y. Kase, M. Kumagai, H. Shibata, H. Tonuma, T.
REC X-rays for ³He and ⁴He targets.
J. Phys. Soc. Japan 56 1907 - 1908 1987 E
Ne¹⁰⁺ + ³He, ⁴He, ⁴He -> Ne⁹⁺ (REC)
X-ray spectroscopy
5.5x10³ keV/amu
no isotope effect in REC
- 87E39 Kamber, E.Y. Cocke, C.L. Giese, J.P. Pedersen, J.O.K. Waggoner, W.
State-selective differential single-electron-capture cross sections for O²⁺ - He collisions.
Phys. Rev. A 36 5575 - 5580 1987 E
O²⁺ + He -> O⁺ + He⁺
translational energy spectroscopy
3.75 x 10⁻³ - 1.6 x 10⁻² keV/amu
angular distribution, predominant capture into 2p² P state.
- 87E37 Kamber, E.Y. Horrmis, W.G. Brenton, A.G. Hasted, J.B. Beynon, J.H.
State-selective electron capture by Kr^{q+} ions from rare-gas atoms.
J. Phys. B 20 105 - 120 1987 E
Kr^{q+} (q=2,3,4) + B = Kr^{(q-1)+} + B⁺ (B = He, Ne, Ar, Kr, Xe)
translational energy spectroscopy
0.1 - 0.3 keV/amu
partial cross sections for Kr⁴⁺ + He, Ne -> Kr³⁺(4p² ⁴S, 4p² ⁴P, 5s ⁴P + 4p²(³P)4d) and total cross sections.

87E38 Kamber, E.Y., Jonathan, P., Brenton, A.G., Benon, J.H.I.
Single electron capture by Ar^{2+} from atomic and molecular targets.
J. Phys. B 20 4129 - 4142 1987 E
 $Ar^{2+} + B \rightarrow Ar^+ (B = He, Ne, Ar, Kr, Xe, O_2, NO, N_2, O, NH_3, CO_2, CH_4, C_2H_6, 1-C_4H_{10}, C_2H_2)$
translational energy spectroscopy
0.15 keV/amu
identification of transfer channels ; no cross sections

87E40 Kelly, G.J., Hird, B.
Double electron capture cross sections for F^+ in a magnesium-vapor target.
Phys. Rev. A 35 5262 - 5265 1987 E
 $F^+ + Mg \rightarrow F^+$
Oven
0.16 - 0.70 keV/amu

87E91 Kikiani, B.I., Lomsadze, R.A., Gochilashvili, M.R., Mosulishvili, N.O., Lavrov, V.M.
Ionization, charge exchange and stripping in $K^+ + He$ and $K^+ + Ne$ collisions at ion energies 0.7 - 7.0 keV.
Sov. Phys.-JETP 64 468 - 474 1987 E
 $K^+ + He, Ne \rightarrow K$
condenser method
 $1.8 \times 10^{-2} - 1.8 \times 10^{-1}$ keV/amu
also ionization and stripping cross sections given

87E41 Kim, H.J., Janev, R.K.
Electron loss sections in symmetric multicharged ion collisions.
Phys. Rev. Letters 58 1837 - 1840 1987 E
 $A^{3+} + A^{3+} \rightarrow A^{*+} + A^{2+} (A = Ar, Kr)$
folded beam technique
3.0 keV/amu (Ar); 1.4 keV/amu

87E42 Kimura, M., Kobayashi, N., Ohtani, S., Tawara, H.
State-selective one-electron capture from H and H_2 by slow, highly stripped C, N, O and Ne ions.
J. Phys. B 20 3873 - 3884 1987 E
 $Ne^{q+} (q = 8, 9), O^{q+} (q = 6-8), N^{q+} (q = 5-7), C^{q+} (q = 4-6) + H, H_2 \rightarrow A^{(q-1)+}$
translational energy spectroscopy ; MCLZ model
0.6 keV/amu
n - distribution; no cross sections

87E43 Knudsen, H., Andersen, L.H., Hvelplund, P., Sorensen, J., Ciric, D.
Simultaneous capture and ionization for fast ion impact on helium.
J. Phys. B 20 1253 - 257 1987 E
 $H^+, He^{2+} + He \rightarrow H, He^+ + He^{2+} + e; H, He^+ + He^+$
coincidence technique
 10^3 keV/amu (H) ; 350 - 1500 keV/amu (He)
ratios only, no cross sections

87E44 Laurent, H., Barat, M., Gaboriaud, M.N., Guillemot, L., Roncin, P.
Differential cross section and electron transfer mechanisms in multiply charged ion-atom collisions.
J. Phys. B 20 6581 - 6595 1987 E
 $C^{6+} + B \rightarrow C^{5+}(n), C^{4+}(n, n')$ (B = He, H₂, Ar, Xe) ; $N^{6+} + B \rightarrow O^{3+}(n), O^{4+}(n, n')$ (B = H₂, Ar, Kr) ; $N^{7+} + B \rightarrow N^{6+}(n), N^{5+}(n, n')$ (B = H₂, He, Ar, Xe) ; $O^{7+} + B \rightarrow O^{6+}(n), O^{5+}(n, n')$ (B = He, H₂) ; $O^{8+} + B \rightarrow O^{7+}(n), O^{6+}(n, n')$ (B = He, H₂) ; $Ne^{8+} + B \rightarrow Ne^{7+}$

87E45 Lee, A.R., Jonathan, P., Brenton, A.G., Benon, J.H.
Transitional energy loss of H^+ fragments from capture-dissociation of H_2^+ in collisions with rare gas atoms.
Phys. Letters A 122 346 - 349 1987 E
 $H_2^+ + B \rightarrow H^+ ; H^+$
translational energy spectroscopy
3 keV/amu
no cross sections given

87E92 Lee, A.R., Jonathan, P., Brenton, A.G., Beynon, J.H.
Dissociative electron capture of H_2^+ into H fragments.
Int. J. Mass Spectro. 75 329 - 343 1987 E
Ion Processes
 $H_2^+ + B \rightarrow H^+ + H (B = H_2)$
translational energy spectroscopy
3 keV/amu

- 87E55 Müller, A., Seluch, B., Groh, W., Salzborn, E.
Multiple-electron processes in 1.4 MeV/u ion-atom collisions.
Z. Phys. D 7 251 - 260 1987 E
 $A^{q+} + B \rightarrow A^{(q-1)+} A^{(q-2)+} A^{(q-3)+} + B'$ (A= N, Fe, Kr, Gd, U ; q=6-44 ; B= Ne, Ar, Kr, Xe ; i= 1-19)
projectile-recoil ion coincidence
1400 keV/amu
no cross sections but relative intensities of recoil ions.
- 87E46 Mann, R., Schulte, H.
Evidence for one-step double electron capture in single collisions of slow O^{6+} and C^{4+} ions with rare gas atoms.
Z. Phys. D 4 343 - 349 1987 E
 $O^{6+}, C^{4+} + B \rightarrow O^{4+}, C^{2+}$ (B= He, H₂, Ar, Xe)
zero-degree Auger electron spectroscopy
6 - 7 keV/amu
no cross sections given. Coster-Kronig transitions.
- 87E48 Marselle, P., Bliman, S., Desclaux, J.P., Doussin, S., Hitz, D.
Spectroscopy of Mg-like Ar produced in low energy charge exchange collisions.
J. Phys. B 20 5127 - 5132 1987 E
 $Ar^{7+} + He \rightarrow Ar^{6+} + He^+$
photon spectroscopy (100 - 1000 Angstrom)
1.75 keV/amu
no cross sections given, n=4 level dominant.
- 87E47 Marselle, P., Bliman, S., Indelicato, P., Hitz, D.
Single electron capture into $Ar^{6+}(nl)$ subshells in $Ar^{7+} + He$ collisions.
J. Phys. B 20 1423 - 426 1987 E
 $Ar^{7+} + He \rightarrow Ar^{6+}(4l)$
VUV spectroscopy
1.75 keV/amu
1-distribution, emission cross section.
- 87E50 Mathur, D., Kingston, R.G., Harris, F.M., Brenton, A.G., Beynon, J.H.
State-selected electron capture by molecular ion collisions of CS_2^{3+} and CS_2^{2+} with monatomic and diatomic targets.
J. Phys. B 20 1811 - 1822 1987 E
 $CS_2^{2+}, CS_2^{3+} + B \rightarrow CS_2^+, CS_2^{2+}$ (B = He, Ne, Ar, Kr, Xe; H₂, N₂, O₂)
translational energy spectroscopy
no cross sections given
- 87E49 Mathur, D., Reid, C.J., Harris, F.M.
State-diagnosed electron capture by OCS^{3+} ions in collisions with atomic and molecular gases.
J. Phys. B 20 1577 - 581 1987 E
 $OCS^{3+} + B \rightarrow OCS^{2+}$ (B= Ar, Kr, Xe, H₂, N₂, O₂, CH₄)
translational energy spectroscopy
0.27 keV/amu
energy gain spectrum only, no cross sections given
- 87E51 McAfee, K.B., Szmanda, C.R., Hozack, R.S.
Excitation energy transfer charge exchange during collisions of $N^+(^1S)$ with N_2
Phys. Rev. A 36 2056 - 2060 1987 E
 $N^+(^1P, ^1D, ^1S, ^1S) + N_2 \rightarrow N + N_2^+ ; N_2^{2+} + N_2 \rightarrow N_2^+ + N_2^+$
translational energy spectroscopy
no cross sections given
- 87E52 McCullough, R.W., Wilson, S.M., Gilbody, H.B.
State-selective capture by slow Ar^{6+} , Ar^{5+} and Ar^{4+} recoil ions in H, H₂ and He.
J. Phys. B 20 2031 - 2055 1987 E
 $Ar^{q+} (q=4,5,6) + B \rightarrow Ar^{(q-1)+}(n,l) + B^+$ (B= H, H₂, He)
translational energy spectroscopy ; Multichannel Landau-Zener model.
energy-gain spectroscopy, no cross sections, MLZ calculated cross sections.
- 87E53 McGuire, J.H., Salzborn, E., Muller, A.
Simultaneous capture and ionization in helium.
Phys. Rev. A 35 3265 - 3268 1987 E
 $Ar^{2+} + He \rightarrow A^{(2-1)+} + He^{2+,+} e$ (A= H, He, Li)
projectile-recoil ion coincidence
1 - 5 x 10³ keV/amu
data compilation and analysis.
- 87E93 Melchert, F., Rink, K., Rinn, K., Salzborn, E.
Ionization in He⁺-He⁺ collisions.
J. Phys. B 20 1797 - 801 1987 E
 $He^+ + He^+ \rightarrow He^{2+} + He^{2+} + e ; He^{2+} + He$
crossed beam technique
2.75 - 28 keV/amu

- 87E54 Melchert, F. Rink, K. Rinn, K. Salzborn, E. Grun, N.
Charge transfer in $\text{He}^+ - \text{He}^+$ collisions.
J. Phys. B 20 L223 - 230 1987 E
 $\text{He}^+ + \text{He} \rightarrow \text{He}^0 + \text{He}^{2+}$
coincidence technique ; two-state coupling.
15 - 224 keV/amu
- 87E54 Nakai, Y. Shirai, M. Tabata, T. Ito, R.
Cross sections for charge transfer of hydrogen atoms and ions colliding with gaseous atoms and molecules.
At. Data and Nucl. Data Tables 37 69 - 101 1987 E
analytic formula for charge transfer cross sections as a function of collision energy.
- 87E56 Niedner, G. Noll, M. Toennies, J.P.
Selective vibrational excitation and mode conservation in $\text{H}^+ + \text{CO}_2/\text{N}_2\text{O}$ inelastic and charge transfer collisions.
J. Chem. Phys. 87 2067 - 2083 1987 E
 $\text{H}^+ + \text{B} \rightarrow \text{H}^+ + \text{B}(n_1, n_2, n_3) ; \text{H} + \text{B}^+(n_1, n_2, n_3)$ (B= $\text{CO}_2, \text{N}_2\text{O}$)
TOF
0.01 - 0.03 keV/amu
Angular distribution.
- 87E57 Niedner, G. Noll, M. Toennies, J.P. Schlier, Ch.
Observation of vibrationally resolved charge transfer in $\text{H}^+ + \text{H}_2$ at $E_{\text{cm}} = 20$ eV.
J. Chem. Phys. 87 2685 - 2694 1987 E
 $\text{H}^+ + \text{H}_2(v=0) \rightarrow \text{H} + \text{H}_2^+(v_f) ; \text{H}^+ + \text{H}_2(v_f)$
TOF
0.03 keV/amu
doubly differential cross sections for $\text{H}, \text{H}^+, \text{H}^{\dagger}$.
- 87E58 Ohtani, S. Kimura, M. Kobayashi, N. Tawara, H.
Observation of selective electron capture by fully stripped C, N and O ions from H atoms.
J. Phys. Soc. J. 56 1271 - 1273 1987 E
 $\text{A}^{Z+} + \text{H} \rightarrow \text{A}^{(Z-1)+}(\text{n}) + \text{H}^+$ (A= C, N, O)
translational energy spectroscopy
0.75 keV/amu
n-distribution. no cross section.
- 87E101 Panev, G.S. Andersen, N. Andersen, T. Dably, P.
Orientation and alignment of $\text{Mg}^+(3p)$ states excited in 1 - 60 keV collisions with He and Ar.
Z. Phys. D 5 331 - 337 1987 E
 $\text{Mg}^+(3s) + \text{He}, \text{Ar} \rightarrow \text{Mg}^+(3p)$
photon-particle coincidence technique
0.04 - 2.5 keV/amu
- 87E59 Peart, B. Foster, S.J.
Measurements of mutual neutralization of Li^+ with H^- ions and of Na^+ with O^- ions.
J. Phys. B 20 L691 - 694 1987 E
 $\text{Li}^+ + \text{H}^- \rightarrow \text{Li} + \text{H} ; \text{Na}^+ + \text{O}^- \rightarrow \text{Na} + \text{O}$
crossed beam technique
0.03 - 2.4 keV/amu
- 87E60 Pedersen, J.O.K. Hveplund, P.
Energy gain spectroscopy studies of electron capture from neon by doubly charged CO ions
J. Phys. B 20 L317 - 322 1987 E
 $\text{CO}^{2+} + \text{Ne} \rightarrow \text{CO}^+ + \text{Ne}^+$
energy gain spectroscopy
 3×10^{-3} keV/amu
no cross sections given
- 87E61 Phaneuf, R.A. Janev, R.K. Hunter, H.T.
Charge exchange processes involving iron ions.
Nucl. Fusion Special 7 - 20 1987 E
Supplement
 $\text{Fe}^{8+} + \text{B} \rightarrow \text{Fe}^{(q)+} + \text{B}^+$ (B= H, H₂, He)
Evaluated cross section and rare coefficients
- 87E62 Politis, M.F. Jouin, H. Bonnefoy, M. Bonnet, J.J. Chassevent, M. Fleury, A.F. Bliman, S. Harel, C.
Relative (n,l) populations following electron capture by low energy $\text{N}^{7+}, \text{O}^{8+}$ and Ne^{8+} ions from two-electron targets (H_2, He).
J. Phys. B. 20 2267 - 2279 1987 E
 $\text{N}^{7+}, \text{O}^{8+}, \text{Ne}^{8+} + \text{H}_2, \text{He} \rightarrow \text{N}^{(q+)}(\text{n}, l), \text{O}^{(q+)}(\text{n}, l), \text{Ne}^{(q+)}(1s^2, \text{n}l)$
photon spectroscopy
4 keV/amu
no cross sections. relative population only

- 87E63 Roncin, P., Geborlaud, M.N., Barot, M., Laurent, H.
Transfer ionization in collisions involving multiply charged ions at low keV energy
Europhys. Letters 3 53 - 59 1987 E
 $N^{7+} + B \rightarrow N^{6+} + B^+$ (B = Ar, Xe; $k = 1 - 4$)
translational energy spectroscopy + recoil ion
0.75 keV/amu
no cross sections
- 87E64 Schon, W., Krudener, S., Melckert, F., Rinn, K., Wagner, M., Salzborn, E.,
Karamera, M., Szucs, S., Terao, M., Fussen, D., Janev, R., Urbain, X., Brouillard, F.
Transfer ionization in $H^+ + H$ collisions,
Phys. Rev. Letters 59 1565 - 1568 1987 E
 $H^+ + H \rightarrow H + H^+ + e$
crossed beam, LZ
 $5 \times 10^2 - 40$ keV/amu
- 87E65 Schon, W., Krudener, S., Melckert, F., Rinn, K., Wagner, M., Salzborn, E.,
Mutual neutralization in $H^+ - H$ collisions
J. Phys. B 20 L759 - 764 1987 E
 $H^+ + H \rightarrow H + H$
crossed beam technique
1 - 40 keV/amu
- 87E66 Schulz, M., Justiniano, E., Konrad, J., Schuch, R., Salin, A.
K-shell to K-shell charge transfer in collisions of bare decelerated S ion with Ar.
J. Phys. B 20 2057 - 2073 1987 E
 $S^{16+} + Ar \rightarrow S^{15+}(1s) + Ar^+(K^{-1})$
X-ray-X-ray coincidence technique
500 keV/amu
Impact parameter dependence. no cross sections given
- 87E67 Schulz, M., Justiniano, E., Schuch, R., Mokler, F.H., Reusch, S.
Separated resonances in simultaneous capture and excitation of S^{15+} in H_2 observed by
K-X-ray-K-X-ray coincidences,
Phys. Rev. Letters 58 1734 - 1737 1987 E
 $S^{15+} + H_2 \rightarrow S^{14+}(2l, n) + H_2^+$
X-ray-X-ray coincidence
2190 - 5000 keV/amu
resonant capture + excitation
- 87E68 Schwab, W., Baptista, G.B., Justiniano, E., Schuch, R., Vogt, H., Weber, E.W.
Measurement of the total cross sections for electron capture of 2.0 - 7.5 MeV H^+ in
 H, H_2 and He.
J. Phys. B 20 2825 - 2834 1987 E
 $H^+ + H, H_2, He \rightarrow H$
liquid nitrogen-cooled Wood tube
 $2 \times 10^3 - 7.5 \times 10^3$ keV/amu
- 87E69 Sedgwick, J.B., Paulson, B.P., Shields, G.C., Moran, T.F.
Competition between single and double electron transfer in collisions of doubly
charged molecular pyrrol molecules.
Int. J. Mass Spectro. 79 127 - 140 1987 E
Ion Processes
 $C_4H_5N^{3+} + C_4H_5N \rightarrow C_4H_5N^+ + C_4H_5N$
TOF
0.068 - 0.090 keV/amu
 $\sigma_{20} = 0.3 \times \sigma_{21}$
- 87E96 Sekiya, H., Tsuji, M., Nishiyamura, Y.
Optical study of the $He^+ + N_2$ charge transfer reaction in a flowing afterglow and in a
low-pressure chamber coupled with flowing afterglow.
J. Chem. Phys. 87 325 - 330 1987 E
 $He^+ + N_2 \rightarrow He + N_2^{+*}$
photon-spectroscopy + flowing afterglow technique
 2×10^3 keV/amu
no cross section given
- 87E97 Shul, R.J., Uptschulte, B.L., Passarella, R., Keese, R.G., Castleman, A.W.
Thermal energy charge-transfer reactions of Ar^+ and Ar_2^+ .
J. Phys. Chem. 91 2556 - 2562 1987 E
 $Ar^+, Ar_2^+ + B \rightarrow Ar, Ar_2 + B^+$ (B = H_2S, CS_2, NO_2 , all 26 molecules)
selected ion flow tube technique
rate coefficients at thermal energies
- 87E69 Suzuki, R., Kaneko, T., Tomita, M., Sakisaka, M.
Dissociation and electron capture of CO^+ and CF^+ ions in collisions with He, Ne and
Ar atoms.
J. Phys. Soc. J apan 56 495 - 501 1987 E
 $AC^+ + B \rightarrow A + C^+ + B$; $A^+ + C + B$; $A^+ + C^+ + e + B$; $A + C + B^+$; $AC + B^+$; $AC^+ +$
 $B^+ + e$ (B = He, Ne, Ar)
coincidence technique
0.13 - 0.5 keV/amu

- 87E70 Tanis, J.A., Clark, M.W., Price, R., Olson, R.E.
Contribution of transfer ionization to total electron capture from a helium target.
Phys. Rev. A 36 1952 - 1954 1987 E
 O^{q*} ($q=5,6,7,8$) + He $\rightarrow O^{q-1*} + He$; $O^{q-1*} + H^{2+} + e$
500 - 1500 keV/amu
large contribution of transfer ionization. scaling law.
- 87E102 Tsurubuchi, S., Arikawa, T.
Optical spectroscopic study on $Li^+ + Ne$ collision.
J. Phys. Soc. Japan 56 1996 - 2003 1987 E
 $Li^+ + Ne \rightarrow Li(2P_{3/2})$
photon spectroscopy technique
 $5.7 \times 10^{-2} - 5.7 \times 10^{-1}$ keV/amu
transition ($2p \rightarrow 2s$; $3d \rightarrow 2p$; $4d \rightarrow 2p$) of Li; also Ne^* transition
- 87E71 Tunnell, L.N., Cocke, C.L., Giese, J.P., Kamber, E.Y., Varghese, S.L., Waggoner, W.
Experimental angular distributions for electron capture by slow Ne^{q*} ($q=3-6$) ions from He.
Phys. Rev. A 35 3299 - 3308 1987 E
 Ne^{q*} ($q=3-6$) + He $\rightarrow Ne^{q-1*}$
recoil ion beam
0.01 - 0.06 keV/amu
angular differential cross sections (absolute)
- 87E72 Van Der Zande, W.J., Koot, W., Peterson, J.R., Los, J.
Charge exchange of O^{2+} with Cs: spectroscopy and predissociation pathways for the Π_g Rydberg states of O_2
Chem. Phys. Letters 140 175 - 180 1987 E
 $O_2^+(X^2\Pi_g) + Cs \rightarrow O_2^+(^1\Pi_g, ^3\Pi_g)$
translational energy spectroscopy
 $\rightarrow 0.1$ keV/amu
Vibrationally separated states determined
- 87E73 Van Zyl, B., Gealy, M.W., Neumann, H.
Lyman-alpha emission from H^+ impact on rare-gas atoms.
Phys. Rev. A 35 4551 - 1560 1987 E
 $H^+ + B \rightarrow H(2p, Lyman-alpha) + B^+$ ($B=He, Ne, Kr, Xe$)
0.01 - 2 keV/amu
polarization of Lyman-alpha lines
- 87E74 Varghese, S.L.
Electron capture phenomena in proton-atom and proton-molecular collisions.
Nucl. Instr. Meth. in 24 115 - 118 1987 E
Phys. Res. B
 $H^+ + Li \rightarrow H + Li^+$; $H^+ + B \rightarrow H^+ + B^+$ ($B=CH_4, C_2H_2, C_2H_4, C_2H_6, C_3H_6, C_3H_8, (CH_2)_2, C_3H_8, C_4H_8, O_2, CO, CO_2$)
growth
0.26 - 3.85 keV/amu (Li); 800 - 3000 keV/amu (B)
- 87E77 Wang, H.Y., Church, D.A.
Electron transfer collisions of low energy multicharge nitrogen ions with H_2 and N_2 .
Phys. Rev. A 36 4261 - 4266 1987 E
 N^{q*} ($q=2,3,4$) + B $\rightarrow N^{q-1*}$ ($B=H_2, N_2$)
trapping technique
 10^{-4} keV/amu
rate coefficients
- 87E75 Wang, Y., Champion, R.L., Doverspike, L.D.
Slow collisions of H⁻ and D⁻ with Na and K.
Phys. Rev. A 35 1503 - 1509 1987 E
 $H, D + Na, K \rightarrow H, D$
growth method
 $2 \times 10^{-3} - 0.3$ keV/amu
electron capture, detachment cross sections
- 87E76 Wang, Y., Champion, R.L., Doverspike, L.D.
Slow collisions of H⁻ and D⁻ with Cs.
Phys. Rev. A 36 381 - 383 1987 E
 $H, D + Cs \rightarrow H, D + Cs^+$; $H, D + e + Cs$
condenser
 $3 \times 10^{-3} - 0.25$ keV/amu
- 87E98 Warczak, A.
Pre-collision and post-collisional capture; crucial phenomena for inner-shell processes in very heavy systems.
Comm. At. Mol. Phys. 20 19 - 34 1987 E
review

- 87E99 Winter, H. Mack, M. Hoekstra, R. Niehaus, A. de Heer, F.J.
Comment on "Evidence for correlated double-electron capture in low-energy collisions of O^{6+} with He^+ ".
Phys. Rev. Letters 58 957 1987 E
 $O^{6+} + He \rightarrow O^{4+} + He^{2+}$
short comment
- 87E103 Witte, R. Campbell, E.E.B. Richter, C. Schmidt, H. Hertel, I.V.
Alignment and orientation effects in resonant charge exchange from laser excited Na^* ($3p$).
Z. Phys. D 5 101 - 111 1987 E
 $Na^+ + Na^*(3p)$
laser-excited atom target
 $2 \times 10^3 - 4 \times 10^3$ keV/amu
- 87E100 Yenen, O. Jaacks, D.H. Martin, P.J.
Quasidiatomic study of Ly-alpha producing H_f^+ - Ne collisions at keV.
Phys. Rev. A. 36 1517 - 1521 1987 E
 $H_f^+ + Ne \rightarrow H^+ + He^+$ \rightarrow Ly-alpha
photon-particle (H, H^+) coincidence technique
2.5keV/amu
direction excitation with subsequent dissociation is more likely than electron capture followed by dissociation.
- 87E78 Yousif, F.B. Lindsay, B.G. Simpson, F.R. Latimer, C.J.
Dissociative ionization and charge transfer in $He^+ - O_2$ collisions.
J. Phys. B 20 5079 - 5088 1987 E
 $He^+ + O_2 \rightarrow He + O^+(\sigma^2 \Sigma_u^-, B^2 \Sigma_g^-)$
TOF with dissociated ions
0.7 - 4 keV/amu
Energy and angular distribution of dissociated ions
- 87E79 Zouros, T.J. Schneider, D. Stolterfoht, N.
Production of ($2s^2$)S, ($2p^2$)D and ($2s2p$)P states by double electron capture in 150 - 500 keV $^3He^{2+} + He$ collisions.
Phys. Rev. A. 35 1963 - 1966 1987 E
 $^3He^{2+} + He \rightarrow He^0 + He^{2+}$
o-degree angular spectroscopy
50 - 166 keV/amu
- 87T 1 Aberg, T. Blomberg, A. MacAdam, K.B.
Interpretation of final state distributions in charge transfer from Rydberg atoms
J. Phys. B 20 4795-4814 1987 T
 $A^+ + Na(nl) \rightarrow A(nl) + Na^+$ ($A=Ne, Na, Ar$; $n=23-35$; $l=0, 2$)
Maximum entropy principle
0.5 - 2 keV/amu
- 87T58 Anholt, R. Becker, U.
Atomic collisions with relativistic heavy ions IX. ultrarelativistic collisions.
Phys. Rev. A 36 4628 - 4636 1987 T
REC and non-radiative electron capture cross sections based on scaling laws. also ionization cross sections given
- 87T 2 Bacchus-Montabonel, M.C.
Ab initio potential-energy curves and radial and rotational couplings for the process $N^{5+} + He \rightarrow N^{4+} + He^+$
Phys. Rev. A 36 1994-2001 1987 T
 $N^{5+} + He \rightarrow N^{4+} + He^+$
ab initio calculation with configuration interaction
no cross section given
- 87T 3 Bachau, H.
Autoionization of diatomic quasi-molecules
Europhys. Letters 3 559-564 1987 T
 $N^{7+} + He \rightarrow N^{6+} + He^{2+} + e$
quasi-molecular model
Auger ionization; transfer Penning ionization; two-electron capture followed by autoionization
- 87T66 Baer, M. Nakamura, H.
A three-dimensional quantum mechanical study of exchange and charge transfer processes in the ($Ar+H_2^+$) system.
J. Chem. Phys. 87 4651 - 4664 1987 T
 $H_2^+ + Ar$
infinite order sudden approx.
 6×10^{-4} keV/amu

- 87T67 Barnard, S.A. Ford, M.J. Cooper, D.L. Greeratt, J. Raimondi, M.
Calculation of potential energy curves for electron capture by C^{3+} from neutral lithium using spin-coupled VB theory.
Mol. Phys. 61 1193 - 1198 1987 T
 $C^{3+}(2s) + Li(2p) \rightarrow C^{2+}(nlnl'; 1l) + Li^+(1s^2)$
spin-coupled valence band method
potential energy curves
- 87T5 Belkic, D. Saini, S. Taylor, H.S.
Critical test of first order theories for electron transfer in collisions between multi-charged ions and atomic hydrogen: The boundary condition problem
Phys. Rev. A 36 1601-1617 1987 T
 $A^{z+} + H \rightarrow A^{(z-1)+}(nl) + H^+$ (A=H, He, Li, Be, B, C)
1st Born with/without correct boundary condition
20 - 300 keV/amu
(nl) distribution and total cross section
- 87T4 Belkic, D. Taylor, H.S.
First-order theory for charge exchange with correct boundary conditions; general results for hydrogen like and multielectron target atoms
Phys. Rev. A 35 1991-2006 1987 T
 $^4He^{2+} + Li \rightarrow He^+(nlm) + Li^+(1s^1/2s^{-1})$
first Born with correct boundary condition
62.5-625 keV/amu
general theory
- 87T6 Bianco, S.A. Falcon, C.A. Reinhold, C.O. Casaubon, J.I. Piancettini, R.D.
Electron capture in low and intermediate energy collisions between completely stripped light ions and metastable H(2s) targets
J. Phys. B 20 6295-6304 1987 T
 $A^{z+} + H(2s) \rightarrow A^{(z-1)+}$ (A = H, He, Li, C)
MO with ETF, LZ, CTMC
0.06-0.5 keV/amu
total cross sections
- 87T7 Borondo, F. Martin, F. Yanez, M.
Molecular treatment of the ion-pair formation reaction in H(1s) + H(1s) collision
Phys. Rev. A 35 60 - 65 1987 T
 $H(1s) + H(1s) \rightarrow H^+ + H^+(1s^2)$
MO
0.25 - 9.00 keV/amu
- 87T8 Cooper, I.L. Dickinson, A.S. Sur, S.K. Ta, C.T.
Ab initio studies of collision between Li^+ ions
J. Phys. B 20 2005-2023 1987 T
 $Li^+ + Li^+ \rightarrow Li^{2+}(1s) + Li(1s^2 2s; 1s^2 2p)$
1.4 - 13 keV/amu
- 87T10 Crothers, D.S.F. Dunseath, K.M.
Target continuum distorted-wave theory for capture of inner-shell electron by fully stripped ions
J. Phys. B 20 4115-4128 1987 T
 $H^+ + B \rightarrow H + B^+(K^{-1})$ (B=C, Ne, Ar)
Target continuum distorted-wave, CDW
 $10^2 - 2 \times 10^3 (C); 3 \times 10^2 - 6 \times 10^3 (Ne); 10^3 - 2 \times 10^4 (Ar)$ keV/amu
K-shell electron transfer cross sections
- 87T9 Crothers, D.S.F. McCarroll, R.
Correlated continuum distorted-wave resonant double electron capture in $He^{2+} - He$ collisions
J. Phys. B 20 2835-2842 1987 T
 $He^{2+} + He \rightarrow He + He^{2+}$
CDW
125 - 350 keV/amu
- 87T59 Deco, E.R. Rivarola, R.D.
Relativistic electron capture in ion-atom collisions.
J. Phys. B 20 3853 - 3865 1987 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$; $C^{6+}, Ne^{10+}, Ar^{18+} + B \rightarrow C^{5+}, Ne^{9+}, Ar^{17+}$ (B = 15 - 92)
CDW model
 $5 \times 10^4 - 10^6$ keV/amu
K-K-electron transfer cross sections.
- 87T12 Deco, G.R. and Rivarola, R.D.
Relativistic continuum distorted-wave model for arbitrary initial and final shells - electron capture in ion-atom collisions
J. Phys. B 20 5117-25 1987 T
 $A^{z+} + B \rightarrow A^{(z-1)+} + B^+$ (A=C, Ne, Ar; B=12-92)
relativistic CDW
 10^6 keV/amu

- 87T11 Deco,G.R. Rivarola,R.D.
A theoretical model for charge transfer at relativistic energies
J. Phys. B 20 317-324 1987 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$; $H^+ + B^+(1s) \rightarrow H(1s) + B^+$
Symmetric alkonal theory
 $5 \times 10^5 - 10^8$ keV/amu
Analytic expression for K-K transfer
- 87T13 Deco,G.R. Rivarola,R.D.
On spin flip charge exchange in relativistic ion-atom collisions
Nucl. Instr. Meth. in 28 154-156 1987 T
Phys. Res. B
CDW
K-K transfer cross sections equivalence between second Born and CDW for spin-flip asymptotic form at relativistic energies
- 87T60 Dewangan,D.P. Eichler,J.
Electron capture and the long range of the Coulomb interaction.
Comm. At. Mol. Phys. 21 1 - 13 1987 T
a review
- 87T68 Duba, L.T. Salin, A.
Electron capture to Rydberg and low-lying continuum states.
J. Phys. B. 20 1499 - 502 1987 T
 $O^8 + He \rightarrow O^7(n = 2 - 10) + He^+$
CDW
50 - 125 keV/amu
 $A^Z + He (A = 1 - 6)$ at 800 - 1200 keV/amu
- 87T14 Eichler,J.
Theory of relativistic charge exchange with Coulomb boundary conditions
Phys. Rev. A 35 3248-3255 1987 T
 $H^+ + H \rightarrow H(1s) + H^+$; $Ne^{10+} + B \rightarrow Ne^9(1s) + B^+(K^-)$ (B=Al-U)
relativistic first-order Born with Coulomb boundary condition
 $10^4 - 10^6$ keV/amu (H^+); 10^6 keV/amu (Ne^{10+})
- 87T16 Ermolaev,A.M. Hewitt,R.N. McDowell,M.R.C.
Quantal and classical calculations of $He^+ + Li$ interactions at intermediate energies: I charge transfer
J. Phys. B 20 3125-3155 1987 T
 $He^+ + Li(1s^2 2s) \rightarrow He^+(nl) + Li^+(1s^2)$ [$n=2,3,4,5,6$]; $He^+ + Li^+(1s^2) \rightarrow He^+(nl) + Li^+(1s)$ [$nl = 1s, 2s, 3p, 3s$]
close coupled AO and CTMC
2-100 keV/amu
- 87T15 Ermolaev,A.M. McDowell,M.R.C.
Quantal and classical calculations of interactions between p and Li^{2+} ions in the proton energy range from 17.5 keV to 3.0 MeV
J. Phys. B 20 1379-383 1987 T
 $H^+ + Li^{2+}(1s) \rightarrow H(nlm) + Li^{3+}$; $H^+ + Li^{3+}$; $H^+ + Li^{2+}(nl)$
close coupled AO, CTMC
 $17.5 \cdot 3 \times 10^3$ keV/amu
- 87T17 Errea,L.F. Gomez-Llorente,J.M. Mendez,L. Riera,A.
Convergence study of $He^{2+} + H$ and $He^+ + H^+$ charge exchange cross sections using a molecular approach within an optimized common translation factor
J. Phys. B 20 6089-6103 1987 T
 $He^{2+} + H \rightarrow He^+(total, 2s, 2p, 3s, 3p, 3d)$; $He^+ + H^+ \rightarrow He^{2+} + H(total, 1s)$
MO with translation factor
- 87T18 Errea,L.F. Gomez-Llorente,J.M. Mendez,L. Riera,A.
Practical criterion for the determination of translation factors III. a common translation factor with optimized asymptotic form
Phys. Rev. A 35 4060-4067 1987 T
 $He^{2+} + H(1s) \rightarrow He^+(2s, 2p) + H^+$
5keV/amu
- 87T19 Freire,F.L. Montenegro,E.C.
On the calculation of the electron capture within the strong potential Born approximation
Z. Phys. D 7 239-241 1987 T
Strong potential Born approx.
analytical expressions for high energy limit

- 87T20 Fritsch, W., Lin, C.D.
Two electron description of electron transfer in $\text{He}^+ + \text{He}^+$ collision
Phys. Letters A 123 128-131 1987 T
 $\text{He}^+ + \text{He}^+ \rightarrow \text{He}(\text{all } ^3\text{S}) + \text{He}^{2+}$
AO
3-80 keV/amu
significant contribution from ^3S state
- 87T21 Gargaud, M., McCarroll, R., Valiron, P.
Influence of rotational coupling on charge transfer in low-energy C^+/H collisions
J. Phys. B 20 1555-1564 1987 T
 $\text{C}^+ + \text{H} \rightarrow \text{C}^+(^3\text{P}), \text{C}^+(^1\text{D}) + \text{H}^+$
MO with translation effect + radial/rotational coupling
 $9 \times 10^{-4} - 1.178$ keV/amu
- 87T22 Gayet, R., Sain, A.
Simultaneous capture and ionization by fast ion impact on helium
J. Phys. B 20 L 571-576 1987 T
 $\text{A}^{2+} + \text{He} \rightarrow \text{A}^{(2-)^{1+}} + \text{He}^+; \text{A}^{(2-)^{1+}} + \text{He}^{2+} + e$ (A=H, He, Li, O)
CDW
400 - 1500 keV/amu
- 87T23 Gazdy, B., Micha, D.A.
Electron transfer and spin-flip processes in atom-atom collisions from variationally improved time-dependent Hartree-Fock results
Phys. Rev. A 36 546-556 1987 T
 $\text{He}^{2+} + \text{He} \rightarrow \text{He}^{2+} + \text{He}$ (elastic); $\text{He} + \text{He}^{2+}; \text{He}^+ + \text{He}^+;$
 $\text{He}^+(\text{u}) + \text{He}^+(\text{u}) \rightarrow \text{He}^+(\text{u}) + \text{He}^+(\text{u})$ (elastic); $\text{He}(\text{u}) + \text{He}^{2+}(\text{u})$
time dependent Hartree-Fock
7.5-25 keV/amu
Impact parameter dependence of probabilities
- 87T24 Ghosh, M., Mandal, C.R., Mukherjee, S.C.
Charge transfer cross sections for asymmetric collisions of protons with carbon, nitrogen, oxygen, neon and argon
Phys. Rev. A 35 2815-2820 1987 T
 $\text{H}^+ + \text{B} \rightarrow \text{H} + \text{B}^+(\text{K})$ (B=C, N, O, Ne, Ar)
DW with peaking-impulse approximation
150-20000 keV/amu
- 87T25 Ghosh, M., Mandal, C.R., Mukherjee, S.C.
Double electron capture from helium by ions of helium, carbon and oxygen
Phys. Rev. A 35 5259-5261 1987 T
 $\text{A}^{2+} + \text{He} \rightarrow \text{A}^{(2-)^{2+}} + \text{He}^{2+}$ (A=He, Li, C, O)
CDW, continuum Intermediate State (CIS) approx.
125-500 keV/amu (He); 160-400 keV/amu (Li); $10^3-2 \times 10^3$ keV/amu (C);
- 87T26 Graham, W.G., Bernstein, E.M., Clark, M.W., Tamis, J.A.
Predicted electron-correlation effects in U^{98+} collisions with light targets at GeV energies
Phys. Letters A 125 134-136 1987 T
 $\text{U}^{98+} + \text{B} \rightarrow \text{U}^{98+}$ (B=H₂, C)
 $10^4-2 \times 10^4$ keV/amu
Non-radiative direct capture, REC, RTE
- 87T27 Heil, T.G., Sharma, J.B.
Differential cross sections for the charge transfer reaction $\text{O}^{2+} + \text{He} \rightarrow \text{O}^+ + \text{He}^+$ at low energies
Phys. Rev. A 36 3669-3673 1987 T
 $\text{O}^{2+} + \text{He} \rightarrow \text{O}^+(2p^3 \ ^3\text{P}, ^1\text{D}) + \text{He}^+$
PSS
 $3 \times 10^{-4}-0.03$ keV/amu
Differential cross sections
- 87T28 Henne, A., Ludde, H.J., Toepfer, A., Dreizler, R.M.
Atomic basis calculations for the two-electron system $\text{Li}^{2+}-\text{H}$
Phys. Letters A 124 508-509 1987 T
 $\text{Li}^{2+} + \text{H} \rightarrow \text{Li}^+ + \text{H}^+$
AO
1-36 keV/amu
- 87T30 Hiro, K., Watanabe, T.
Angular-distribution and linear polarization correlation of photons induced by the relativistic radiative electron capture process
Phys. Rev. A 36 5862-5865 1987 T
Born approx.
REC into K and L shells; angular distribution

- 87T29 Hino, K. Watanabe, T.
Cross sections of relativistic radiative electron capture by use of the strong-potential Born calculation
Phys. Rev. A 36 581-590 1987 T
Xe⁴⁺ + Be; U⁹²⁺ + Be
Relativistic strong-potential Born approx.
197x10³ keV/amu (Xe); 4.22x10³ keV/amu (U)
Angular distribution
- 87T31 Hsin, S.H. Lieber, M.
Third-Born-approximation effects in electron capture
Phys. Rev. A 35 4833-4835 1987 T
H⁺ + H → H + H⁺
Strong potential Born approximation; DWBA
10³-2x10³ keV/amu
Angular distribution
- 87T69 Ivakin, I.A. Karbovanets, M.I. Ostrovskii, V.N.
Charge exchange with ion excitation: asymptotic theory.
Opt. Spectrosc. (USSR) 63 288-292 1987 T
He⁺ + Cd → He + Cd⁺; Ne⁺ + Hg → Ne + Mg⁺
Semiclassical method
rate coefficients at thermal energies
- 87T32 Jain, A. Lin, C.D. Fritsch, W.
Density matrix for the H(n=3) atoms formed in electron capture process of H⁺ - helium collisions at 25-100 keV
Phys. Rev. A 35 3180-3182 1987 T
H⁺ + He → H(n=3)
Two-centered AO close-coupling expansion method
Density matrix; time lag of electron after capture into n=3
- 87T33 Jain, A. Lin, C.D. Fritsch, W.
Density matrices of the excited H(n=2 and 3) atoms formed in 25-100 keV proton-helium charge transfer collisions
Phys. Rev. A 36 2041-2055 1987 T
H⁺ + He → H(n=2,3) + He⁺
Ab initio calculation
25-100 keV/amu
Capture cross sections for 1s, 2s, 2p, 3s, 3p and 3d
- 87T34 Jakubassa-Amundsen, D.H.
Distorted-wave Born theory for electron capture during resonant nuclear scattering
J. Phys. B 20 L 705-709 1987 T
H⁺ + C → H + C⁺ (K⁻¹)
DWBA
10³ keV/amu
Probabilities as a function of scattering angle
- 87T35 Jakubassa-Amundsen, D.H.
On the applicability of the impulse approximation for radiative electron capture into bound and continuum states
J. Phys. B 20 325-336 1987 T
A^{Z+} + He → A^{Z-1+} (A=C, Ne)
Impulse approximation/strong potential Born approximation
Differential cross section
- 87T62 Johnson, C.A.F. Parker, J.E.
The charge transfer reactions of protons with carbon dioxide: a two-state treatment.
Chem. Phys. 111 307-312 1987 T
H⁺ + CO₂ → H + CO₂⁺
two-state model (Stueckelberg-Demkov)
0.1 - 5.0 keV/amu
relative branching ratios for CO₂⁺; CO⁺, O⁺, C⁺.
- 87T36 Kartoshkin, V.A.
Isotope effect in charge exchange of He⁺ ions with helium atoms
JETP Letters 45 154-156 1987 T
³He + ³He⁺; ⁴He⁺ → ³He⁺ + ³He; ⁴He
Rate constant at 300K (->10 % difference)
- 87T37 Kimura, M. Lane, N.F.
Travelling-molecular-orbital-expansion studies of electron capture in collisions of fully stripped ions (Z=6-9) with H and He
Phys. Rev. A 35 70-78 1987 T
A^{Z+} + H, He → A^{Z-1+} (n) (A=C, N, O, F)
Travelling MO
0.1-10 keV/amu
- 87T61 Kimura, M. Lin, C.D.
A unified atomic-orbital and molecular-orbital matching method for ion-atom and atom-atom collisions.
Comm. At. Mol. Phys. 20 35-49 1987 T

- 87T38 Lin, C.D. Macek, J.H.
Theory of anisotropy transfer and calculations of alignment of np states populated in electron capture by highly charged ions
Phys. Rev. A 35 5005-5011 1987 T
 $O^{8+} + He \rightarrow O^{7+}(\text{Lyman alpha})$; $Ne^{8+} + H_2 \rightarrow Ne^{8+}(\text{Lyman alpha})$
300 - 2200 keV/amu (O); 4 keV/amu (Ne)
- 87T39 McGuire, J.H. Deb, N.C. Sil, N.C. Taulbjerg, K
Third-Born-approximation calculation of electron capture
Phys. Rev. A 35 4830-4832 1987 T
 $H^+ + H \rightarrow H + H^+$
Symmetrized strong potential Born approximation with third Born term
 $10^3 - 2 \times 10^9$ keV/amu
Angular distribution
- 87T40 McKenzie, M.L. Olson, R.E
Ionization and charge exchange in multiply charged ion-helium collisions at intermediate energies
Phys. Rev. A 35 2863-2868 1987 T
 $A^{q+} + He \rightarrow A^{(q-1)+} + He^+$; $A^{q+} + He^+ + e$; $A^{(q-2)+} + He^{2+}$; $A^{q+} + He^{2+} + 2e$; $A^{(q-1)+} + He^{2+} + e$ ($q=1-100$)
Classical trajectory Monte Carlo method
1000 - 5000 keV/amu
Scaling law for q and E
- 87T63 Mercier, E. Chamband, G.
Quasi-adiabatic potential energies and electronic couplings for $(ArH)^{q+}$; mechanisms and threshold of excited hydrogen formation in low-energy collisions.
J. Phys. B. 20 4659 - 4671 1987 T
 $Ar^+ + H \rightarrow Ar^+(3p^3 3d) + H^+$
 2.5×10^{-4} keV/amu
potential energies and coupling; no cross sections given; cross sections for $Ar^+ + H^+(2p\pi)$ process.
- 87T41 Moisewitsch, B.L.
Symmetric eikonal approximation for electron capture at relativistic energies
J. Phys. B. 20 L171-174 1987 T
 $H^+ + B^{q+} \rightarrow H(1s) + B^{q+}(1s)$; $A^{2+} + H(1s) \rightarrow A^{(2-1)+}(1s)$ ($Z=13-92$)
Relativistic eikonal approximation
 $5 \times 10^5 - 10^8$ keV/amu
- 87T42 Moisewitsch, B.L.
Relativistic eikonal phase factors for electron capture
J. Phys. B. 20 4111-4114 1987 T
Relativistic eikonal approximation
Formalism
Neufeld, D.A. Daigarno, A.
Charge transfer in collisions of doubly charged ions of iron and nickel with hydrogen atoms
Phys. Rev. A 35 3142-3144 1987 T
 Fe^{2+} ; $Ni^{2+} + H \rightarrow Fe^+$; Ni^+
Landau-Zener approximation
 $10^3 - 10^5$ K rate coefficients $Fe^{2+} \rightarrow Fe^+$ (ground state); preferential. $Ni^{2+} \rightarrow Ni^+$ (excited state); preferential.
- 87T64 Nikitin, E.E. Reznikov, A.I. Umanskii, S.Y.
Two-level model of charge exchange with coulomb interaction in one of the channels; quantum and quasiclassical cross sections in the weak-coupling limit.
Sov. Phys.-JETP 64 937 1987 T
 $Ar^{2+} + He$
- 87T44 Ohyama-Yamaguchi, T
Double- and single-charge transfer in collision of C^{6+} ion with He atom at low impact energies
J. Phys. Soc. Japan 56 1693-1702 1987 T
 $C^{6+} + He \rightarrow C^{3+} + He^+$; $C^{6+} + He^{2+}$
PSS with impact parameter approximation
0.1 - 10 keV/amu
 $\sigma(6,4) = 0.1 \times \sigma(6,5)$
- 87T45 Pachter, M.C. Gonzalez, A.D. Miraglia, J.E.
Retardation effects in radiative electron capture
Phys. Rev. A 35 4108-4113 1987 T
 $Xe^{54+} e \rightarrow Xe^{53+}(1s) + hv$; $H^+ + H(1s) \rightarrow H(1s) + H^+ + hv$
 $5.6 \times 10^3 - 5.1 \times 10^4$ keV/amu
Retarding effects at high impact energy; total, double, triple differential cross sections

- 87T46 Reinhold, C.O. Miraglia, J.E.
Electron capture from H(2s) by protons at intermediate energies
J. Phys. B 20 541-549 1987 T
H⁺ + H(2s) → H(n=1,2,3) + H⁺
A close-coupling with ETF, classical trajectory Monte Carlo method
1-200 keV/amu
- 87T47 Roberts, M.J.
A comparative study of the second-order Born and Faddeev-Watson approximation: II
charge transfer
J. Phys. B 20 551-564 1987 T
H⁺ + He(1s²) → H(1s) + He⁺(1s)
Second Born approximation, Faddeev-Watson approximation
2820 - 20000 keV/amu
Angular differential cross sections
- 87T48 Saha, G.C. Datta, S. and Mukherjee, S.C.
Charge transfer in collisions of atomic hydrogen with N⁷⁺ ions in the high energy
region
Phys. Rev. A 36 1656-1662 1987 T
N⁷⁺ + H(1s) → N⁶⁺(nlm) + H⁺
CDW
710-2857 keV/amu
Arbitrary (nlm) → arbitrary (n'l'm') transfer
- 87T49 Shimakura, N. Sato, H. Kimura, M. Watanabe, T.
Electron capture processes in collisions of O⁶⁺ with He using the travelling molecular
orbital method
J. Phys. B 20 1801-1810 1987 T
O⁶⁺ + He → O³⁺(n,l) + He⁺
MO expansion method with ETF
0.14 - 7 keV/amu
(n,l) partial cross sections
- 87T52 Shingal, R. Bransden, B.H.
Mutual neutralization in H⁺ + H⁺ collisions
J. Phys. B 20 L 533 - 535 1987 T
H⁺ + H⁺ → H(nl) + H(1s)
Multistate impact parameter method
8 - 50 keV/amu
- 87T53 Shingal, R. Bransden, B.H.
Charge transfer, target excitation and ionization in H⁺ + Na(3s) collisions
J. Phys. B 20 4815 - 4825 1987 T
H⁺ + Na(3s) → H⁺ + Na(nl) ; H(nl) + Na⁺
Two-center expansion with travelling atomic orbitals
0.8 - 50 keV/amu
- 87T51 Shingal, R. Bransden, B.H. Flower, D.R.
Formation of H(2s) and H(2p) in collisions between ground state hydrogen atoms
J. Phys. B 20 L477 - 480 1987 T
H(1s) + H(1s) → H(1s) + H(2s,2p)
travelling AO model
1-100 keV/amu
- 87T50 Shingal, R. Noble, C.J. Bransden, B.H.
A study of charge transfer and excitation processes in collisions of alpha particles
with sodium atoms
J. Phys. B 20 793 - 799 1987 T
He²⁺ + Na(3s) → He⁺(nl) + Na⁺(n=1s,2s,2p,3s,3p, 3d,4s,4p,4d,4f)
coupled state impact parameter method
2.5 - 67.5 keV/amu
Preferential capture into He⁺(3l) at low energy (<30 keV)
- 87T54 Tan, J. Lin, C.D. Kimura, M.
A quantum study of differential cross sections for double charge transfer in C⁴⁺ - He
collisions
J. Phys. B 20 L 91 - 97 1987 T
C⁴⁺ + He → C²⁺
Quantal two-channel MO close-coupling expansion method
0.04 - 0.13 keV/amu
Angular differential cross sections
- 87T65 Tiwari, Y.N. Roy, D.N.
Electron capture cross sections in proton-lithium atom collisions.
Ind. J. Pure Appl. 25 323 - 327 1987 T
H⁺ + Li → H + Li⁺

- 87T55 Toshima, N. Ishihara, T. Eichler, J.
Distorted-wave theories for electron capture and the associated high energy behavior of cross sections
Phys. Rev. A 36 2659 - 2666 1987 T
H⁺ + He → H⁰ + He⁺
DW with Coulomb boundary conditions
50 - 10⁴ keV/amu
- 87T56 Winter, T.G.
Electron transfer and ionization in collisions between protons and the ions He⁺, Li²⁺, Be³⁺, B⁴ and C⁵⁺ studied with the use of a Sturmian basis
Phys. Rev. A 35 3799 - 3809 1987 T
H⁺ + B^{(Z-1)+} → H(1s,total) + B^{Z+}; H⁺ + B^{(Z-1)+} + e (B=He, Li, Be, B, C)
Coupled-Sturmian-pseudo state approach
75 - 937 keV/amu (B); 150 - 600 (C); 17.5 - 150 (He); 17.5 - 200 (Li); 50 -
- 87T57 Winter, T.G. Hutton, G.J. Day, A.R. Lane, N.F.
Differential cross sections for electron transfer and elastic scattering in collisions between alpha particles and hydrogen atoms
Phys. Rev. A 36 625 - 640 1987 T
He²⁺ + H → He⁺ + H⁺; He²⁺ + H(elastic)
MO
1 - 70 keV/amu
Angular distribution

- 88E 1 Andersson, H.A. Astner, G. Cederquist, H.
Total cross sections for different charge changing processes in collisions of highly charged Xe ions with He atoms at low energy.
J. Phys. B 21 L187 - 93 1988 E
 $\text{Xe}^{q+}(q = 11 - 31) + \text{He} \rightarrow \text{Xe}^{s+}(q' = q - 1, q - 2) + \text{He}^{s+}(s = 1, 2)$
coincidence technique
 $3 \times 10^{-2} \text{ keV/amu}$
- 88E 2 Anholt, R. Xu, X.Y. Stoller, Ch. Molitoris, J.D. Meyerhof, W.E.
Intermediate-velocity atomic collisions; electron capture and loss in 10 - 42 MeV C ions.
Phys. Rev. A 37 1105 - 1114 1988 E
 $\text{C}^{3+}(q = 6, 5, 4, 3) + \text{B} \rightarrow \text{C}^{(q-1)+} (\text{B} = \text{H}_2, \text{He}, \text{N}_2, \text{O}_2, \text{Ne}, \text{Ar}, \text{Kr}, \text{Xe}) ; \text{C}^{3+} + \text{B} \rightarrow \text{C}^{q+}$
Glauber theory for ionization; eikonal approximation for electron capture.
833 - 2100 keV/amu
equilibrium-charge distributions calculated from observed data.
- 88E 3 Baker, O.K. Meyerhof, W.E. Spooner, D.W. Stoller, Ch. Scheurer, J.N.
Nuclear resonance effect in atomic electron capture by protons.
Phys. Rev. Letters. 60 913 - 916 1988 E
 $\text{H}^{1+} + {}^2\text{Ne} \rightarrow \text{H} + \text{Ne}^+$
1500 keV/amu
- 88E 61 Barat, M.
Multiple electron capture processes by highly charged ions.
Comm. At. Mol. Phys. 21 307 - 319 1988 E
review
- 88E 4 Benoit-Cattin, P. Bordenave-Montesquieu, A. Boudjerna, M. Gleizes, A. Dousson, S. Hitz, D.
Multiple capture in $\text{N}^{7+} + \text{Ar}$ investigated by electron spectroscopy (70keV, theta = 10).
J. Phys. B 21 3387 - 3416 1988 E
 $\text{N}^{7+} + \text{Ar}, \text{He}, \text{H}_2 \rightarrow \text{N}^{s+}(n, l, n' l') (n = 2, 3, 4)$
electron spectroscopy
5 keV/amu
no cross sections given ; electron peaks assigned to $(n, l, n' l')$
- 88E 5 Bouchama, T. Druetta, M. Martin, S.
Subshell selective electron capture in collision of $\text{O}^{6+}(q = 6, 7)$ with H_2 , He at 10q keV.
Nucl. Instr. Meth. in Phys. Res. B 31 371 - 373 1988 E
 $\text{O}^{6+} + \text{H}_2 \rightarrow \text{O}^{s+}(1s^{\pm} n l) ; n = 3, 4 ; \text{O}^{7+} + \text{H}_2, \text{He} \rightarrow \text{O}^{s+}(1s n l) ; n = 3, 4$
photon spectroscopy
3.75 - 4.4 keV/amu
- 88E 6 Brechignac, C. Cahuzac, Ph. Leygnier, J. Pflaum, R. Weiner, J.
Direct observation of charge-exchange collisions between mass-selected $(\text{Na})_n^+$ clusters and Cs atoms.
Phys. Rev. Letters 61 314 - 317 1988 E
 $(\text{Na})_n^+ + \text{Cs} \rightarrow (\text{Na})_n + \text{Cs}^+ (n = 1 - 21)$
TOF
0.05 keV/amu
total cross sections $(40 - 20 \text{ \AA}^2 \text{ for } n = 1 - 20)$
- 88E10 Castro Faria, N.V. Freire, F.L. de Pinho, A.G.
He⁺ formation by two-and three-electron capture.
Z. Phys. D 8 167 - 170 1988 E
 $\text{He}^{2+}, \text{He}^+ + \text{B} \rightarrow \text{He}^+ (\text{B} = \text{He}, \text{Ne}, \text{Ar}, \text{Kr})$
growth method
187 - 1000 keV/amu
- 88E 9 Castro Faria, N.V. Freire, F.L. de Pinho, A.G.
Electron loss and capture by fast helium ions in noble gases.
Phys. Rev. A 37 280 - 283 1988 E
 $\text{He}^{2+} + \text{B} \rightarrow \text{He}^+, \text{He}^0 ; \text{He}^+ + \text{B} \rightarrow \text{He}^0 (\text{B} = \text{He}, \text{Ne}, \text{Ar}, \text{Kr}) ; \text{He}^+ + \text{B} \rightarrow \text{He}^{2+} (\text{B} = \text{He}, \text{Ne}, \text{Ar}, \text{Kr})$
growth/attenuation method
187 - 1000 keV/amu
total cross sections
- 88E 7 Chiu, Y.N. Friedrich, B. Maring, W. Niedner, G. Noll, M. Toennies, J.P.
Charge transfer and structured vibrational distributions in $\text{H}^+ + \text{CH}_4$, low-energy collisions.
J. Chem. Phys. 88 6814 - 6830 1988 E
 $\text{H}^+ + \text{CH}_4 \rightarrow \text{H}^+$ (elastic) ; $\text{H} + \text{CH}_4^+, \text{CH}_3^+, \text{CH}_2^+$
crossed beam technique + TOF(energy loss measurement)
 $10^{-2} - 3 \times 10^{-2} \text{ keV/amu}$
elastic scattering ; theta = 0 - 10 ; $\text{CH}_4^+ ; \text{CH}_3^+ ; \text{CH}_2^+ = 74 : 22 : 4$ at 30 eV

- 88E8 Church, D.A.
Studies of ion collisions in ion traps.
Phys. Scripta T 22 164 - 170 1988 E
 $N^{3+} + H_2 \rightarrow N^{2+} + H_2^+$
Penning ion trap
 10^{-4} keV/amu
a review on low energy electron transfer.
- 88E11 Engelhardt, C.L. Jaacks, D.H.
Isotopic velocity-dependent effects in $He^+ + H_2$ or D_2 collisions.
Phys. Rev A 37 1041 - 1043 1988 E
 $He^+ + H_2(D_2) \rightarrow He(3^1P; m_1=1) + H_2^+(D_2^+)$
 $0.25 - 3$ keV/amu
rotational coupling in united-atom
- 88E12 Ferguson, F.E. Richter, R. Lindinger, W.
Competitive charge-transfer and vibrational quenching of $N_2^+(X, v=1)$ in collisions with O_2 and NO .
J. Chem. Phys. 89 1445 - 2447 1988 E
 $N_2^+(X, v=1) + O_2 \rightarrow N_2 + O_2(a^1\Pi_u) ; N_2^+(X, v=0) + NO \rightarrow N_2 + NO(a^1\Sigma^+)$
 $3 \times 10^{-6} - 3.6 \times 10^{-5}$ keV/amu
rate constants $N_2^+(X, v=1) + B \rightarrow N_2^+(X, v=0) + B$ ($B = O_2, NO$) also investigated.
- 88E13 Finck, K. Wang, Y. Roller-Lutz, Z. Hutz, H.O.
Lyman-alpha emission in collisions of H^+ ions with $Na(3s)$ and laser-assisted $Na(3p)$ atoms
Phys. Rev. A 38 6115 - 6119 1988 E
 $H^+ + Na(3s, 3p) \rightarrow H(2p)$
growth method
 $0.5 - 10$ keV/amu
- 88E14 Gay, T.J. Redd, E. Blankenship, D.M. Park, J.T. Peacher, J.I. Seely, D.G.
Charge transfer in quasi-one-electron systems at 'high' energy.
J. Phys. B 21 L467 - 472 1988 E
 $Mg^+ + He \rightarrow Mg; Be^+ + He \rightarrow Be$
energy-loss spectroscopy
 $1.25, 2.78, 6.25$ keV/amu (Mg) ; 6.25 keV/amu (Be)
angle-differential cross sections
- 88E15 Giese, J.P. Cocke, C.L. Waggoner, W.T. Pedersen, J.O.K. Kamber, E. Y. Tunnell, L.N.
Non-Frank-Condon transitions in two-electron capture from D_2 by low-energy, highly charged Ar projectiles.
Phys. Rev. A 38 4494 - 4503 1988 E
 $Ar^{q+} + D_2 \rightarrow Ar^{(q-1)+} + D^+ + D^+$
projectile-break-up proton coincidence
 $1.25 \times 10^{-2} - 0.25$ keV/amu
- 88E16 Guyon, P.M. Baer, T. Cole, S.K. Govers, T.R.
The electron transfer and collision-induced dissociation cross section of state-selected H_2^+ and D_2^+ ions.
Chem. Phys. 119 145 - 158 1988 E
 $H_2^+, D_2^+(v=1-10) + H_2 \rightarrow H_2, D_2 + H_2^+; H^+ + H, D^+ + D$
TREPICO
 -10^{-2} keV/amu
collision-induced dissociation > charge transfer for high v ; the reverse for low v .
- 88E19 Hadman, M. Jonathan, P. Kingston, R.G. Brenton, A.G.
Single-electron capture by $Cl^{2+}(^4S, ^3D, ^2P)$ from rare-gas targets.
Int. J. Mass Spec. Ion Proc. 83 331 - 338 1988 E
 $Cl^{2+} + B \rightarrow Cl^{2+*}, Cl^+$ ($B = He, Ne, Ar, Kr, Xe$) ; $Cl^+ + He \rightarrow Cl^{1*}$
translation energy spectroscopy
 0.17 keV/amu
only energy spectra for identification of levels $Cl^{2+}(^4S)$ and metastable ($^3D, ^2P$) states contained.
- 88E17 Hamdan, M. Lee, A.R. Branton, A.G.
Fine-structure translations in collisions of Xe^{2+}, Xe^{3+} and Xe^{4+} ions with He atoms.
J. Phys. B 21 L561 - 566 1988 E
 $Xe^{2+}(^3P, ^1D_2), Xe^{3+}(^3S_{1/2}, D_3, ^3P), Xe^{4+}(^1D_2) + He \rightarrow Xe^+, Xe^{2+}, Xe^{3+}$
translational energy spectroscopy
 0.04 keV/amu
no cross sections given; only translational energy spectra.

- 88E18 Hamdan, M, Mazumdar, S, Marathe, V.R, Badrinathan, C, Brenton, A.G, Mathur, D.
Excited states of XH^{2+} ($X = C, N, O, S$) ions : a combined experimental and theoretical study.
J. Phys. B 21 257 - 284 1988 E
 $XH^{2+} + He \rightarrow XH^+(X = C, N, O, S)$
translational energy spectroscopy
0.2 - 0.5 keV/amu
- 88E62 Henri, G, Lavoille, M, Dutuit, O, Ozanne, J.B, Guyon, P.M, Gislason, E.A.
State-selected ion-molecule reactions ; $N_2^+(v) + H_2 \rightarrow N_2 + H_2^+$ and $Ar^+(^2P) + H_2 \rightarrow Ar + H_2^+$.
J. Chem. Phys. 88 6381 - 6389 1988 E
 $N_2^+(v) + H_2 \rightarrow N_2 + H_2^+ ; Ar^+(^2P) + H_2 \rightarrow Ar + H_2^+$
TPEPICO
 $3.7 \times 10^{-4} - 5.2 \times 10^{-4}$ keV/amu
- 88E20 Hippler, R, Datz, S, Krauss, H.F, Miller, P.D, Pepmiller, P.L, Dittner, P.F.
Partial cross sections for electron capture into specific n states for 0.1 - and 0.25 - MeV/nucleon $Fe - H_2$ collisions ($q = 12 - 18$)
Phys. Rev. A 27 3201 - 3203 1988 E
 $Fe^q(q = 12 - 18) + H_2 \rightarrow Fe^{(q-1)+}(n)$
photon spectroscopy
 $10^2, 2.5 \times 10^2$ keV/amu
strong core-effect
- 88E21 Hippler, R, Datz, S, Miller, P.D, Dittner, P.F, Pepmiller, P.F.
Double and single electron capture and loss in 0.5 - 2.5 MeV/u $O^{q+} + Ne$ ($q=5,7,9$) collisions.
Z. Phys. D 8 163 - 166 1988 E
 $O^{q+}(q = 5,7,9) + Ne \rightarrow O^{(q-2)+}, O^{(q-1)+}, O^{(q+1)+}, O^{(q+2)+}$
growth
 $0.5 \times 10^3 - 2.5 \times 10^3$ keV/amu
total cross sections
- 88E60 Hird, B, Rahman, F, Orakzai, M.W.
Electron capture and loss by fast fluorine atoms in collisions with rare gas targets
Can. J. Phys. 66 973 - 977 1988 E
 $F + B \rightarrow F^+, F^-$ ($B = He, Ne, Ar, Kr, Xe$)
growth method
1 - 5.9 keV/amu
- 88E22 Hird, B, Rahman, F, Orakzai, M.W.
Ion-production cross sections in chlorine-rare gas collisions.
Phys. Rev. A 37 4620 - 4624 1988 E
 $Cl^- + B \Rightarrow Cl, Cl^+$ ($B = He, Ne, Ar, Kr, Xe$)
growth method
0.31 - 3.2 keV/amu
total cross sections
- 88E23 Hoekstra, R, Ciric, D, Zimoviev, A.N, Gordeev, Yu.S, De Heer, F.J, Morgenstern, R.
Emission cross sections for fully stripped carbon colliding atomic hydrogen.
Z. Phys. D 8 57 - 61 1988 E
 $C^{6+} + H \rightarrow C^{n+}(n, n') + H^+(n, n') = 4-2 ; 4-3 ; 3-2 ; 5-2 ; 5-3 ; 7-6 ; 8-7$
photon-spectroscopy
- 88E24 Howard, S, Rockwood, A, Anderson, S, Howorka, F, Futrell, J.
Crossed-beam study of the charge-transfer reaction of helium ions with xenon.
Phys. Rev. A 37 3211 - 3216 1988 E
 $He^+ + Xe \rightarrow He + Xe^+$
crossed-beam technique
 $1.3 \times 10^{-3} - 2.4 \times 10^{-2}$ keV/amu
 $6s \ ^3P_{1/2}$ dominant; no cross sections given
- 88E25 Huq, M.S, Champion, R.L, Doverspike, L.D.
Low-energy collisions of O^{2+} with atoms and molecules.
Phys. Rev. A 37 2349 - 2353 1988 E
 $O^{2+} + B \rightarrow O^+ + B^+$ ($B = He, Ne, Ar, H_2, D_2, N_2, O_2$)
retarding method
 $1.8 \times 10^{-4} - 2.5 \times 10^{-3}$ keV/amu
only total cross section
- 88E26 Jonathan, P, Hamdan, M, Brenton, A.G, Willett, G.D.
Translational spectroscopy of the triatomic dications CO_2^{2+}, OCS_2^{2+} and CS_2^{2+} .
Chem. Phys. 119 159 - 170 1988 E
 $A^{2+} + B \rightarrow A^+ + B^+$ ($A = CO_2, OCS, CS_2$; $B =$ rare gases)
translational energy spectroscopy

- 88E63 Kamber, E. Y.
State-selective single- and double-electron capture by Ar^{q+} and Ar^{3+} ions from rare-gas atoms.
J. Phys. B 21 4185 - 4203 1988 E
 $\text{Ar}^{q+} + \text{B} \rightarrow \text{Ar}^{(q-1)+}$ ($q = 4, 5$; $\text{B} = \text{He}, \text{Ne}, \text{Ar}, \text{Kr}$)
translational energy spectroscopy
0.3 keV/amu
no cross sections ; only possible channels
- 88E27 Kamber, E. Y. Hormis, W.G. Hasted, J.B. Brenton, A.G. Beynon, J.H.
Multiple-electron capture processes by multiply charged ions from rare-gas atoms at low velocities.
J. Phys. B 21 3423 - 3438 1988 E
 $\text{Kr}^{2+} + \text{He}, \text{Ne}, \text{Ar} \rightarrow \text{Kr}^{q+}$; $\text{Kr}^{2+} + \text{Ne} \rightarrow \text{Kr}^{3+}$; $\text{Kr}^{2+} + \text{Ar}, \text{Kr}, \text{Xe} \rightarrow \text{Kr}^{4+}$; $\text{Kr}^{4+} + \text{Ar}, \text{Kr} \rightarrow \text{Kr}^{5+}$; $\text{Xe}^{3+} + \text{Ar} \rightarrow \text{Xe}^{4+}$; $\text{Xe}^{4+} + \text{Ne}, \text{Ar} \rightarrow \text{Xe}^{5+}$; $\text{Xe}^{5+} + \text{Kr} \rightarrow \text{Xe}^{6+}$
translational energy spectroscopy
energy spectra only, crossing radius estimated.
- 88E28 Kaname, R. Ushijima, Y. Kitsuikawa, M. Kiyaguchi, M. Nagata, T.
Total cross sections for collisional quenching of $\text{H}(2s)$ atom in molecular targets.
J. Phys. Soc. Japan 57 1212 - 1219 1988 E
 $\text{H}(2s) + \text{B} \rightarrow \text{sum}(\text{H}^+ + \text{H} + \text{H}(1s))$ ($\text{B} = \text{H}_2, \text{N}_2, \text{O}_2, \text{CO}, \text{CO}_2, \text{CH}_4$)
beam attenuation technique
0.2 - 3.5 keV/amu
- 88E29 Koslowski, H.R. Huber, B.A. Staemmler, V.S.
Angular distribution of Ar^+ ions resulting from single-electron capture in Ar^{2+} - He collisions.
J. Phys. B 21 2923 - 2937 1988 E
 $\text{Ar}^{2+} + \text{He}$
translational energy spectroscopy
 9.9×10^{-3} keV/amu
only relative angular differential cross sections.
- 88E30 Kushawaha, V. Michael, A. Mahmood, M.
Collisional studies involving N^+ and N_2^+ ion and HgX_2 ($\text{X} = \text{Cl}, \text{Br}, \text{I}$)
Phys. Rev. A 38 1809 - 1818 1988 E
 $\text{A}^+ + \text{HgB}_2 \rightarrow \text{A} + \text{HgB}_2^+$ ($\text{A} = \text{N}, \text{N}_2$; $\text{B} = \text{Cl}, \text{Br}, \text{I}$)
photon spectroscopy
 $3.6 \times 10^{-5} - 6.4 \times 10^{-2}$ keV/amu
total cross sections ; partial cross sections.
- 88E31 Lembo, L.J. Dazmann, K. Stoller, Ch. Meyerhof, W.E. Hansch, T.W.
Core effect on the polarization of optical Rydberg transitions following electron capture into slow, highly ionized neon recoil ions.
Phys. Rev. A 37 1141 - 1151 1988 E
 $\text{Ne}^{q+}(q = 5 - 10) + \text{Na} \rightarrow \text{Ne}^{(q-1)+}$
photon-spectroscopy (visible, near UV)
0.2 keV/amu
emission cross sections determined (sharp variation at $q = 7$ and 8)
- 88E32 Lindsay, B.G. Laitner, C.J.
Some state-selected charge transfer processes involving 10 - 1500 eV rare-gas ions and simple molecules.
J. Phys. B 21 1617 - 1625 1988 E
 $\text{Ar}^+(^2\text{P}_{1/2}, ^2\text{P}_{3/2}) + \text{H}_2, \text{N}_2, \text{CO} \rightarrow \text{Ar}^+(\text{S}_0)$; $\text{Kr}^+(^2\text{P}_{1/2}, ^2\text{P}_{3/2}) + \text{CO} \rightarrow \text{Kr}^+(\text{S}_0)$
PEPICO
relative cross sections
- 88E33 Martinez, H. Cisneros, C. De Urquijo, J. Alvarez, I.
Absolute cross section measurements of the direct charge transfer of He^+ in neon in the energy range 0.5 - 5 keV
Phys. Rev. A 38 51914 - 51916 1988 E
 $\text{He}^+ + \text{Ne} \rightarrow \text{He} + \text{Ne}^+$
growth method
0.125 - 1.25 keV/amu
- 88E34 Martinez, R.I. Dheandhanoo, S.
Absolute cross section measurements in XQA instrument : $\text{Ar}^+ + \text{N}_2 \rightarrow \text{Ar} + \text{N}_2^+$
Int.J. Mass Spec. Ion Proc. 84 1 - 16 1988 E
 $\text{Ar}^+ + \text{N}_2 \rightarrow \text{Ar} + \text{N}_2^+$
triple quadrupole tandem mass spectrometer
 $1.25 \times 10^{-4} - 1.5 \times 10^{-3}$ keV/amu
- 88E35 Meyer, F.W. Griffin, D.C. Havener, C.C. Hug, M.S. Phaneuf, R.A. Swenson, J.K. Stolterfoht, N.
Population of high-angular-momentum states in low-energy double-electron-capture collisions of O^{6+} with He
Phys. Rev. Letters 60 1821 - 1824 1988 E
 $\text{O}^{6+} + \text{He} \rightarrow \text{O}^{4+}(1s^2 2pnl)$; $n = 6, 7$; $l = 0 - 5$
electron spectroscopy
1.88 - 6.6 keV/amu
relative cross sections for (n,l) distribution

- 88E36 Mokler, P.H. Reusch, S.
Comments on correlated electron capture in relativistic, high charge, heavy ions
Z. Phys. D 8 393 - 394 1988 E
 $A^{(Z-3)+} + H_2 \rightarrow A^{(Z-2)+}(A = S, Ti, Ge, Xe, Pb)$
RTE scaling for Li-like ions
- 88E64 Montenegro, E.C. Xu, X.Y. Meyerhof, W.E. Anholt, R.
Intermediate-velocity atomic collisions IV. Ar K-shell ionization and capture by C^{3+} and C^{4+} ions.
Phys. Rev. A 38 3357 - 3364 1988 E
 $C^{3+,4+} + Ar \rightarrow C^{n+,3+}(K) + Ar^+(K^+)$; $C^{3+} + Ar \rightarrow C^{3+}$
X-ray spectroscopy
 1.8×10^3 , 3.5×10^3 keV/amu
K-shell ionization cross section
- 88E37 Montenegro, E.C. Xu, X.Y. Meyerhof, W.E. Anholt, R. Danzmann, K. Schlachter, A.S. Rude, B.S. McDonald, R.J.
Intermediate-velocity atomic collisions III. electron capture in 8.6 MeV/amu Ca ions
Phys. Rev. A 38 1854 - 1859 1988 E
 $Ca^{n+}(q = 18, 19, 20) + B \rightarrow Ca^{(q-1)+} + B^+$ (B = H₂, He, N₂, Ne, Ar, Kr, Xe)
growth/K-X-ray coincidence
8600 keV/amu
total cross sections and K-capture cross sections (K-X-ray coincidence)
- 88E38 Mowat, J.R.
Ion-ion collisions and ion storage rings
Phys. Scripta T22 171 - 177 1988 E
review
- 88E39 Oza, D.H. Benoit-Cattin, P. Bordenave-Montesquieu, A. Boudjema, M. Gleizes, A.
Autoionization of $N^{2+}(3ln'l')$ for $n' = 3 - 10$: experiment and theory
J. Phys. B 21 L131 - 137 1988 E
 $N^{7+} + B \rightarrow N^{3+}(3ln'l') + B^{2+} \rightarrow N^{6+}(2l) + e + B^{2+}$ (B = H₂, He, Ar)
electron spectroscopy: pseudo-state close coupling calculation
electron energies
- 88E40 Penent, F. Champion, R.L. Doverspike, L.D. Esaulov, V.A. Grouard, J.P. Hall, R.I. Montagnon, J.L.
Positive ion production in halogen negative ion collisions.
J. Phys. B 21 3375 - 3386 1988 E
 $F + B \rightarrow F^0, F^+$ (B = N₂, Ne); $Cl + Ar \rightarrow Cl^0, Cl^+$
growth + electron spectroscopy
 $4 \times 10^{-4} - 1 \times 10^{-3}$ keV/amu (F); $1.6 \times 10^{-3} - 7 \times 10^{-3}$ keV/amu (Cl)
- 88E41 Pommier, J. Kubeck, C. Tuan, V.N. Reynaud, C.
Angular analysis in the 100 - 1500 eV energy range
J. Phys. B 21 L665 - 670 1988 E
 $He^+ + Na \rightarrow He^+(2^1S, 2^1S, 2^1P, 2^1P) + Na^+$
TOF
0.025 - 0.375 keV/amu
theta = 0 - 4°
- 88E42 Rajgara, F.A. Badrinathan, C. Mathur, D.
Absolute cross-sections for state-diagnosed electron capture by N^{2+} ions from molecular hydrogen
Int. J. Mass Spectrosc. Ion Proc. 85 229 - 236 1988 E
 $N^{2+}(2p^2P_{1/2}) + H_2 \rightarrow N^+(2p^2^1S_n, ^1D_2; 2p^3^3D_j)$
translational energy spectroscopy
0.036 - 0.36 keV/amu
 H_2^+ and H^+ + H are distinguished.
- 88E65 Royer, T. Doweck, D. Houver, J.C. Pommier, J. Andersen, N.
Collision spectroscopy with aligned and oriented atoms I. charge transfer in H^+ - $Na(3s, 3p)$ collisions.
Z. Phys. D 10 45 - 57 1988 E
 $H^+ + Na(3s, 3p) \rightarrow H$
TOF energy-loss spectroscopy + laser-excited atom target
0.3 - 3 keV/amu
- 88E45 Schönfeldt, W.A. Mokler, P.H. Maor, D.
Charge transfer in 1.4 MeV/amu $Ni^{10+} \rightarrow Kr$ collisions, $q = 16 - 22$
Z. Phys. D 9 47 - 57 1988 E
 $Ni^{10+}(q = 19 - 22) + Kr \rightarrow Ni^{q+}$
X-ray measurement
1400 keV/amu
total cross sections

- 88E43 Schlachter, A.S. Bernstein, E.M. Clark, M.W. DuBois, R.D. Graham, W.G. McFarland, R.H. Morgen, T.J. Mueller, D.W. Stockli, M.P. Tamis, J.A.
Multiple-electron capture in close nearly symmetric ion-atom collisions
J. Phys. B 21 L291 - 297 1988 E
 $\text{Ca}^{17+} + \text{Ar} \rightarrow \text{Ca}^{(17-p)+}$ ($p = 1 - 5$)
X-ray-ion coincidence technique
 1.17×10^3 keV/amu
- 88E44 Schmidt-Böcking, H. Prior, M.H. Dörner, R. Berg, H. Pedersen, J.O.K. Cooke, C.L. Stockli, M. Schlachter, A.S.
Angular dependence of multiple-electron capture in 90 keV Ne^{7+} - Ne collisions
Phys. Rev. A 37 4640 - 4648 1988 E
 $\text{Ne}^{7+} + \text{Ne} \rightarrow \text{Ne}^{r+} + \text{Ne}^p$ ($r = 6 - 2$; $p = 1 - 6$)
recoil ion-scattered particle coincidence
angular distributions over $1 - 20$ mrad.; no cross sections given
- 88E46 Schuch, R. Scho'ne, H. Miller, P.D. Krause, H.F. Dittner, P.F. Datz, S. Olson, R.E.
Charge-and angle-correlated inelasticities in collisions of bare fast carbon ions with neon
Phys. Rev. Letters 60 925 - 928 1988 E
 $\text{C}^{6+} + \text{Ne} \rightarrow \text{C}^{3+} + \text{Ne}^{6+}$; $\text{C}^{3+} + \text{Ne}^*$; $\text{C}^{6+} + \text{Ne}^{4+}$; $\text{C}^{6+} + \text{Ne}^*$
scattered projectile-recoil ion coincidence
833 keV/amu
angular differential cross section
- 88E47 Schulz, M. Schuch, R. Datz, S. Justiniano, E.L.B. Miller, P.D. Schöne, H.
Resonant transfer and excitation in Li-like F colliding with H_2
Phys. Rev. A 38 5454 - 5457 1988 E
 $\text{F}^{6+} + \text{H}_2 \rightarrow \text{F}^{2+}(\text{1s2snln'l'}) + \text{H}_2^{2+}$
X-ray-projectile coincidence
789 - 1713 keV/amu
- 88E49 Sedgwick, J.B. Nelson, I.R. Jordan, C.A. Abbey, L.E. Xu, Y. Moran, T.F.
Resonant and near-resonant charge transfer reactions of gaseous organic ions
Chem. Phys. Letters 146 113 - 120 1988 E
 $\text{C}_m\text{H}_m\text{N}_p^+ + \text{C}_q\text{H}_q\text{N} \rightarrow \text{C}_m\text{H}_m\text{N}_p^0 + \text{C}_q\text{H}_q\text{N}^*$ ($m = 2,3,4$; $n = 3,4,5$; $p = 0,1$)
TOF
 4×10^{-2} keV/amu
- 88E50 Suraud, M.G. Bonnet, J.J. Bonnefoy, M. Chassevent, M. Fleury, A. Bliman, S. Dousson, S. Hitz, D.
X-ray emission spectroscopy of one-electron capture into Li-like radiative N^{4+} ($1s2ln'l'$) configurations by metastable N^{3+} ($1s2s^2s$) ions in collisions with He and H_2
J. Phys. B 21 1219 - 1228 1988 E
 $\text{N}^{3+}(\text{1s2s}^2s) + \text{H}_2, \text{He} \rightarrow \text{N}^{4+}(\text{1s2ln'l'})$
photon spectroscopy
3.4 keV/amu
no cross section given
- 88E51 Tabata, T. Ito, R. Nakai, Y. Shirai, T. Saitaka, M. Sugitara, T.
Analytic cross sections for charge transfer of hydrogen atoms and ions colliding with metal vapors
Nucl. Instr. Meth. in Phys. Res. B 31 375 - 381 1988 E
 $\text{H}^+(q = 1,0,-1) + \text{B} \rightarrow \text{H}^{r+}$ ($\text{B} = \text{Li, Na, Mg, Ca, Sr, Cs}$)
analytical fitting
- 88E52 Tsurubuchi, S. Arikawa, T.
Excitation of $\text{Li}(2p)$ in collisions of Li^+ with Ar and Kr atoms
J. Phys. Soc. J apan 57 1220 - 1225 1988 E
 $\text{Li}^+ + \text{Ar, Kr} \rightarrow \text{Li}^*(2p \rightarrow 2s; 3d \rightarrow 2p)$
photon spectroscopy
 $5.7 \times 10^{-2} - 0.57$ keV/amu
- 88E66 Tsurubuchi, S. Arikawa, T.
Excitation of $\text{Li}(2p)$ in collisions of Li^+ with Ar and Kr atoms.
J. Phys. Soc. Japan 57 1220 - 1225 1988 E
 $\text{Li}^+ + \text{Ar, Kr} \rightarrow \text{Li}(2P_0, 2P_{\text{res}}/2)$
photon spectroscopy
 $5.7 \times 10^{-2} - 5.7 \times 10^{-1}$ keV/amu
also emission cross sections for $2p \rightarrow 2s, 3d \rightarrow 2p$ of Li : polarization of $2p \rightarrow 2s$ transition
- 88E53 Underwood, T.A. Breinig, M. Gaitner III, C.C. Freyon, J.
Cusp-electron production in pure-target-ionization and transfer-ionization events for 0.1 MeV/u Li^{3+} projectiles on He and H_2 targets
Phys. Rev. A 38 6138 - 6142 1988 E
 $\text{Li}^{3+} + \text{H}_2, \text{He} \rightarrow \text{Li}^{2+}; \text{Li}^{2+} + \text{H}_2, \text{He} \rightarrow \text{Li}^{1+}$
growth method
100 keV/amu
cusp cross sections

- 88E54 Van Zyl, B. Neumann, H.
Lyman alpha emission cross sections for low-energy H and H⁺ collisions with N₂ and O₂
J. Geophys. Res. 93 1023 - 1027 1988 E
H + B -> H⁺(2p); H⁺ + B -> H⁺(2p) (B = N₂, O₂)
Lyman alpha detection
0.04 - 2.5 keV/amu
- 88E55 Varmeeran, L. De Bisschop, P. Lievens, P. Silverans, R.E.
Velocity dependence of neutralization cross sections in collisions of ground state K⁺, Rb⁺, Sr⁺ and metastable Sr⁺(4d) ions with Na atoms
J. Phys. B 21 3417 - 3422 1988 E
K⁺, Rb⁺, Sr⁺, Sr⁺(4d) + Na -> K, Rb, Sr, Sr
- 88E56 Varnhet, D. Chetoui, A. Rozet, J.P. Stephan, C. Wöhren, K. Touati, A. Politis, M.F. Bouisse, P. Hitz, D. Doussen, S.
Characteristics of single capture nI distributions and double capture probabilities in slow collisions of Al¹³⁺, Al¹²⁺ and Ne⁸⁺ ions with two-electron targets (He, H₂)
J. Phys. B 21 3949 - 3968 1988 E
Ne⁸⁺ + B -> Ne⁸⁺(nI); Al¹²⁺ + H₂, He -> Al¹¹⁺(nI); Al¹³⁺ + He -> Al¹²⁺(nI)
photon spectroscopy
4 keV/amu
average <I>; double electron capture probabilities
- 88E57 Waggoner, W. Cocke, C.L. Tunnell, L.N. Havener, C.C. Meyer, F.W. Phaneuf, R.A.
Angular distributions for electron capture from He by multiply charged C, N, O, F and Ne ions
Phys. Rev. A 37 2386 - 2392 1988 E
C⁵⁺, N⁵⁺, O⁶⁺, N⁶⁺, O⁶⁺, F⁷⁺, Ne⁶⁺, O⁷⁺, F⁷⁺, Ne⁸⁺ + He -> A^{(q-1)+}
angular scattering spectroscopy
0.37 - 1.3 keV/amu
differential cross sections in angle
- 88E58 Wilson, S.M. McCullough, R.W. Gilbody, H.B.
State-selective electron capture by slow O³⁺ and Ne³⁺ recoil ions in H
J. Phys. B 21 1027 - 1035 1988 E
O³⁺(2s²2p)³P⁰ + H -> O²⁺(2s²2pnl) + H⁺(n = 2, 3); Ne³⁺(2s²2p²nl)³S⁰ + H -> Ne²⁺(2s²2p²nl) + H⁺(n = 3)
translational energy spectroscopy
0.26 - 0.75 keV/amu(O); 0.09 - 0.7 keV/amu(Ne)
- 88E59 Zouros, T.J.M. Schneider, D. Stolterfoht, N.
State-selective observation of resonant and non-resonant transfer-excitation in 50 - 500 keV ³He⁺ + H₂ collisions
J. Phys. B 21 L671 - 676 1988 E
He⁺ + H₂ -> He²⁺(2lnl) + H₂⁺
zero-degree electron spectroscopy
12.5 - 125 keV/amu
- 88T68 Abramov, D.I. Ovchinnikov, S.Yu. Solovov, E.A.
New type of resonances in elastic scattering
JETP Letters 47 504 - 508 1988 T
S-matrix
- 88T1 Alston, S.
Strong-potential Born-approximation electron capture cross sections for realistic atomic potentials
Phys. Rev. A 38 3124 - 3127 1988 T
H⁺ + B -> H + B⁺(K⁻¹) (B = C, Ar)
strong-potential Born approx
150 - 2500 keV/amu(C); 1500 - 20000 keV/amu(Ar)
- 88T2 Alston, S.
Further contributions of the Thomas double-scattering mechanism to electron capture in the second Born approximation
Phys. Rev. A 38 6092 - 6097 1988 T
H⁺ + H(1s), He(1s²) -> H(1s) + H⁺, He⁺
multiple-peaking approx., linearized-propagator approx.
10² - 5x10⁴ keV/amu
- 88T67 Ast, H. Liddle, H.J. Dreitzler, R.M.
Optical potentials in ion-atom collisions I. Results for one-electron systems.
J. Phys. B 21 4143 - 4156 1988 T
H⁺ + H -> H; He²⁺ + H -> He⁺; Li²⁺ + H -> Li²⁺; H⁺ + He⁺ -> H; H⁺ + Li²⁺ -> H
1 - 10⁴ keV/amu
also ionization and excitation cross sections given

- 88T 3 Bachan, H. Deco, G. Salin, A.
Introduction of short-range interactions in continuum distorted-wave theory of electron capture for ion-atom collisions
J. Phys. B 21 1403 - 1410 1988 T
 $H^+ + Ne(2s, 2p^2, 2p^1) \rightarrow H(1s) + Ne^+$
CDW
 $10^2 = 3 \times 10^2 \text{ keV/amu}$
- 88T 4 Baer, M. Niedner, G. Toennies, J.P.
A comparison between theoretical and experimental state-to-state charge transfer cross sections for $H^+ + H_2$ at 20 keV : Evidence for quantum effects
J. Chem. Phys. 88 1461 - 1463 1988 T
 $H^+ + H_2(v=0) \rightarrow H + H_2^+(v_f)$
infinite order sudden approx
 $2 \times 10^2 \text{ keV/amu}$
- 88T 5 Balkic, D.
Electron capture by fast protons from helium, nitrogen and oxygen : the corrected first Born approximation
Phys. Rev. A 37 55 - 67 1988 T
 $H^+ + B \rightarrow H + B^+(K^{-1})$ (B = He, N, O)
corrected first Born approximation
 $50 - 5 \times 10^4 \text{ keV/amu}$
K-electron capture
- 88T 6 Bhattacharyya, S. Rinn, K. Salzborn, E. Chatterjee, L.
High energy electron capture by fully stripped ions from He atoms - a QED approach
J. Phys. B 21 111 - 118 1988 T
 $Li^{2+} + He \rightarrow Li^{2+} + He^+$; $Li^{2+} + He^{2+} + e$
second-order S-matrix method
 $10^2 - 10^3 \text{ keV/amu}$
- 88T 7 Bianco, S.A. Piantecini, R.D.
Charge exchange between H^+ and $H(n=2)$ at low collision energies
J. Phys. B 21 L49 - 52 1988 T
 $H^+ + H(2s, 2p_0, 2p_{11}) \rightarrow H(\text{total}, 2s, 2p_0, 2p_{112})$
OEDM
 $0.06 - 2.25 \text{ keV/amu}$
dominant contribution from resonance reactions
- 88T 8 Boudjerna, M. Benoit-Catin, P. Bordenave-Montesquieu, A. Gleizes, A.
State-selective one-electron capture by multiply charged ions, investigated with a modified multichannel Landau-Zener model
J. Phys. B 21 1603 - 1615 1988 T
 $Ar^{n+}(2p^6) + He, Ne, Ar, Xe \rightarrow Ar^{n+}(2p^{n1}, n=4-6)$; $Ar^{n+}(2p^3s^3p)$ + $D_2, He, Ar, Xe \rightarrow Ar^{n+}(2p^6)$; $N^{n+}(1s2s^3s)$ + $He \rightarrow N^{n+}(1s2s3l)$; $C^{n+}(1s2s^3s)$ + $H_2 \rightarrow C^{n+}(1s2s3l)$
modified multichannel Landau-Zener model
 $2.5 \times 10^{-3} - 6.25 \text{ keV/amu}$
- 88T 9 Chatterjee, S.N. Prasad, S. Roy, B.N.
Proton and alpha particle impact transfer ionization cross sections for He and Li
J. Phys. B. 21 1209 - 1217 1988 T
 $H^+ + B \rightarrow H + B^+$; $He^{2+} + B \rightarrow He^+ + B^+$ (B = He, Li)
BEA
 $50 - 10^3 \text{ keV/amu}$ (H^+) ; $125 - 750 \text{ keV/amu}$ (He^{2+})
two successive collision-ionization in first and capture in second encounter
- 88T10 Deb, N.C.
Evaluation of $n'l'm' \rightarrow n'l'm'$ capture amplitude in the target continuum distorted-wave theory
Phys. Rev. A 38 1202 - 1206 1988 T
CDW
- 88T11 Deco, G.R. Rivarola, R.D.
Electron capture in the target following $e^- e^+$ pair production in the simultaneous presence of the fields of the projectile and of the target
J. Phys. B 21 L299 - 302 1988 T
 $A^{Z+} + B^{q+} \rightarrow A^{Z+} + B^{q+} + e^+$
CDW
energy spectra of ejected e^+ at relativistic collision energies
- 88T12 Deco, G.R. Rivarola, R.D.
Electron capture in collisions between bare heavy ions at ultrarelativistic impact energies
J. Phys. B 21 1229 - 1235 1988 T
 $H^+ + H^+, U^{92+} \rightarrow H(1s) + H^+, U^{92+} + e^+$; $U^{92+} + U^{92+} \rightarrow U^{91+}(1s) + U^{92+} + e^+$
PWBA
distribution of emitted positrons at $\gamma = 10, 100$

- 88T13 Dewangan, D.P. Bransden, B.H.
The boundary-corrected second Born (B2B) approximation : proton-hydrogen electron capture
J. Phys. B 21 L353 - 357 1988 T
H⁺ + H → H + H⁺
B2B
1.25 keV/amu
angular distribution
- 88T14 Dunseath, K.M. Crothers, D.S.F. Ishihara, T.
The first-corrected Born and target continuum distorted theories of electron capture : a comparison of differential and total cross sections
J. Phys. B 21 L461 - 466 1988 T
H⁺ + B → H + B⁺ (K⁻¹) (B = N, O, Ar)
200 - 6000 keV/amu (N, O) ; 6000 keV/amu (Ar)
angle-differential cross sections for Ar
- 88T15 Ermolaev, A.M.
Neutralization and detachment in collisions between protons and negative hydrogen ions in the proton energy range from 0.62 to 80.0 keV
J. Phys. B 21 81 - 101 1988 T
H⁺ + H⁻ → H(total, 1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p, 4d) + H
semi-classical impact parameter approx.
0.62 - 80 keV/amu
also direct ionization and capture into projectile continuum in H⁺+H⁻ → H⁺ + H + e
- 88T16 Forster, C. Shingal, R. Flower, D.R. Bransden, B.H. Dickinson, A.S.
Total and differential cross sections for charge transfer in He²⁺ - He⁺ collisions : trajectory effects
J. Phys. B 21 3941 - 3948 1988 T
He²⁺ + He⁺ → He⁺ + He²⁺
AO
0.21 - 2.5 keV/amu (c.m.)
theta = 0 - 13°
- 88T19 Fritsch, W.
Calculation of partial electron-transfer cross sections in 1 - 84 keV/amu He²⁺ + H collisions
Phy. Rev. A 38 2664 - 2666 1988 T
He²⁺ + H → He^{+(nl)} + H⁺ (n = 2, 3, 4, 5, 6)
AO model
1 - 84 keV/amu
- 88T18 Fritsch, W. Lin, C.D.
Analysis of electron correlation in simultaneous electron transfer and excitation in atomic collision
Phys. Rev. Letters 61 690 - 693 1988 T
He⁺ + H → He^{+(2l, 2l')} + H⁺
close-coupling AO method
20 - 150 keV/amu
transfer excitation impact parameter dependence
- 88T17 Fritsch, W. Lin, C.D.
Comment on atomic basis calculations for two electron system Li²⁺ · H
Phys. Letters A 127 425 - 426 1988 T
Li²⁺ + H → Li⁺ + H⁺
AO expansion method
1 - 40 keV/amu
total cross sections only
- 88T20 Gao, R.S. Johnson, L.K. Schafer, D.A. Newman, J.H. Smith, K.A. Stebbings, R.F.
Absolute differential cross sections for small-angle He⁺-He elastic and charge transfer scattering at keV energies
Phys. Rev. A 38 2789 - 2793 1988 T
He⁺ + He → He⁺ + He ; He + He⁺
0.06 - 1.25 keV/amu
theta = 0.04 - 1°. Integrated cross sections given
- 88T21 Gargaud, M. McCarroll, R.
Charge transfer in low-energy O⁺-H and Si⁺-H collisions
J. Phys. B 21 513 - 520 1988 T
O⁺ + H → O^{+(3s, 3p, total)} ; Si⁺ + H → Si^{+(3d, 4s, total)}
molecular model with ETF
10³ - 1 keV/amu
significant core effect in even total cross sections

- 88T22 Gargaud, M. McCarroll, R. Opradolec, L.
Charge transfer in low-energy Al^{3+} -H and Ti^{4+} -H collisions : effect of rotational coupling in three-state crossings
J. Phys. B 21 521 - 532 1988 T
 $Al^{3+} + H \rightarrow Al^{2+}(3s,3p,4s,4p, total) ; Ti^{4+} + H \rightarrow Ti^{3+}(3s,3p,4s,4p, total)$
MO with translation factor
 $0.8 \times 10^{-3} - 1.1$ keV/amu
- 88T23 Gatyucq, J.P. Wang, Y. Champion, R.L. Doverspike, L.D.
Electron detachment in low-energy H(D)-Na collisions
Phys. Rev. A 38 2284 - 2289 1988 T
 $H + Na \rightarrow H + Na$
effective range approx.
 $0.01 - 0.25$ keV/amu
- 88T24 Graviele, M.S. Miraglia, J.E.
Electron capture in asymmetric collisions
Phys. Rev. A 38 5034 - 5037 1988 T
 $H^+ + B \rightarrow H + B^+(K^{-1})$ (B = H, O, Ne, Ar)
Impulse Approx.(IA), semigeneralized IA, eikonal IA, peaking IA, CDW, eikonal peaking IA
15 - 200(H); 150 - 4000(O); 200 - 5000(Ne); 1500 - 15000(Ar) keV/amu
- 88T25 Greenland, P.T. Harrison, M.F.A.
Excited impurity species and plasma transport
J. Phys. B 21 4035 - 4048 1988 T
 $A^{q+} + B^r(n) \rightarrow A^{q+r+}(n) + B^{r-1+}$
classical-over barrier model
- 88T26 Grimbert, D. Lassier-Gavers, B. Sidis, V.
Model potentials and related diabatic state for the $H^+ + O_2$ collisional system
Chem. Phys. 124 187 - 204 1988 T
 $H^+ + O_2$
effective model-potential approach
potential curves for $(HO_2)^+$ molecular system
- 88T27 Grozdianov, T.P. Krstic, P.S.
On a first order theory for charge exchange with Coulomb boundary conditions
Phys. Scripta 38 32 - 36 1988 T
 $H^+ + B^{(z,1)+} \rightarrow H + B^{z+}$ (B = He, Li, Be, B, C)
first order Coulomb Born approx.
 $(0.5-20) \times 25Z^2$ keV/amu
analytical form for impact parameter dependence for K-K electron transfer
- 88T28 Hansen, J.P. Taubjerg, K.
Electron capture in highly charged ion collisions and a theoretical analysis of the energy-gain spectrum
J. Phys. B 21 2459 - 2471 1988 T
 $Ar^{6+} + D(1s) \rightarrow Ar^{5+}(4s,4p,4d,4f,5s,5p,5d,5f,5g) + D^+$
 $2f^-$ -state AO
0.1 keV/amu
- 88T30 Harel, C. Jouin, H.
Electron capture by slow multicharged ions : core effect on final l distribution
J. Phys. B 21 859 - 883 1988 T
 $C^{4+}, N^{5+}, O^{6+}, O^{8+}, Ne^{8+}, Ar^{8+} + H \rightarrow C^{3+}, N^{4+}, O^{5+}, O^{7+}, Ne^{7+}, Ar^{7+}(nl) + H^+$
MO expansion with OEDM
0.25 - 20 keV/amu
- 88T29 Harel, C. Salin, A.
Theory of low energy charge transfer by multiply charged ions.
Electronic and Atomic Collisions (631 - 642 1988 T
H.B.Gilbody, W.R.Newell, F.H.Read
 $A^{8+} + H \rightarrow A^{7+}(nl)$ (A = O, Ne, Ar) ; $N^{7+} + He \rightarrow N^{6+}(4l)$
OEPM
1 keV/amu
- 88T31 Ishihara, T. McGuire, J.H.
Second-order singularities in transfer ionization
Phys. Rev. A 38 3310 - 3318 1988 T
 $H^+ + He \rightarrow H + He^{2+} + e$
 $5 \times 10^3 - 5 \times 10^4$ keV/amu
Thomas peak in transfer ionization

- 88T32 Isler, R.C. Olson, R.E.
Contribution of excited hydrogen atoms to charge-exchange excitation of impurities in fusion plasmas
Phys. Rev. A 37 3399 - 3402 1988 T
 $C^{6+}, O^{8+} + H(m) \rightarrow C^{5+}(n'), O^{7+}(n') + H^*$ ($n = 2,3; n' = 4-30$)
classical-trajectory Monte Carlo method
13.3 - 40 keV/amu
effective emission cross sections also given
- 88T33 Janev, R.K. Krstic, P.S.
Dynamics of transfer-ionization processes in slow collisions of multi-charged ions with atoms
J. Phys. B 21 485 - 501 1988 T
General two electron transfer processes
- 88T34 Kimura, M.
Single- and double-electron capture in $He^{2+} + He$ collisions and single-electron capture in $He^{2+} + He^+$ collisions
J. Phys. B 21 L19 - 24 1988 T
 $He^{2+} + He \rightarrow He^+ + He^+(total); He + He^{2+}; He^+ + He^+ \rightarrow He^{2+}$
travelling MO
- 88T35 Koike, F.
Continuous energy state model for charge transfer in collisions of fully stripped ions with hydrogen atoms
J. Phys. Soc. Japan 57 2344 - 2353 1988 T
 $O^{8+} + H \rightarrow O^{7+}(total); Si^{14+} + H \rightarrow Si^{13+}(nl)$
continuous energy state model
1 - 10^3 keV/amu
- 88T36 Macek, J.
Perturbation approximation for scattering amplitudes in ion-atom collisions
Phys. Rev. A 37 1661 1988 T
general theory for perturbation expansion with Coulomb potential
- 88T37 Macek, J. Dong, X.Y.
Differential cross sections for electron capture: a comparison of three approximations
Phys. Rev. A 38 3327 - 3332 1988 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
strong potential Born approx.; impulse approx.
 $5 \times 10^3, 10^4$ keV/amu
angular distribution of $H(1s)$. closed forms given
- 88T38 Maidagan, J.M.
First-order calculation in charge transfer at large scattering angles
J. Phys. B 21 1395 - 1401 1988 T
 $H^+ + Ne \rightarrow H + Ne^+$
750 keV/amu
scattering angle : 0 - 180 deg.
- 88T39 Martinez, A.E. Deco, G.R. Rivarola, R.D. Fainstein, P.D.
K-shell vacancy production in asymmetric collisions
Nucl. Instr. Meth. in Phys. Res. B 34 32 - 36 1988 T
 $A^z + B \rightarrow A^{(z-1)+} + B^+(K^{-1})$ ($A = H, He, Li; B = C, O, Ne$)
CDW-eikonal initial state approximation
500 - 5000 keV/amu
also ionization cross section given
- 88T40 Mathur, D.
A reaction window in double charge transfer mass spectroscopy
Int. J. Mass Spectro. Ion Proc. 83 203 - 208 1988 T
double electron transfer
Landau-Zener model
- 88T41 McGuire, J.H.
Electron capture at high velocities
Ind. J. Phys. 62B 261 - 277 1988 T
Strong potential Born approx.
- 88T42 McGuire, J.H. Deb, N.C. Aktas, Y. Sil, N.C.
Shake-over probability for electron capture
Phys. Rev. A 38 3333 - 3338 1988 T
first Born approx.
asymptotic energy region

- 88T43 McLaughlin, D.J. Hahn, Y.
K-shell resonant-transfer-excitation cross sections for S^{13+} and Ca^{17+}
Phys. Rev. A 37 3587 - 3589 1988 T
 $S^{13+} + He \rightarrow S^{12+}(K^{-1})$; $Ca^{17+} + He \rightarrow Ca^{16+}(K^{-1})$
Impulse approx.
 $1.56 \times 10^3 - 7.8 \times 10^3$ keV/amu(S); $3.5 \times 10^3 - 8 \times 10^3$ keV/amu(Ca)
dielectronic recombination cross section averaged over the momentum distribution
- 88T44 McLaughlin, D.J. Hahn, Y.
Cascade theory for double KX-ray emission in transfer and excitation collisions
Phys. Rev. A 38 531 - 534 1988 T
 $S^{13+} + H_2 \rightarrow S^{14+} \rightarrow S^{14+} + 2h\nu$
 $2.2 \times 10^3 - 5.9 \times 10^3$ keV/amu
 $K\alpha$ - $K\alpha$, $K\alpha$ - $K\beta$, $K\alpha$ - $K\gamma$ coincidence
- 88T45 Miraglia, J.E. Gayet, R. Salin, A.
Radiative electron capture by ions channelled in crystals
Europhys. Letters 6 397 - 402 1988 T
 $O^{8+} + Ag \rightarrow O^{7+}(1s) + Ag^+(N^{-1}) + h\nu(REC)$
 2.2×10^3 keV/amu
REC comes mainly from N-shell electrons but not from valence electrons
- 88T46 Mizushima, M.
A note on the cross sections of the symmetric charge transfer between uranium ions
Japanese J. Appl. Phys. 27 449 - 451 1988 T
 $U^+ + U \rightarrow U + U^+$
time development operator formalism
 4×10^{-4} keV/amu
transfer of 6d,7s electrons
- 88T47 Mo, O. Riera, A.
Excitation and charge exchange in $He^+ + Na$ collisions
J. Phys. B 21 119 - 124 1988 T
 $He^+ + Na \rightarrow He(\text{total})$
two-state MO with common translation factor
 $5 \times 10^2 - 10$ keV/amu
also $He^+ + Na(3s) \rightarrow He^+ + Na(3p)$ excitation cross sections
- 88T48 Moisewitsch, B.L.
Relativistic second-order OBK approximation for electron capture
J. Phys. B 21 603 - 610 1988 T
 $H^+ + H(1s) \rightarrow H(1s)$; $Ne^{10+} + B \rightarrow Ne^{9+}(1s) + B(K^{-1})$ (B = Al, Zn, Ag, Ta, U)
relativistic second-order OBK
 $10^5 - 5 \times 10^7$ keV/amu
- 88T49 Nikitin, E.E. Reznikov, A.I.
Theoretical total cross section and branching ratio for $Kr^{2+}(^2P_{3/2}, ^2P_{1/2})$ ions produced in low-energy charge exchange collisions of $Kr^{2+}(^1S_0)$ with $He(^1S_0)$
Chem. Phys. Letters 49 212 - 216 1988 T
 $Kr^{2+}(^1S_0) + He(^1S_0) \rightarrow Kr^{+}(^2P_{3/2}, ^2P_{1/2}) + He^{+}(^2S_{1/2})$
asymptotic approach
 $1 \times 10^{-6} - 2.4 \times 10^{-5}$ keV/amu
- 88T50 Opradotce, L. Benmeuraten, L. McCarroll, R. Piancettini, R.D.
State-selective electron capture in slow C^{3+} - H collisions
J. Phys. B 21 503 - 512 1988 T
 $C^{3+} + H \rightarrow C^{2+}(3s, 3p, \text{total})$
molecular model with ETF
 $0.125 - 5$ keV/amu
- 88T66 Ovchinnikov, S. Yu. Solovov, E.A.
Hidden crossings in ion-atom collisions.
Comm. At. Mol. Phys. 22 69 - 85 1988 T
review
- 88T51 Reinhold, C.O. Falcon, C.A.
Classical charge transfer and ionization cross sections for one- and three-dimensional collision processes
J. Phys. B 21 2473 - 2483 1988 T
 $A^{Z+} + H \rightarrow A^{(Z-1)+} + H^+$ (A = H, He, Li, C); $H^+ + He^+, Li^{2+}(1s) \rightarrow H + He^{2+}, Li^{3+}$
classical trajectory Monte Carlo method
 $3 - 250$ keV/amu
total cross sections, ionization cross sections also given.

- 88T52 Roueff, E, Dalgarno, A.
Fine-structure excitation of O^{2+} by charge transfer of O^{3+} in H at low energies
Phys. Rev. A 38 93 - 97 1988 T
 $O^{3+}(^2P_{1/2,3/2}) + H \rightarrow O^{2+}$
multi-state MO expansion method.
 $1.9 \times 10^{-5} - 1.7 \times 10^{-3}$ keV/amu
also $O^{3+}(^4P_{3/2}) + H \rightarrow O^{3+}(^2P_{1/2}) + H$ cross sections given
- 88T55 Shingal, R.
Charge transfer target excitation and ionization in $Be^{2+} + Li$ and $Li^+ + Be^+$ collisions
J. Phys. B 21 2065 - 2076 1988 T
 $Be^{2+} + Li(2s) \rightarrow Be^+(nl) + Li^+(nl=2s,2p,3s,3p,3d)$; $Li^+ + Be^+(2s) \rightarrow Li(nl) + Be^{2+}$
($nl=2s,2p,3s,3p,3d$)
multistate semi-classical impact parameter model.
1 - 90 keV/amu
also $Be^{2+} + Li(2s) \rightarrow Be^{2+} + Li(2p,3s,3p,3d)$ and the alignment factor A_{30} ; $Be^{2+} + Li \rightarrow Be^{2+} + Li^+ + e$; $Li^+ + Be^+(2s) \rightarrow Li^+ + Be^+(nl)$ ($nl=2p,3s,3p,3d$); $Li^+ +$
- 88T53 Shimamura, N.
Electron capture cross sections in $Be^{3+} + H$ collisions using the travelling-molecular-orbital method
J. Phys. B 21 2485 - 2496 1988 T
 $Be^{3+} + H(1s) \rightarrow Be^{2+}(2s,2p,3s,3p) + H^+$
Travelling MO
0.39 - 6.25 keV/amu
- 88T54 Shingal, R.
Charge transfer, target excitation and ionization in $Li^+ + Li$ collisions
J. Phys. B 21 125 - 135 1988 T
 $Li^+ + Li(2s) \rightarrow Li(2s,2p,3s,3p,3d, total) + Li^+$
also $Li^+ + Li(2p,3s,3p,3d, total)$ excitation cross sections and $Li^+ + Li^+ + e$ ionization cross sections
- 88T57 Sois, F, Flores, F.
Inelastic cross sections and charge state for B, C, N and O ions moving in metals
Phys. Rev. A 37 1469 - 1475 1988 T
 $A^{Z+} + Al \rightarrow A^{Z-1+}$; $A^{Z-1+} + Al \rightarrow A^{Z+}$ ($A = B, C, N, O$)
modified OBK
charge distributions calculated.
- 88T58 Tan, J, Lin, C.D.
Theoretical study of differential charge transfer cross sections for $Ne^{4+} + He$ collisions at low energies
Phys. Rev. A 37 1152 - 1160 1988 T
 $Ne^{4+}(2p^2 + P) + He(1s^2) \rightarrow Ne^{3+}(2p^2 3s^2 P, ^4P) + He^+(1s)$
quantal two-channel calculation.
0.01 - 0.025 keV/amu
angular distributions
- 88T59 Terao, M, Harel, C, Salin, A, Allan, P.J.
Theoretical study of single-electron capture in $He^{2+} - H$ collision
Z. Phys. D 7 319 - 332 1988 T
 $He^{2+} + H \rightarrow He^+(n=4,5) + H(1s)$
OEDM model with ETF
 $5 \times 10^{-4} - 2.25$ keV/amu
- 88T60 Toshima, N, Eichler, J.
Coupled-channels treatment of excitation and charge transfer in $U^{92+} + U^{91+}$ collisions at 1 and 0.5 GeV/u
Phys. Rev. Letters 60 573 - 576 1988 T
 $U^{92+} + U^{91+} \rightarrow U^{91+}(nl) + U^{92+}$
fully-relativistic, two-center, coupled channel calculation
 $5 \times 10^3 - 10^6$ keV/amu
excitation cross sections
- 88T61 Toshima, N, Eichler, J.
Coupled-channel theory of excitation and charge transfer in relativistic-atomic collisions
Phys. Rev. A 38 2305 - 2316 1988 T
 $U^{92+} + U^{91+}(1s; 2s) \rightarrow U^{91+}(1s; 2l; 3l)$; $Xe^{54+} + Ag, Au \rightarrow Xe^{53+}(1s; 2l; 3l)$
fully-relativistic, two-center, coupled channel theory
 U (5×10^5 keV/amu; 8.2×10^9); 1.97×10^5 keV/amu (Xe)

- 88T62 Valance, A. Maddars, M.El. Pradel, P.
 Quantal calculation of differential cross sections for H(1s) elastic scattering and H⁺ ion formation from interactions of H(1s) with caesium
 J. Phys. B 21 995 - 1006 1988 T
 H(1s) + Cs(6s) → H⁺ + Cs ; H(1s) + Cs
 two-state curve-crossing model
- 88T63 Watanabe, T. Hino, K.
 Photon emission processes induced by ion-atom collisions
 Ind. J. Phys. 62B 278 - 295 1988 T
 radiative electron capture
- 88T64 Winter, T.G.
 Triple-center treatment of electron transfer and ionization in He²⁺ - H and p - He⁺ collisions
 Phys. Rev. A 37 4656 - 4670 1988 T
 He²⁺ + H(1s) → He⁺(total, 2s, 2p, 2p₁) ; H⁺ + He⁺ → H(1s, total) + He²⁺
 triple center coupled state approach
 1.6 - 40 keV/amu
 also ionization cross sections
- 88T65 Winter, T.G.
 Triple-center determination of differential cross sections for electron transfer and elastic scattering in He²⁺ - H collisions
 Phys. Rev. A 38 1612 - 1615 1988 T
 He²⁺ + H → He⁺ + H⁺
 Triple-center MO model
 4 - 30 keV/amu
 angular differential cross section for electron transfer. also elastic scattering cross sections given.

- 89E 1 Andersson, L.R. Pedersen, J.O.P. Barany, A. Bangsgaard, J.P. Hvelplund, P. Angular scattering effects in energy-gain spectra of A^{6+} ($A = \text{Ne, Ar, Kr, Xe}$): one-electron capture from He.
J. Phys. B 22 1603 - 1621 1989 E
 $A^{6+} + \text{He} \rightarrow A^{5+}$ ($A = \text{Ne, Ar, Kr, Xe}$)
energy-gain spectroscopy
 $1.5 \times 10^{-3} - 1 \times 10^{-1}$ keV/amu
 $A^{6+} + \text{He} \rightarrow \text{Ar}^{2+}(4p, 4s, 3d)$: T : semi-classical multi-state collision model
- 89E 2 Ashburn, J.R. Cline, R.A. Stone, C.D. van der Burgt, P.J. Westveld, W.B. Risley, J.S.
Experimental determination of the $H(n=3)$ density matrix for 80 keV H^+ on He.
Phys. Rev. A 40 4885 - 4901 1989 E
 $H^+ + \text{He} \rightarrow H(n=3) + \text{He}^+$
photon-polarization technique
80 keV
- 89E 4 Aumayr, F. Schweinzer, J. Winter, H.
State-selective electron capture in $\text{He}^{2+} - \text{Li}$ collisions studied jointly by photon and translational energy spectroscopy.
J. Phys. B 22 1027 - 1034 1989 E
 $\text{He}^{2+} + \text{Li} \rightarrow \text{He}^+(n = 2, 3, 4, 5)$
photon spectroscopy + translational energy spectroscopy/coincidence
 $0.7 - 14$ keV/amu
 $n = 3$ dominant at low energies ; emission cross section for $\text{He}^+ 468.6$ nm line.
- 89E 3 Aumayr, F. Winter, H.
Experimental investigations on electron capture in the presence of metastable ion beam fractions.
Phys. Scripta T28 96 - 100 1989 E
translational energy spectroscopy
a review on techniques for determining metastable beam fractions
- 89E 5 Bangsgaard, J.P. Hvelplund, P. Pederson, J.O.P. Andersson, L.R. Barany, A.
Energy-gain spectroscopy studies of $\text{O}^{6+}(q = 2 - 5)$ collisions with He atoms.
Phys. Scripta T28 91 - 95 1989 E
 $\text{O}^{6+}(q = 2, 3, 4, 5) + \text{He} \rightarrow \text{O}^{(q-1)+}(nl)$
translational energy spectroscopy
 $1.5 \times 10^{-2} - 0.1$ keV/amu
- 89E 6 Ben-Itzhak, I. Mann, A. Meron, M. Rosner, B.
Single- and double-electron capture probabilities in close sub-MeV collisions of He^{2+} on Ar and N_2 .
Phys. Rev. A 40 2928 - 2934 1989 E
 $\text{He}^{2+} + B \rightarrow \text{He}^{2+}, \text{He}^+, \text{He}^0$ ($B = \text{Ar, N}_2$)
scattering technique
 $10^2 - 2.5 \times 10^3$ keV/amu
scattered angles at $0.7^\circ, 1^\circ$; T : Bohr-Lindhard model
- 89E 7 Bernstein, E.M. Clark, M.W. Tanis, J.A. Woodland, W.T. Berkner, K.H. Schlachter, A.S. Stearns, J.W. DuBois, R.D. Graham, W.G. Meiler, D.W. Stockli, M.P.
Test of predicted $\Delta n \geq 1$ L-shell dielectronic recombination cross sections.
Phys. Rev. A 40 4085 - 4088 1989 E
 $\text{Nb}^{6+}(q = 28 - 32) + \text{H}_2, \text{He} \rightarrow \text{Nb}^{(q-1)+} + h\nu$
X-ray-projectile coincidence
 $3.7 - 4.0 \times 10^3$ keV/amu
RTE
- 89E 8 Bliman, S. Suraud, M.G. Hitz, D. Rubensson, J.E. Nordgren, J. Cornille, M. Indelicato, P. Knystautas, E.J.
Spectroscopic study of doubly excited Na-like argon ions.
J. Phys. B 22 3647 - 3655 1989 E
 $\text{Ar}^{8+}(2p^2 3s) ^3P_{0,2} + \text{H}_1 \rightarrow \text{Ar}^{7+}(2p^2 3l n l')$
photon spectroscopy
2 keV/amu
- 89E 9 Boduch, P. Chantepie, M. Hennecart, D. Husson, X. Kucal, H. Lecler, D. Lesteven-Vaisse, I.
Photon emission spectroscopy of single and double electron capture in $\text{Ar}^{11+} - \text{He}$ or H_2 collisions.
J. Phys. B 22 L 377 - 380 1989 E
 $\text{Ar}^{11+} + B \rightarrow \text{Ar}^{7+}, \text{Ar}^{6+}$ ($B = \text{H}_2, \text{He}$)
photon spectroscopy
3.75 keV/amu
no cross sections given ; strong $\Delta n=0$ transitions ($n=5$ for single electron capture ; $3dnl-3dnl'$ ($n = 4, 5$) for double electron capture)

- 89E10 Boman, S.A. Bernstein, E.M. Tanis, J.A.
Single-electron capture and loss cross sections versus target Z for 1 MeV/u oxygen ions incident on gases.
Phys. Rev. A 39 4423 - 4427 1989 E
 $O^{8+} (q = 5 - 8) + B \rightarrow O^{(q+1)+}; O^{(q+1)+} (B = D_2, He, Ne, Ar, Kr)$
growth method
 10^3 keV/amu
- 89E11 Bouchama, T. Druetta, M. Martin, S.
Electron capture into excited states of low energy Kr^{q+} ($q = 8 - 7$) ions.
J. Phys. B 22 71 - 89 1989 E
 $Kr^{q+} + He, H_2 \rightarrow Kr^{r+} (4sml), Kr^{q+}$
photon (VUV) spectroscopy
emission cross sections for various transitions in Kr^{q+}, Kr^{r+} impact.
- 89E12 Boudjema, M. Moretto-Capelle, P. Bondenave-Montesquieu, A. Benoit-Cattin, P. Gleizes, A. Bachaus, H. Galan, P. Martin, F. Riera, A. Yanez, M.
Double electron capture in collisions of the helium-like ions N^{6+}, O^{6+} and Ne^{6+} with helium atoms.
J. Phys. B 22 L 121 - 127 1989 E
 $A^{Z,2+}(1s^2) + He \rightarrow A^{Z-4+}(1s^2 3l^2) + He^{2+} (A = N, O, Ne)$
Electron spectroscopy
5 keV/amu
cross sections for (3l²) capture
- 89E13 Brower, M.C. Pipkin, F.M.
Measurement of cross sections for electron capture into $n=3$ states of hydrogen.
Phys. Rev. A 39 3323 - 3335 1989 E
 $H^+ + He \rightarrow H(3L, M, ; 4L) + He^+$
micro-wave resonance, optical method
30 - 80 keV/amu
observed Balmer-alpha line
- 89E14 Cederquist, H. Andersson, H. Astner, G. Hvelplund, P. Pedersen, J.O.P.
Evidence for radiative stabilization of two-electron transfer process in slow Xe^{q+} -Xe ($15 \leq q \leq 35$) collisions.
Phys. Rev. Letters 62 1465 - 1468 1989 E
 $Xe^{q+} + Xe \rightarrow Xe^{(q+2)+} + Xe^{2+} (q = 15 - 35)$
translational energy spectroscopy
 3.1×10^{-2} q keV/amu
radiative stabilization for high q ions
- 89E15 Cederquist, H. Liljeby, L. Biedermann, C. Levin, J.C. O. C.S. Rothard, H. Groeneveld, K.O. Vane, C.R. Seflin, I.A.
State-selected angular distributions of single-electron capture in very slow Ar^{q+} -Ar collisions.
Phys. Rev. A 39 4308 - 4311 1989 E
 $Ar^{q+} + Ar \rightarrow Ar^{q+} (4p)$
translational energy-spectroscopy
 $8 \times 10^{-4} - 5 \times 10^{-3}$ keV/amu
no 4s capture
- 89E16 Church, D.A. Holzschelter, H.M.
Charge transfer from molecular hydrogen to stored O^{2+} and O^{3+} ions.
Phys. Rev. A 40 54 - 58 1989 E
 $O^{3+}, O^{2+} (^3P, ^1D) + H_2 \rightarrow O^{2+}, O^+ + H_2^+$
ion trapping technique/attenuation
 8×10^{-3} keV/amu (O^{2+}); 1.3×10^{-4} keV/amu (O^{3+})
rate coefficients
- 89E17 Cornat, A. Chen, S.H. Urbain, X. Antoine, Ph. Lorent, V. Brouillard, F.
Measurement of the angular distribution of the metastable hydrogen atoms formed in the transfer process $H^+ + Cs \rightarrow II(2s) + Cs^+$ in the energy range 200 - 3000 eV.
J. Phys. B 22 L647 - 650 1989 E
 $H^+ + Cs \rightarrow H(2s) + Cs^+$
0.2 - 2 keV/amu
angular distribution proportional to E^{-1} .
- 89E18 Dillingham, T.R. Doughty, B.M. Hall, J.M. Tipping, T.N. Sanders, J.M. Shinnpaugh, J.L.
Single electron capture by 0.5 - 1.5 MeV/amu F^{8+} and F^{9+} on hydro carbon gases.
Nucl. Instr. Meth. in Phys. 40/41 40 - 43 1989 E
Res. B
 $F^{8+} + B \rightarrow F^{8+}; F^{9+} + B \rightarrow F^{9+}, F^{7+} (B = CH_4, C_2H_4, C_2H_6, C_3H_6, C_3H_8, H_2)$
growth method
 $5 \times 10^2 - 1.5 \times 10^3$ keV/amu
cross sections for carbon atoms deduced from those for hydrocarbons.

- 89E18 DuBois, R.D. Kover, A.
Single and double ionization of helium by hydrogen-atom impact.
Phys. Rev. A 40 3605 - 3612 1989 E
H + He \rightarrow H⁺ + He⁺; H⁺ + He²⁺ + e
projectile-recoil coincidence
25 - 300 keV/amu
also direct ionization and electron loss cross sections given over 25 - 1000 keV/amu
- 89E19 Fukuroda, A. Kobayashi, N. Kaneko, Y.
One-electron capture processes in Ne⁸⁺ - H₂ collisions.
J. Phys. B 22 3457 - 3469 1989 E
Ne⁸⁺(¹S) + H₂² \rightarrow Ne⁷(²S) + H₂⁺(X²Σ, v)
translational energy spectroscopy
0.025 - 0.1 keV/amu
relative cross sections
- 89E20 Fukuroda, A. Kobayashi, N. Kaneko, Y.
High-resolution study of one-electron capture processes in Kr²⁺(¹D) - Ne collisions.
J. Phys. B 22 3471 - 3481 1989 E
Kr²⁺(¹D) + Ne \rightarrow Kr⁺(²P<sub>1/2,3/2) + Ne⁺(²P⁺)
translational energy spectroscopy
5x10⁻³ - 2.4x10⁻² keV/amu
relative cross sections</sub>
- 89E21 Gilbody, H.B.
Total cross sections for charge exchange and ionization in collisions of O⁷⁺ and O⁸⁺ ions with H, H₂ and He.
Phys. Scripta T 28 49 - 57 1989 E
review
- 89E24 Hamdan, M. Almeida, D.P. Brenton, A.G.
Translational-energy spectroscopy of OCS³⁺ and CS₂³⁺ single-electron capture from Ne and Ar targets.
J. Phys. B 22 1817 - 1822 1989 E
OCS³⁺, CS₂³⁺ + B \rightarrow OCS²⁺, CS₂²⁺ (B = Ne, Ar)
0.07 keV/amu
only energy spectra.
- 89E22 Hamdan, M. Brenton, A.G.
Translational energy spectroscopy of ²⁹N₂²⁺; one-electron capture in collision with He and Ne atoms.
J. Phys. B 22 L 9 - 13 1989 E
²⁹N₂²⁺ + He(Ne) \rightarrow N₂⁺ + He⁺(Ne⁺)
translational energy spectroscopy
0.2 keV/amu
various channels observed; no cross sections given
- 89E23 Hamdan, M. Brenton, A.G.
High-resolution translational energy spectroscopy of CO²⁺.
J. Phys. B 22 L 45 - 50 1989 E
CO²⁺ + Ne \rightarrow CO⁺
translational energy spectroscopy
0.2 keV/amu
double ionization energy = 41.76 ± 0.1eV; various excited states observed; no cross sections
- 89E25 Havener, C.C. Huq, M.S. Krause, H.F. Schultz, P.A. Phanef, R.A.
Merged-beams measurements of electron capture cross sections for O³⁺ + H at electron-volt energies.
Phys. Rev. A 39 1725 - 1740 1989 E
O³⁺ + H \rightarrow O²⁺ + H⁺
merged-beams technique
9x10⁻⁴ - 8x10⁻¹ keV/amu
- 89E26 Hird, B. Orakzai, M.W. Rahman, F.
Electron loss and transfer for 20 - 110 keV iodine-rare gas collisions.
Phys. Rev. A 39 5010 - 5013 1989 E
I + B \rightarrow I⁺; I⁺ (B = He, Ne, Ar, Kr, Xe)
growth method
0.15 - 0.86 keV/amu
- 89E27 Hoekstra, R. Cirtic, D. de Heer, F.J. Morgenstern, R.
State-selective electron capture in collisions of C⁶⁺ and O⁸⁺ on atomic and molecular hydrogen studied by photon emission spectroscopy.
Phys. Scripta T 28 81 - 90 1989 E
C⁶⁺, O⁸⁺ + H, H₂ \rightarrow C⁵⁺, O⁷⁺
photon spectroscopy
1 - 9 keV/amu
emission cross sections

- 89E28 Hoekstra, R. Schlatmann, A.R. de Heer, F.J. Morgenstern, R.
Electron capture into He⁺(2p) in low energy collisions of He²⁺ with atomic and molecular hydrogen.
J. Phys. B 22 L 603 - 607 1989 E
He²⁺ + H,H₂ → He⁺(2p)
photon spectroscopy
0.3 - 1.75 keV/amu
- 89E29 Houver, J.C. Doweck, D. Pommier, J. Richter, C.
Collisions spectroscopy with aligned and oriented atoms II. charge exchange in He⁺ - Na(3p) collisions.
J. Phys. B 22 L 585 - 589 1989 E
He⁺ + Na(3s,3p) → He(n) + Na⁺
TOF method
0.125 - 0.75 keV/amu
n=2 dominant at low energies ; n=3 at high energies
- 89E30 Huq, M.S. Havener, C.C. Phaneuf, R.A.
Low energy electron capture by N³⁺, N⁴⁺ and N⁵⁺ from hydrogen atoms using merged beams.
Phys. Rev. A 40 1811 - 1816 1989 E
N^{q+}(q = 3,4,5) + H → N<sup>(q-1)+ + H⁺
merged-beam technique
1x10⁻³ - 1.4 keV/amu</sup>
- 89E31 Hutton, R. Prior, M.H. Chantrenne, S. Chen, M.H. Schneider, D.
Double and single electron capture in slow collisions of Ar^{q+} ions with He atoms.
Phys. Rev. A 39 4902 - 4905 1989 E
Ar^{q+} + He → Ar^{r+} ; Ar^{q+} + He → Ar^{r+}
zero-degree electron spectroscopy
2 keV/amu
- 89E32 Itoh, Y.
One-electron capture and deexcitation processes in Ar^{m+} - He collisions at 10 eV.
J. Phys. Soc. Japan 58 1871 - 1874 1989 E
Ar^{r+}(²P ; ¹D) + He → Ar^{r+}(²P) + He⁺(²S)
translational energy spectroscopy
2.5x10⁻⁴ keV/amu
angle = 0 - 3 deg.
- 89E33 Johnson, L.K. Gao, R.S. Dixon, R.G. Smith, K.A. Lane, N.F. Stebbings, R.F. Kimura, M.
Absolute differential cross sections for small angle H⁺ - He direct and charge transfer scattering at keV energies.
Phys. Rev. A 40 3026 - 3631 1989 E
H⁺ + He → H(0.02 - 1 deg.)
position-sensitive detection
5 keV/amu
angular distribution (0.02 - 1 deg.). also direct scattering H⁺ + He → H⁺ + He ; T : MO close-coupling calculation
- 89E34 Johnson, L.K. Gao, R.S. Hakes, C.L. Smith, K.A. Stebbings, R.F.
Direct and charge transfer scattering of KeV energy H⁺ and He^r projectiles from rare gas atoms to obtain small-angle absolute cross sections.
Phys. Rev. A 40 4920 - 4925 1989 E
A⁺ + B → A (A = H,He ; B = Ne,Ar,Kr,Xe)
0.5 - 5.0 keV/amu
diff. cross sections for scattering angle = 0.03 - 1.0 deg.
- 89E35 Koslowski, H.R. Huber, B.A.
Double-electron capture in low-energy collisions of Ar⁴⁺ with Ar and Kr.
J. Phys. B 22 2255 - 2264 1989 E
Ar⁴⁺ + B → Ar²⁺
translational energy spectroscopy
2x10⁻² keV/amu
angular distributions ; no cross section given.
- 89E36 Lavollee, M. Henri, G.
State-selected atomic ion reactions ; a new experimental method. first results on the O⁺(³S,³D,³P) + N₂ system.
J. Phys. B 22 2019 - 2025 1989 E
O⁺(³P) + N₂ → O(³P) + N₂⁺(v=1) ; O⁺(³D) + N₂ → O(¹D) + N₂⁺(v=0)
modified TPEPICO
5x10⁻⁴ - 1.25x10⁻³ keV/amu
ratios for ²P/³D(<1) ; no absolute cross sections
- 89E37 Lebius, H. Koslowski, H.R. Huber, B.A.
State-selective single electron capture by multiply charged ions-reaction window and multichannel Landau-Zener calculations.
Z. Phys. D 11 53 - 61 1989 E
Ar^{q+} + Ar → Ar^{r+} ; Ne^{q+} + He → Ne^{r+} ; Ne^{q+} + Ne → Ne^{r+} ; Ar^{q+} + Ne → Ar^{r+}
translational energy spectroscopy
1.5x10⁻² keV/amu
cross sections for different (nl) states ; T : Landau-Zener calculation

- 89E38 Lei, Z.M., Yang, F., Liu, J.R., Pan, G.Y., Yu, D.H., Sun, S.,
He²⁺ collisions with Ne and Ar atoms into excited states.
Nucl. Instr. Meth. in Phys. 42 38 - 40 1989 E
Res. B
He²⁺ + B → He⁺(6g ²G_{7/2} → 4f ²F_{5/2}) ; He(3¹S → 2¹P ; 2³S) (B = Ne, Ar)
photon spectroscopy
35 - 85 keV/amu
emission cross sections ; Ar⁺, Ne⁺ emission cross sections in He⁺, He²⁺ collisions
- 89E39 Linsay, B.G., Irvine, A.D., Latimer, C.J.
Charge exchange of O₂⁺ ions with O₂ and CH₄ ; the effect of internal energy
studied using a new fixed wave-length PIPECO technique
Int. J. Mass Spectro. Ion 91 113 - 122 1989 E
Proc.
O₂⁺, O₂⁺* + O₂, CH₄ → O₂
PIPECO
1.5x10⁻² - 2.3x10⁻² eV/amu
- 89E40 Liu, C.J., Dunford, R.W., Berry, H.G., Parao, R.C., Groeneveld, K.O., Haas, M.,
Raphaelian, M.L.A.
Subshell selective electron capture (2 - 105 keV/amu) studied by VUV
spectroscopy in O⁶⁺ + He collisions.
J. Phys. B 22 1217 - 1224 1989 E
O⁶⁺ + He → O⁵⁺ + He⁺
photon spectroscopy
2 - 105 keV/amu
emission cross sections for 3p→2s ; 3s→2p ; 3d→2p ; 4f→3d ; 4d→3p
- 89E41 Loyd, D.H., Dawson, H.R.
Balmer-alpha emission from H⁺ impact on Kr and Xe atoms.
Nucl. Instr. Meth. in Phys. 40/41 219 - 220 1989 E
Res. B
H⁺ + Kr, Xe → H(3l)
photon-spectroscopy
4 - 20 keV/amu
- 89E42 Martin, S., Salmoun, A., Ouertane, Y., Druetta, M., Desesquelles, J., Denis, A.
Double Rydberg of high angular momentum (l = 6 - 8) produced in Ar VIII by
Ar⁹⁺ + Cs collisions.
Phys. Rev. Letters 62 2112 - 2115 1989 E
Ar⁹⁺ + Cs → Ar^{n*}(1s²s²p⁵gnl; n = 7 - 9)
photon spectroscopy
2.25 keV/amu
transition energies ; no cross sections given
- 89E43 Martinez, H., Morales, A., de Urquijo, J., Alvarez, I., Cisneros, C.
Absolute differential cross sections for single-electron capture of H⁰ in Ar at keV
energies.
Nucl. Instr. Meth. in Phys. 40/41 44 - 46 1989 E
Rev. B
H + Ar → H⁺
angular distribution
1 - 4 keV/amu
differential cross sections also given
- 89E44 Melchert, F., Debus, W., Liehr, M., Olson, R.E., Salzborn, E.
Single- and double-electron removal from H in energetic collisions with
multiply-charged argon ions.
Europhys. Letters 9 433 - 439 1989 E
H⁺ + Ar^q(q = 1 - 8) → H, H⁺
crossed beam technique
3 - 100 keV/amu
scaled as q^{1.3}
- 89E45 Moretto-Capelle, P., Oza, D.H., Benoit-Cattin, P., Bordenave-Montesquieu, A.,
Boudjema, M., Gleizes, A., Dousson, S., Hitz, D.
Double capture in the O⁶⁺ + He collision investigated by electron spectroscopy
(80 keV, 10 deg.).
J. Phys. B 22 271 - 286 1989 E
O⁶⁺ + He → O⁶⁺(3, n ; n = 3, 4, 5) + He²⁺
electron spectroscopy
5 keV/amu
identification of various channels : their energies and lifetimes.
- 89E46 Nakai, Y., Shirai, T., Tabata, T., Ito, R.
A semiempirical formula for single-electron capture cross sections of multiply
charged ions colliding with H, H₂ and He.
Phys. Scripta T 28 77 - 80 1989 E
analytical fitting
- 89E41 Mack, M., Nijland, J.H., Straten, P.V.D., Niehaus, A., Morgenstern, R.
Correlation in double electron capture in collisions of fully stripped ions on He
and H₂.
Phys. Rev. A 39 3846 - 3854 1989 E
C⁶⁺ + H₂ → C⁴⁺(3l, 3l') ; O⁶⁺ + He → O⁶⁺(3l, 3l') + He²⁺
electron spectroscopy
5 - 6 keV/amu

- 89E47 Okuno, K. Fukuroda, A. Kobayashi, N. Kaneko, Y.
High resolution translational energy spectroscopy of one-electron capture in Ne^{2+} - N_2 collisions.
J. Phys. Soc. Japan 58 1590 - 1594 1989 E
 $\text{Ne}^{2+} (^1S_0) + \text{N}^2 \rightarrow \text{Ne}^+(\ ^2S_{1/2}) + \text{N}_2^+(\ ^2\Sigma_g^+ ; v=0,1 ; A^2\Pi_u ; v=0-4)$
translational energy spectroscopy
 $2 \times 10^{-2} - 8 \times 10^{-2}$ keV/amu
- 89E48 Peart, B. Foster, S.J. Dolder, K.
Measurement of the mutual neutralization of N^+O^- and O^+O^- .
J. Phys. B 22 1035 - 1042 1989 E
 $\text{N}^+ + \text{O}^- \rightarrow \text{N} + \text{O} ; \text{O}^+ + \text{O}^- \rightarrow \text{O} + \text{O}$
inclined-beam technique
 $3.3 \times 10^{-2} - 2$ keV/amu
- 89E49 Rebrion, C. Rowe, B.R. Marquette, J.B.
Reactions of Ar^+ with H_2 , N_2 , O_2 and CO at 20, 30 and 70 K.
J. Chem. Phys. 91 6142 - 6147 1989 E
 $\text{Ar}^+(^2P_{3/2}) + \text{B} \rightarrow \text{Ar} (\text{B} = \text{H}_2, \text{N}_2, \text{O}_2, \text{CO})$
cold nozzle technique
20, 30, 70 K
rate coefficients
- 89E50 Roncin, P. Barat, M. Gaboriaud, M.N. Guillemot, L. Laurent, H.
Collision spectroscopy of O^{6+} and N^{6+} colliding on a He target.
J. Phys. B 22 509 - 524 1989 E
 $\text{A}^{6+} + \text{He} \rightarrow \text{A}^{5+} (n = 2, 3, 4), \text{A}^{4+} (2ln^l) (\text{A} = \text{N}, \text{O})$
energy-gain spectroscopy
0.6 keV/amu
angular distributions (0 - 0.15 deg.)
- 89E51 Salzborn, E.
Electron capture and ionization in ion-ion collisions.
J. de Phys. 50 C1/207 - 228 1989 E
a review
- 89E66 Sarkadi, L. Polinkas, J. Kover, A. Berenyi, D. Vajnai, T.
Observation of electron capture into continuum states of neutral atoms.
Phys. Rev. Letters 62 527 - 530 1989 E
 $\text{He} + \text{B}, \text{Ar} \rightarrow \text{He} + e + \text{B}^+ (\text{B} = \text{He}, \text{Ar})$
projectile-cusp electron coincidence
75 keV/amu
- 89E52 Saunders, W.A.
Charge exchange and metastability of small multiply charged gold clusters.
Phys. Rev. Letters 62 1037 - 1040 1989 E
 $(\text{Au})_n^{2+} + \text{B} \rightarrow (\text{Au})_n^+ ; (\text{Au})_n^{3+} + \text{B} \rightarrow (\text{Au})_n^{2+} (n = 2 - 4 ; \text{B} = \text{Ar}, \text{N}_2, \text{Kr}, \text{CO}, \text{Xe}, \text{O}_2)$
 3×10^{-3} keV/amu
fragmentation cross sections are comparable to charge exchange cross sections.
- 89E54 Schauer, M.M. Jefferts, S.R. Barlow, S.E. Dunn, G.H.
Reactions of H_2 with He^+ at temperatures below 40K.
J. Chem. Phys. 91 4593 - 4596 1989 E
 $\text{He}^+ + \text{H}_2 \rightarrow \text{He} + \text{H} + \text{H}^+ , \text{He} + \text{H}^+ \text{I}_2$
trapped ion technique
1.5 - 40 K
dissociative capture is dominant : rate coefficients
- 89E55 Schluz, M. Giese, J.P. Swenson, J.K. Datz, S. Dittner, P.F. Krause, H.F. Schöne, H. Vane, C.R. Benhenni, M. Shafrath, S.M.
Electron-electron interactions in transfer and excitation in F^{8+} - $\rightarrow \text{H}_2$ collisions.
Phys. Rev. Letters 62 1738 - 1741 1989 E
 $\text{F}^{8+} + \text{H}_2 \rightarrow \text{F}^{7+*} + \text{H}_2^+$
zero-degree electron spectroscopy
 $9 \times 10^2 - 1.7 \times 10^3$ keV/amu
electron-electron interaction in ion-atom collisions.
- 89E56 Schweinzer, J. Winter, H.
State-selective preparation of long-lived highly excited ions by means of single electron capture.
J. Phys. B 22 893 - 905 1989 E
 $\text{Ar}^{2+} + \text{B} \rightarrow \text{Ar}^* (\text{B} = \text{Mg}, \text{Li}, \text{Na}, \text{K})$
translational energy spectroscopy
 $7.5 \times 10^{-3} - 2.5 \times 10^{-1}$ keV/amu
fractions of metastable ions (2 - 5 %)
- 89E57 Shah, M.B. McCallion, P. Gilbody, H.B.
Ionization and electron capture in collisions of slow H^+ and He^{2+} ions with hydrogens.
J. Phys. B 22 3938 - 3988 1989 E
 $\text{A}^{2+} + \text{H}_2 \rightarrow \text{A}^{2+} + \text{H}_2^+ ; \text{A}^{2+} + \text{H} + \text{H}^+ ; \text{A}^{2+} + \text{H}^+ + \text{H}^+ ; \text{A}^{2+} + \text{H}^+ + \text{H}^+ ; \text{A}^{2+} + \text{H}_2^+$
; $\text{A}^{2+} + \text{H}^+ + \text{H} (\text{A} = \text{H}^+, \text{He}^{2+})$
TOF
38 - 1500 keV/amu (H) : 31 - 550 keV/amu (He)

- 89E53 Shah, M.B. McCallion, P.Gilbody, H.B.
Electron capture and ionization in collisions of slow H^+ and He^{2+} ions with helium.
J. Phys. B 22 3037 - 3045 1989 E
 $H^+ + He \rightarrow H + He^+ ; H + He^+ + e ; He^{2+} + He \rightarrow He^+ + He^+ ; He^+ + He^{2+} + e$
coincidence technique
9 - 100 keV/amu (H) ; 6 - 67 keV/amu (He)
also $H^+ + He \rightarrow H^+ + He^+ + e ; H^+ + He^{2+} + 2e ; He^{2+} + He \rightarrow He^{2+} + He^+ + e$
- 89E58 Sofield, C.J., Bridwell, L.B. Moak, C.D. Miller, P.D. Gregory, D.C. Jones, C.M. Alton, G.D. Peprmler, P.L. Hall, J.M.
Charge exchange cross sections for 445 MeV Cl ions in solid C targets.
Phys. Rev. A 40 59 - 68 1989 E
 $Cl^{16+} + C \rightarrow Cl^{17+} ; Cl^{15+} + C \rightarrow Cl^{16+}, Cl^{17+} ; Cl^{17+} + C \rightarrow Cl^{16+} \text{ (total); } 2p, 3p ; Cl^{16+} + C \rightarrow Cl^{15+} \text{ (5n)}$
growth + fitting
 1.27×10^4 keV/amu
also excitation $Cl^{16+} + C \rightarrow Cl^{16+}(2p,3p) ; Cl^{17+} + C \rightarrow Cl^{17+}(2P)$
- 89E59 Sonnenfroh, D.M. Leone, S.R.
A laser-induced fluorescence study of product rotational state distributions in the charge transfer reaction : $Ar^+(^2P_{3/2}) + N_2 \rightarrow Ar + N_2^+(X)$ at 0.28 and 0.40 eV.
J. Chem. Phys. 90 1077 - 1085 1989 E
 $Ar^+(^2P_{3/2}) + N_2 \rightarrow Ar + N_2^+(X)$
ion-molecule crossed beam technique
 $(7 - 10) \times 10^{-6}$ keV/amu
X-distribution
- 89E68 Swenson, J.K. Havener, C.C. Stollerfoht, N. Sommer, K. Meyer, F.W.
Observation of Coulomb focusing of autoionization electrons produced in low-energy $He^+ + He$ collisions
Phys. Rev. Letters 63 35 - 38 1989 E
 $He^+ + He \rightarrow e(0^\circ-180^\circ)$
electron spectroscopy
0.5 - 3.75 keV/amu
- 89E60 Tanis, J.A. Schwietz, G. Schneider, D. Stollerfoht, N. Graham, W.G. Alterogt, H. Kowalik, R. Mätts, A. Skogvall, B. Schneider, T. Szmola, E.
Evidence for electron correlation during double capture in fast ($v = 10$ a.u.) collisions.
Phys. Rev. A 39 1571 - 1574 1989 E
 $Ne^{10+} + B \rightarrow Ne^{8+}, Ne^{9+} \text{ (B = He, Ne, Ar)}$
electron-projectile coincidence
 3.5×10^3 keV/amu
strong electron correlation
Tawara, H. Fritsch, W.
Electron transfer data for C^{8+} and O^{8+} ions in collisions with H, H_2 and He targets - Present status and some related data needs in applications to fusion research.
Phys. Scripta T 28 58 - 66 1989 E
review
- 89E61 Tonuma, T. Kumagai, T. Matsuo, T. Tawara, H.
Coincidence measurements of slow recoil ions with projectile ions in 42 MeV $Ar^{17+} - Ar$ collisions.
Phys. Rev. A 40 6238 - 6245 1989 E
 $Ar^{17+} + Ar \rightarrow Ar^{q+} \text{ (q = 4, 6, 8, 10, 12, 14)}$
projectile-recoil ion coincidence
 10^5 keV/amu
recoil ion production cross sections
van Zyl, B. Gealy, M.W. Neuman, H.
Lyman-alpha emission from low-energy H + H_2 and $H^+ + H_2$ collisions.
Phys. Rev. A 40 1664 - 1666 1989 E
 $H + H_2, H^+ + H_2 \rightarrow H^*(\text{Lyman-alpha})$
Lyman-alpha emission due to excited projectiles (not due to dissociative excitation of H_2)
- 89E62 Zouros, T.J.M. Lee, D.H. Richard, P. Sanders, J.M. Shinpaugh, J.L. Varghese, S.L. Karim, K.R. Bhalia, C.P.
State-selective observation of resonant transfer excitation in collisions of F^{6+} with He and H_2 targets.
Phys. Rev. A 40 6246 - 6250 1989 E
 $F^{6+} + H_2, He \rightarrow F^{2+}(1s2s2p^2) ^3D, ^1D$
zero-degree Auger electron spectroscopy
263 - 1740 keV/amu

- 89T 1 Alston, S.
Faddeev approach to electron capture.
Nucl. Instr. Meth. in Phys. 43 19 - 23 1989 T
Res. B
 $H^+ + He, H \rightarrow H^0(1s)$
Faddeev-Watson-Lovelace formalism
 5×10^3 keV/amu
Angular distribution of H^0
- 89T 2 Allison, S.
Closed-form expression for $1s \rightarrow 1s$ electron capture amplitude in second-order Faddeev approximation.
Phys. Rev. A 40 4907 - 4913 1989 T
2nd-order Faddeev approx.
- 89T56 Ameziau, K. Bacchus-Montabonel, M.C.
Ab initio potential energy curves for several molecular states of the multiply charged ion $(OHe)^{6+}$
Chem. Phys. 155 199 - 202 1989 T
 $O^{6+} + He \rightarrow O^{5+}$
ab initio calculation
potential energy curves
- 89T 3 Bacchus-Montabonel, M.
Calculated partial cross sections for the single-electron capture process in the $N^{5+} + He$ collisions.
Phys. Rev. A 40 6088 - 6090 1989 T
 $N^{5+} + He \rightarrow N^{4+}(3s, 3p, 3d)$
semiclassical method
0.8 - 8 keV/amu
- 89T 4 Badnell, N.R.
Fine-structure effects on resonant transfer excitation cross sections for Li-like ion collisions with H_2 and He.
Phys. Rev. A 40 3579 - 3583 1989 T
 $S^{13+}, Ca^{17+}, Ti^{19+}, V^{20+}, Ni^{25+}, Ge^{28+} + B \rightarrow S^{12+}, Ca^{16+}, Ti^{18+}, V^{19+}, Ni^{24+}, Ge^{28+} + hv$ ($B = H_2, He$)
Impulse approx. (intermediate coupling, LS-coupling)
- 89T 5 Baer, M. Niedner-Schatteburg, G. Toennies, J.P.
A three-dimensional quantum mechanical study of vibrationally resolved charge transfer process in $H^+ + H_2$ at $E_{cm} = 20$ eV.
J. Chem. Phys. 91 4169 - 4182 1989 T
 $H^+ + H_2(v_1=0) \rightarrow H + H_2^+(v_f)$
Infinite order sudden approx. (IOSA)
 6×10^{-2} keV/amu
also $H^+ + H_2(v_f)$
- 89T 6 Bardsley, J.N. Gangopadhyay, P. Penetrante, B.N.
Symmetric charge transfer to multiply charged ions.
Phys. Rev. A 40 2724 - 2744 1989 T
 $He^{2+} + He^+ \rightarrow He^+ + He^{2+}$; $A^{(z,2)+} + A^{(z,3)+} \rightarrow A^{(z,3)+} + A^{(z,2)+}$ ($A = Be, B, C, N, O$); $A^{(z,10)+} + A^{(z,9)+} \rightarrow A^{(z,9)+} + A^{(z,10)+}$ ($A = Mg, Al, Si, P, S$)
IP with curved trajectories
 $10^2 - 10$ keV/amu
- 89T10 Belkic, D.
State-selective and total single-capture cross sections for fast collisions of multiply charged ions with He and Li.
Phys. Scripta 40 610 - 624 1989 T
 $A^{z+} + B \rightarrow A^{(z-1)+}(nl)$ ($A = H, He$; $B = He, Li$)
Corrected first Born approx.
 $10 - 2500$ keV/amu
- 89T 7 Belkic, D.
State-selective capture cross sections in proton-hydrogen and proton-helium collisions at intermediate and high energies.
Phys. Scripta T28 106 - 111 1989 T
 $H^+ + H, He \rightarrow H(2s, 2p, 3s, 3p, 3d, 4s)$
Corrected-first-Born approx.
 $20 - 1000$ keV/amu
- 89T 9 Belkic, D. Taylor, H.S.
A Schwinger-type variational principle for charge exchange at arbitrary energies.
Phys. Scripta 39 436 - 441 1989 T
Schwinger type variational method

- 89T 8 Belkic, D. Taylor, H.S.
Nonperturbative treatments of charge exchange at arbitrary energies : an alternative variational principle.
Phys. Rev. A 39 6134 - 6147 1989 T
 $H^+ + H \rightarrow H + H^+$
Schwinger-variational method
60,125,5000 keV/amu
Angular distribution
- 89T11 Bhalla, C.P. Karim, K.R.
Resonant transfer and excitation in collisions of Li-like F^{8+} and Ca^{17+} with light targets.
Phys. Rev. A 39 6060 - 6063 1989 T
 $F^{8+} + H_2 \rightarrow F^{8+*} + H_2$, $Ca^{17+} + H_2, He \rightarrow Ca^{15+*}$
Impulse approx.
 $6 \times 10^2 - 1.9 \times 10^3 (F)$; $3.7 \times 10^3 - 9.5 \times 10^3$ keV/amu (Ca)
radiative and non-radiative rates calculated.
- 89T57 Bochkova, I.A. Ivakin, I.A. Osrovskii, V.N. Tolmachev, Yu.A. Kuligin, A.V.
Charge exchange in the He⁻-Hg system at thermal energies II. absolute cross sections of charge exchange with excitation
Opt. Spectrosc. (USSR) 67 298 - 301 1989 T
 $He^+ + Hg(6s^2) \rightarrow He^0(1s^2) + Hg^+(7p^2P_{1/2,3/2})$
T : two-state guasi molecular approx. E : plasma technique
- 89T12 Clary, C.C. Sommenfroh, D.M.
Quantum mechanical calculations on the $Ar^+ + N_2$ charge transfer reaction.
J. Chem. Phys. 90 1086 - 1093 1989 T
 $Ar^+(^2P_{3/2}) + N_2(v=0, j) \rightarrow Ar + N_2^+(v'=1, j)$
Coupled channel-DWBA
(4-10) $\times 10^{-6}$ keV/amu
cross sections for $j=0-28$
- 89T13 Cue, N. Poizat, J.C. Remillieux, J.
Exciting the nucleus by target electron capture into atomic orbitals.
Europhys. Letters 8 10 - 23 1989 T
- 89T15 Decker, D. Eichler, J.
Exact second-order Born calculations for charge exchange with Coulomb boundary conditions.
J. Phys. B 22 L95 - 100 1989 T
 $H^+ + H, He(1s) \rightarrow H(1s) + H^+ + He^+$
second-order Born approx. with Coulomb boundary conditions.
125(H), 5.4 $\times 10^3$ (He) keV/amu
- 89T14 Decker, F. Eichler, J.
Consistent treatment of electron screening in charge transfer.
Phys. Rev. A 39 1530 - 1533 1989 T
 $H^+ + He \rightarrow H + He^+$; $H^+ + C \rightarrow H + C^+(K^{-1})$; $He^{2+} + Li \rightarrow He^+ + Li^+(K^{-1})$
screened first Born approx. with Coulomb boundary condition (SBLS)
 $10^2 - 10^4$ keV/amu(H) ; $10^2 - 6 \times 10^2$ keV/amu(He)
- 89T16 Decker, F. Eichler, J.
Comparative study of the distorted-wave Born and boundary-corrected Born approximation for charge transfer up to the second order.
J. Phys. B 22 3023 - 3036 1989 T
 $H^+ + H \rightarrow H + H^+$
DWBA/boundary-corrected Born approx.
125 - 5000 keV/amu
angular distributions
- 89T58 Deco, G. Grün, N.
Capture from the vacuum in ion-ion collisions at relativistic energies
J. Phys. B 22 3709 - 3716 1989 T
 $S^{16+} + (H^+ - U^{92+}) \rightarrow S^{15+} + e^+$
DW model
(10-200) $\times 10^6$ keV/amu
- 89T18 Deco, G.R. Rivarola, R.D.
Two-center effects in relativistic radiative electron capture.
Phys. Rev. A 39 5451 - 5454 1989 T
 $S^{16+}, U^{92+} + B \rightarrow S^{15+}, U^{91+}$ (B = 10 - 92)
Matrix-continuum distorted-wave model
 1.5×10^6 keV/amu
- 89T17 Deco, G.R. Rivarola, R.D.
Pair productions with electron capture in relativistic heavy-ion collisions.
J. Phys. B 22 1043 - 1050 1989 T
DWBA
- Nuclear excitation by electron capture (NEEC), the inverse of the internal conversion.

- 89T19 Dewangan, D.P. Chakraborty, H.S.
Analytic evaluation of the B1B cross sections.
J. Phys. B 22 L415 - 418 1989 T
B1B(boundary-corrected first Born approx.)
closed form for B1B for $1s \rightarrow 1s$ electron transfer
- 89T20 Dubois, A. Hansen, J.P. Nielsen, S.E.
Orientation of P states in ion-atom collisions:propensity rules for excitation and capture.
J. Phys. B 22 L279 - 284 1989 T
- 89T21 Errea, L.F. Mendez, L. Mo, O. Riera, A.
Molecular treatments of charge exchange in slow $C^{3+} + H$ collisions.
Phys. Scripta T28 67 - 70 1989 T
 $C^{3+} + H \rightarrow C^{2+}(\text{total}, 1s^2 2s 3s, 1s^2 2s 3p)$
MO
0.25 - 6.25 keV/amu
- 89T22 Errea, L.F. Mendez, L. Riera, A.
Excitation and charge transfer in $He^+ + H$ collisions.
Z. Phys. D 14 229 - 236 1989 T
 $He^+ + H \rightarrow He(1s^2; 1s2s; 1s2p) + H^+$
MO + CIF
0.5 - 25 keV/amu
also H(2s;2p) excitation
- 89T23 Gayet, R.
Multiply capture and ionization in high energy ion-atom collisions.
J. de Phys. 50 C1/53 - C1/70 1989 T
a review
- 89T24 Gramlich, K. Gruhn, N. Scheid, W.
Coupled-channel calculations with Gausse-type orbitals for charge transfer and ionization in collisions of the (He-He) $^{2+}$ system.
J. Phys. B 22 2567 - 2579 1989 T
 $He^{2+} + He \rightarrow He^+ He$; $He^+ + He^+ \rightarrow He + He^{2+}$
coupled-channel calculation (AO)
1 - 80 keV/amu (He^{2+}) ; 4 - 120 keV/amu (He^+)
also $He^{2+} + He \rightarrow He^{2+} + He^+ + e$; $He^+ + He^+ \rightarrow He^+ + He^{2+} + e$
- 89T25 Grozdanov, T.P. Janev, R.K. Krstic, P.S.
Two-state model for electron capture in $H^+ + H_2$ collisions at keV impact energies.
Phys. Letters. A 141 346 - 350 1989 T
 $H^+ + H_2 \rightarrow H(\text{total})$
two state model
0.2 - 20 keV/amu
- 89T26 Hahn, Y.
Transfer excitation processes in ion-atom collisions at high energies.
Phys. Rev. A 40 2950 - 2957 1989 T
 $Ca^{17+} + He \rightarrow Ca^{16+} + He^+$; $Nb^{31+} + H_2 \rightarrow Nb^{30+} + H_2^+$
Resonant transfer excitation
- 89T27 Hahn, Y. Ramadan, H.
Uncorrelated transfer excitation collisions at high energies.
Phys. Rev. A 40 6206 - 6209 1989 T
 $Ni^{31+} + H_2 \rightarrow Ni^{31+}; F^{8+} + He, H_2 \rightarrow F^{8+}$
Uncorrelated transfer excitation at high energies
- 89T28 Hansen, J.P. Andersson, L.R.
A study of charge transfer and core excitation in the $Ne^{6+} - He$ collisions at 2 keV projectile energy.
J. Phys. B 22 L285 - 288 1989 T
 $Ne^{6+} + He \rightarrow Ne^{5+} + He^+$
AO-CC
0.1 keV/amu
energy-gain spectrum : impact parameter dependence
- 89T29 Hansen, J.P. Kochbach, L. Taubjerg, K.
Partial capture cross sections and energy gain spectra in $Ar^{6+} - He(1s^2)$ collisions.
J. Phys. B 22 885 - 891 1989 T
 $Ar^{6+} + He(1s^2) \rightarrow Ar^{7+}(3d, 4s, 4p) + He^+$
AO
 $1.25 \times 10^{-2} - 1$ keV/amu

- 89T30 Hansen, J.P., Taubjerg, K.
Coupled-channel calculations of partial capture cross sections in multiply charged ion collisions with hydrogen.
Phys. Rev. A 40 4082 - 4084 1989 T
 $Ar^{q+} + H \rightarrow Ar^{(q-1)+}(4l;5l); Ar^{q+} + H \rightarrow Ar^{(q-1)+}(5l;6l)$
AO
1 - 50 keV/amu
- 89T59 Helfrich, K.
Extended universal correlation diagrams for the quantum mechanical one-electron two-centre problem
Z. Phys. D 13 295 - 299 1989 T
 $He^{2+} + H \rightarrow He^+ + H^+; Li^{3+} + H \rightarrow Li^{2+} + H^+$
correlation diagram
- 89T31 Hino, K., Watanabe, T.
Theory of the relativistic radiative electron capture incorporating effects of the internal conversion process.
Phys. Rev. A 39 3373 - 3387 1989 T
 $A^{Z+} + Be \rightarrow A^{(Z-1)+} + hv(K-REC) + Be^+$ (A = Ne, Ar, Kr, Xe, Ta, U)
relativistic impulse approx.
 $10^4 - 10^5$ keV/amu
- 89T32 Jain, A., Lin, C.D., Frisch, W.
State-selective double-electron capture in $He^{2+} + He$ collision at intermediate impact energies.
Phys. Rev. A 39 1741 - 1746 1989 T
 $He^{2+} + He \rightarrow He(2s^2 \ ^1S, 2s2p \ ^1P_o, 2p^2 \ ^1D_o) + He^{2+}$
AO
50 - 167 keV/amu
- 89T54 Jakubassa-Amundsen, D.H.
The forward peak for neutral projectiles.
J. Phys. B 22 3989 - 3999 1989 T
 $He^{q+}(q = 2, 1, 0) + Ne \rightarrow (He^{(q-1)+} + e) + Ne^+$
peak-impulse-approx.
 10^3 keV/amu
- 89T34 Macek, J., Dong, X.Y.
Calculation of electro-capture cross sections in low energy collisions of C^{6+} with H.
Phys. Rev. A 40 95 - 100 1989 T
 $C^{6+} + H \rightarrow C^{5+}(\text{total}; 4l; l=0-3) + H^+$
LZ with Stark effect coupling
 $1.3 \times 10^{-2} - 1.3 \times 10^3$ keV/amu
- 89T33 Macek, J., Taubjerg, K.
Strong potential wave functions with elastic channel distortion.
Phys. Rev. A 39 6064 - 6067 1989 T
Channel-distorted wave approx.
- 89T60 Martin, F., Sanchez, I., Bachau, H.
Coupled continuum perturbative Feshbach approach to calculate total and partial widths: $^1S^e(3ln)$ resonance states of He, C^{4+} , N^{5+} and O^{6+}
Phys. Rev. A 40 4245 - 4255 1989 T
 $A^{Z+} + He \rightarrow A^{(Z-2)+} + He^{2+}$ (A=He, C, N, O)
Fresh formalism
- 89T35 Martinez, A.E., Deco, G.R., Rivarola, R.D., Fainstein, P.D.
Electron capture and ionization in atomic collisions.
Nucl. Instr. Meth. in Phys. 43 24 - 28 1989 T
Res. B
 $H^+ + He^+ \rightarrow H + He^{2+}; H^+ + Ne \rightarrow H + Ne^+$
Continuum distorted wave-eikonal Initial state method
 $10 - 10^3$ keV/amu(He^+)
differential cross sections. $H^+ + He^+ \rightarrow H^+ + He^{2+} + e$
- 89T36 Marner, H., Briggs, J.S.
The capture of inner-shell electrons in the strong potential Born(SPB) approximation.
Z. Phys. D 13 75 - 76 1989 T
 $p + C \rightarrow H + C^+(K^{-1})$
Strong potential Born approx.
 $10^2 - 3 \times 10^3$ keV/amu

- 89T37 Moisewitsch, B.L.
Relativistic second-order Oppenheimer-Brinkman-Kramers cross sections for electron capture.
Phys. Rev. A 39 5609 - 5612 1989 T
 $A^{Z+} + B \rightarrow A^{(Z-1)+} (A = C, Ne, Ar; B = 1, 3-79)$
relativistic OBK
 $1.4 \times 10^5 - 2.1 \times 10^6$ keV/amu
- 89T38 Nikulin, V.K. Samoylov, A.V.
On the role of correlated double-electron capture in slow multiply charged N^{7+} collisions with He.
J. Phys. B 22 L201 - 205 1989 T
 $N^{7+} + He \rightarrow N^{3+}(3131^+; 3141^+) + He^{2+}$
multichannel Landau-Zener-Nikitin model
 $6 \times 10^2 - 25$ keV/amu
also $N^{7+} + He \rightarrow N^{6+}(n=3; n=4) + He^+$; double capture dominant over single capture at low energies
- 89T39 Olson, R.E. Schultz, D.R.
 n, l distributions for electron capture from H(1s) by C^{6+} and O^{8+} .
Phys. Scripta T28 71 - 76 1989 T
 $C^{6+} + O^{8+} + H \rightarrow C^{5+}(n), O^{7+}(nl)$
CTMC
40 - 140 keV/amu
- 89T40 Olson, R.E. Ullrich, J. Schmidt-Böcking, H.
Multiple-ionization collisions dynamics.
Phys. Rev. A 39 5572 - 5583 1989 T
 $U^{32+} + Ne \rightarrow U^{32+} + Ne^{+}; U^{31+}(n) + Ne^{+}$
CTMC
 1.4×10^3 keV/amu
 n -distribution; impact parameter; electron spectrum; angular distribution of scattered projectile; angular distribution of recoil ions; stopping power
- 89T52 Omar, G. Moussa, A.H. Hahn, Y.
Strong electron correlation and anomalous electron capture.
Phys. Rev. A 40 6709 - 6710 1989 T
 $Ca^+, Sc^{2+}, Ti^{3+}, Fe^{7+} + B \rightarrow Ca, Sc^+, Ti^{2+}, Fe^{6+}$

- 89T41 Opradolice, L. Casaubon, J.I. Piancettini, R.D.
Molecular treatment of single-electron capture in $Li^{3+} + Li$ collisions.
J. Phys. B 22 1809 - 1916 1989 T
 $Li^{3+} + Li(2s) \rightarrow Li^{2+}(n) + Li^+$
MO/Landau-Zener model
 $2 \times 10^{-4} - 1$ keV/amu
 $n=4$ dominant
- 89T42 Parker, J.E. Johnson, C.A.F.
A two-state treatment of the electron transfer reactions from carbon dioxide to helium ions.
Int. J. Mass Spectro. Ion 94 87 - 99 1989 T
Proc.
 $He^+ + CO_2 \rightarrow He$
two-state approx
0.025 - 1.25 keV/amu
branching ratios for $CO_2^+, CO^+, O^+, C^+, CO_2^{2+}$
- 89T53 Parlant, G. Gislason, E.A.
Theoretical state-to-state cross sections for collisions of $N_2^+(v) + Ar$: II results at higher energies.
J. Chem. Phys. 91 5359 - 5364 1989 T
 $N_2^+(v) + Ar \rightarrow N_2(v) + Ar^+ (^2P_{3/2,1/2}) (v = 0, 1, 2)$
1.2 - 320 eV
- 89T43 Rhoades-Brown, M.J. Bottcher, C. Strayer, M.R.
Feynman-Monte Carlo calculations of electron capture at relativistic collider energies.
Phys. Rev. A 40 2831 - 2834 1989 T
 $A^{Z+} + A^{Z+} \rightarrow A^{(Z-1)+} + A^{Z+} + e^+$ ($A = Si, Cu, I, Au, U$)
Feynman-Monte Carlo method
electron capture associated with pair production
- 89T44 Senba, M.
Charge exchange collisions in the presence of competing process: an integral equation approach.
J. Phys. B 22 2027 - 2040 1989 T
 $H + Ne \rightarrow H^+$
integral equation
0.2 - 2.8 keV/amu

- 89T45 Shingal, R. Lin, C.D.
Orientation-dependent atomic model for electron transfer in ion-molecular collisions: applications to $H^+ + H_2$.
Phys. Rev. A 40 1302 - 1309 1989 T
 $H^+, He^{2+} + H_2 \rightarrow H, He^+$
1 - 400 keV/amu (H); 12.5 - 500 keV/amu (He)
ratios $\sigma(H_2)/\sigma(H)$
- 89T55 Shingal, R. Lin, C.D.
Ionization and electron transfer in $He^{2+} + H(1s)$ collisions.
J. Phys. B 22 L445 - 449 1989 T
 $He^{2+} + H(1s) \rightarrow He^+(total, 2s, 2p, 3s+3d, 3p)$
semi-classical impact parameter method
2 - 500 keV/amu
also $He^{2+} + H \rightarrow He^{2+} + H^+ + e$
- 89T46 Shingal, R. Lin, C.D.
Theoretical studies of electron capture in $H^+ + H_2$ collisions.
J. Phys. B 22 L659 - 664 1989 T
 $H^+ + H_2 \rightarrow H(total)$
orientation-dependent AO
4 - 100 keV/amu
impact parameter dependence
- 89T47 Toshima, N. Eichler, J.
Relativistic coupled-channel calculations including pseudostates.
Phys. Rev. A 40 125 - 132 1989 T
 $U^{92+} + U^{91+} \rightarrow U^{91+}(1s, 2s, 2p, 3s, 3p) + U^{92+}$
relativistic, coupled-channel calculation
 5×10^5 keV/amu
also excitation cross sections
- 89T48 Toshima, N. Ishihara, T.
Coulomb boundary conditions in high energy theories for electron capture processes.
Phys. Rev. A 40 638 - 641 1989 T
 $H^+ + H \rightarrow H(\theta) + H^+$
boundary corrected eikonal approx.
60, 125 keV/amu
angular distributions

- 89T49 Toshima, N. Ishihara, T. Ohsaki, A. Watanabe, T.
Impact-parameter treatment of classical trajectory Monte Carlo calculations for ion-atom collisions.
Phys. Rev. A 40 2192 - 2194 1989 T
 $H^+ + H \rightarrow H(\theta) + H^+$
simplified CTMC
60, 125 keV/amu
angular distributions
- 89T50 Wang, Y.D. McGuire, J.H. Rivarola, R.D.
Impact parameter treatment of high-velocity electron capture from diatomic molecules at fixed orientation.
Phys. Rev. A 40 3673 - 3680 1989 T
 $H^+ + H_2 \rightarrow H; He^{2+} + H_2 \rightarrow He^+$
IP
1 - 5×10^3 keV/amu
orientation angle dependence
- 89T51 Zygelman, B. Dalgarno, A. Kimura, M. Lane, N.
Radiative and nonradiative charge transfer in $He^+ + H$ collisions at low energy.
Phys. Rev. A 40 2340 - 2345 1989 T
 $He^+ + H \rightarrow He + H^+; He + H^+ + h\nu$
quantum mechanical method
 $2.5 \times 10^{-5} - 2.5 \times 10^{-2}$ keV/amu
radiative association ($\rightarrow HeH^+ + h\nu$) is dominant at lowest energies; radiative capture is dominant above 10 meV; at higher energies non-radiative capture is dominant.

- 90E 1 Anderson, H. Cederquist, H. Asmer, G. Hvelplund, P. Pedersen, J.O.P.
Radiative stabilization of double-Rydberg states formed in slow $Xe^{q+} \cdot Xe$ collisions ($q=15-35$)
Phys. Scripta 42 150 - 158 1990 E
 $Xe^{q+} + Xe \rightarrow Xe^{(q-2)+} + e; Xe^{(q-2)+} + hv$
translational energy spectroscopy
0.4 - 1.0 keV/amu
for higher q , radiative stabilization plays a roll
- 90E 2 Ashburn, J.R. Cline, R.A. van der Burgt, P.J.M. Westerveld, W.B. Rislley, J.S.
Experimentally determined density matrices for $H(n=3)$ formed in $H^+ \cdot He$ collisions from 20 to 100 keV.
Phys. Rev. A 41 2407 - 2421 1990 E
 $H^+ + He \rightarrow H(n=3)$
photon spectroscopy (Balmer line)
- 90E 3 Barat, M. Roncin, P. Guillemot, L. Gaboriaud, M.N. Laurent, H.
Single and double electron capture by C^{4+} ions colliding with helium target.
J. Phys. B 23 2811 - 2819 1990 E
 $C^{4+} + He \rightarrow C^{3+}, C^{2+}$
translational energy spectroscopy
0.5 - 0.8 keV/amu
also angular differential cross sections given
- 90E 4 Biedermann, C. Cederquist, H. Andersson, L.R. Levin, J.C. Short, R.T. Elston, S.B. Gibbons, J.P. Andersson, H. Liljeby, L. Sellin, I.A.
Experimental and model angular distributions of one- and two-electron capture processes in 0.5 - 20 eV/u $Ar^{4+} \cdot Ar$ collisions.
Phys. Rev. A 41 5889 - 5908 1990 E
 $Ar^{4+} + Ar \rightarrow Ar^{3+}, Ar^{2+}$
transfer energy spectroscopy
 $0.5 \times 10^{-3} - 2 \times 10^{-2}$ keV/amu
angular distribution; only 4p L, but no 4s population
- 90E 5 Biedermann, C. Levin, J.C. Short, R.T. Elston, S.B. Gibbons, J.P. Sellin, I.A. Cederquist, H. Andersson, L.A. Andersson, H. Liljeby, L.
Total capture cross sections for very slow $Ar^{4+} \cdot Ar$ and $Ar^{6+} \cdot Ar$ collisions.
Phys. Rev. A 42 6905 - 6908 1990 E
 $Ar^{q+} (q = 4,6) + Ar \rightarrow Ar^{(q-1)+}, Ar^{(q-2)+}$
Angular distribution measurements
 $2.5 \times 10^{-3} - 2.5 \times 10^{-2}$ keV/amu
- 90E 64 Brechignac, C. Cahuzac, Ph. Cartier, F. Leygnier, J. Hertel, I.V.
charge exchange in alkali cluster collisions
Z. Phys. D 17 61 - 67 1990 E
 $(Na)_n^+ + Cs \rightarrow (Na)_n (n=1-21); (K)_n^+ + Cs \rightarrow (K)_n (n=1-14)$
laser-ionization
 $5 \times 10^{-3} - 6 \times 10^{-2}$ keV/amu
strong dependence on the energy defect, cluster size and impact energy
- 90E 6 Campbell, E.E.B. Hulser, H. Witte, R. Hertel, I.U.
Near resonant charge transfer in $Na(4D) + K^+ \rightarrow Na^+ + K^*$: optical pumping of the $Na(4f)$ state and energy dependence of rank 4 alignment.
Z. Phys. D 16 21 - 33 1990 E
 $K^+ + Na(4D) \rightarrow K^+ + Na^*$
optical pumping
 $8 \times 10^{-3} - 8 \times 10^{-2}$ keV/amu
relative cross sections
- 90E 7 Cheng, S. Cocke, C.L. Kamber, E.Y. Hsu, C.C. Varghese, S.L.
Measurement of electron capture and ionization cross sections for D_2 in collisions with fast O^{8+} ions.
Phys. Rev. A 42 214 - 222 1990 E
 $O^{8+} + D_2 \rightarrow O^{8+} + D_2^+; O^{8+} + D^+ + D^+; O^{8+} + D_2^{2+}; O^{8+} + D^+ + D^+; O^{8+} + D_2^{3+} + D_2^{2+}$
projectile-recoil ion coincidence technique
 $0.5 - 1.25 \times 10^3$ keV/amu
different channels for D^+ ion production
- 90E 8 Chetoui, A. Martin, F. Politis, M.F. Rozet, J.P. Touati, A. Blumenfeld, L. Verthet, D. Wohrer, K. Stephan, C. Barat, M. Gaboriaud, M.N. Laurent, H. Roncin, P.
Doubly excited states populated in collisions of O^{8+} ions with He and H_2 at 1.24 keV/amu.
J. Phys. B 23 3659 - 3675 1990 E
 $O^{8+} + He, H_2 \rightarrow O^{6+}(n,n')$
projectile + X-ray coincidence technique
1.24 keV/amu

- 90E9 Datz, S, Hippler, R, Andersen, L.H, Dittner, P.F, Knudsen, H, Krause, H.F, Miller, P.D, Peppmiller, P.L, Rosseel, T, Schuch, R, Stolterfoht, N, Yamazaki, Y, Vane, C.R.
Coincidence studies of capture and ionization in highly-charged F^{9+} -He and U^{92+} -He collisions at medium velocities.
Phys. Rev. A 41 3559 - 3571 1990 E
 $A^{q+} + He \rightarrow A^{(q-1)+} + He^+ + e$; $A^{q+} + He^2+ + 2e$; $A^{(q-1)+} + He^+$; $A^{(q-1)+} + He^{2+} + e$ ($A = I, U$; $q = 5 - 44$)
projectile-recoil coincidence
 $10^2 - 10^3$ keV/amu
- 90E10 de Jong, R, Niehaus, A.
Transfer ionization in He^{2+} -xenon collisions.
J. Phys. B 23 3933 - 3954 1990 E
 $He^{2+} + Xe \rightarrow He^+ + Xe^{2+} + e$
electron + translational energy spectroscopy
 $10^{-1} - 5.5 \times 10^{-2}$ keV/amu
also angular distribution
- 90E11 DePaola, B.D, Parameswaran, R, Axmann, W.J.
High-resolution state-selective study of transfer with excitation in the $F^{8+} + H_2$ system.
Phys. Rev. A 41 6533 - 6535 1990 E
 $F^{8+}(1s) + H_2 \rightarrow F^{8+}(2p^2 D, 2s2p^1P)$
electron spectroscopy
 $9.5 \times 10^2 - 1.6 \times 10^3$ keV/amu
electron spectra in non-resonant transfer excitation (NTE)
- 90E12 Doweck, D, Houver, J.C, Pommier, J, Richter, C, Royer, T, Andersen, N, Palsdottir, B.
Strong effects of initial orbital alignment observed for electron capture in keV H^+ -Na(3p) collisions.
Phys. Rev. Letters 64 1713 - 1716 1990 E
 $H^+ + Na(3s, 3p) \rightarrow H(n=2, 3) + Na^+$
translational energy spectroscopy
 $0.5 - 5$ keV/amu
aligned with polarized light
- 90E13 Gao, R.S, Johnson, L.K, Hakes, C.L, Smith, K.A, Stebbings, R.F.
Collisions of kilo-electron-volt H^+ and He^+ with molecules at small angles: absolute differential cross sections for charge transfer.
Phys. Rev. A 41 5929 - 5933 1990 E
 $H^+ + B \rightarrow H(B = N_2, O_2, CO, CO_2, NO, CH_4)$; $He^+ + B \rightarrow He(B = H_2, N_2, O_2, CO, NO)$
position-sensitive detector
 $0.5 - 5$ keV/amu (H); 0.4 keV/amu (He)
- 90E14 Gardner, J.A, Dressler, R.A, Salter, R.H, Murad, E.
Reaction cross section and product ion T-O-F measurements for collisions of N^+ and $N^{+1/2}$ with CO_2 at suprathermal energies.
J. Chem. Phys. 93 7780 - 7786 1990 E
 $N^+ + CO_2 \rightarrow N + CO_2^+$; $N_2^+ + CO_2 \rightarrow N_2 + CO_2^+$; $N + CO_2 \rightarrow N + CO_2^+$; $N_2^+ + CO_2 \rightarrow N_2 + CO_2^+$
translational energy spectroscopy
 $10^{-4} - 10^{-3}$ keV/amu
 $N^+ + CO_2 \rightarrow NO + CO^+$ also
- 90E62 Graham, W.G, Berkner, K.H, Bernstein, E.M, Clark, M.W, Feinberg, B, McMahan, M.A, Morgan, T.J, Rathbun, W, Schlachter, A.S, Tanis, J.A.
Resonant transfer and excitation for U^{90+} projectiles in hydrogen.
Phys. Rev. Letters 65 2773 - 2776 1990 E
 $U^{90+} + H_2 \rightarrow U^{89+}$
X-ray-projectile coincidence
($97 - 150$) $\times 10^3$ keV/amu
- 90E15 Guillemot, L, Roncin, P, Gaboriaud, M.N, Barat, M, Laurent, H, Bliman, S, Suraud, M.G, Hitz, D, Bonnet, J.J, Bonnefoy, M, Chassevent, A, Fleury, A.
Collisions of metastable He-like C^{4+} ions on He and H_2 targets.
J. Phys. B 23 3353 - 3360 1990 E
 $C^{4+}(1s2s^3S) + B \rightarrow C^{3+}, C^{2+}$ ($B = H_2, He$)
translational energy + photon spectroscopy
 $0.8 - 3.3$ keV/amu
no cross section given

- 90E16 Guillemot, L. Roncin, P. Gaboriaud, M.N. Laurent, H. Barat, M.
Critical study of the molecular Coulombic barrier model for multiple electron capture by highly charged ions.
J. Phys. B 23 4293 - 4312 1990 E
 $Ar^{q+}(q = 11, 9, 8, 7) + Ar \rightarrow Ar^{q+}; Ar^{q+} + Xe \rightarrow Ar^{q+}; O^{q+} + He, Ar \rightarrow O^{q+}; N^{q+} + He \rightarrow N^{q+}$
translational energy spectroscopy
~ 0.3 keV/amu
relative angular distributions
- 90E21 Hülser, H. Campbell, E.E.B. Witte, R. Genger, H. Hertel, I.V.
Observation of rank-4 alignment in near-resonant charge transfer $Na(4D) + K^+ \rightarrow Na^+ + K^+$
Phys. Rev. Letters 64 392 - 395 1990 E
 $K^+ + Na(4D) \rightarrow K^+ + Na^+$
polarized laser excitation
 $1 \times 10^{-2} - 3.8 \times 10^{-2}$ keV/amu
alignment factor
- 90E17 Hird, B. Elrick, B.M. Lacasse, H. Lacasse, J.H. Tune, P.
Bromine-rare gas electron transfer and electron loss cross sections at 15 - 130 keV collision energies.
Phys. Rev. A 41 5217 - 5220 1990 E
 $Br + B \rightarrow Br^+ (B = He, Ne, Ar, Kr, Xe), Br^- (B = Ar, Kr, Xe)$
growth method
0.2 - 1.6 keV/amu
- 90E18 Hoekstra, R. Beijers, J.P.M. Schlatmann, A.R. Morgenstern, R. de Heer, F.J.
State-selective charge transfer in slow collisions of C^{4+} with H and H_2 .
Phys. Rev. A 41 4800 - 4808 1990 E
 $C^{4+} + H, H_2 \rightarrow C^{3+}(3s, 3p, 3d)$
photon spectroscopy
 $5 \times 10^{-2} - 1.3$ keV/amu
retarded beam
- 90E19 Holland, R.F. Cobb, D.D. Maier II, W.B. Clodius, W.B. Oshea, P.G. Bos, R. Froggott, B.C.
Production of N_2^+ first negative emission by impact of 1 MeV H^0, H^+ and H^- on N_2 .
Phys. Rev. A 41 2429 - 2436 1990 E
 $H^- + N_2 \rightarrow H^0$
 10^3 keV/amu
 N_2^+ first negative (0-0), (0-1) band emissions.
- 90E20 Huel, M.A. Champion, R.L. Doverspike, L.D. Wang, Y.
Charge transfer and electron detachment for collisions of H⁺ and D⁺ with H.
Phys. Rev. A 41 4809 - 4815 1990 E
 $H, D + H \rightarrow H, D + H^+; H, D + e + H$
crossed-beam method
 $7 \times 10^{-3} - 0.4$ keV/amu
- 90E22 Jensen, B. Pedersen, E.H.
Electron capture by Mg^+ and Mg^{2+} in slow collisions with Mg or Zn.
J. Phys. B 23 1501 - 1518 1990 E
 $H^+ + Mg \rightarrow H; Mg^+ + Mg \rightarrow Mg + Mg^+; Mg^{2+} + Mg \rightarrow Mg + Mg^{2+}; Mg^+ + Mg^+; Mg^+ + Zn \rightarrow Mg + Zn^+; Mg^{2+} + Zn \rightarrow Mg^+ + Zn^+; Mg + Zn^{2+}; Zn^+ + Zn > Zn^+ + Zn^+$
coincidence technique
3 - 10 keV/amu (H); $4 \times 10^{-2} - 20$ keV/amu (Mg); 0.15 - 7.7 keV/amu
- 90E23 Jogwisch, M. Huber, B.A. Wiesenmann, K.
A spectroscopic study of double electron transfer from Cu to Ar III in an ECR-microwave discharge.
Z. Phys. D 17 171 - 179 1990 E
 $Ar^{2+} + Cu \rightarrow Ar^0(6d[3/2]^0; 8s[3/2]^0)$
photon spectroscopy
thermal energy
cross sections ($10^{-15} - 10^{-14}$ cm²)
- 90E24 Kamber, E.Y. Brenton, A.G. Hughes, S.
State-selective single-electron stripping processes of Ar^{2+} ions in collisions with He and Ar.
J. Phys. B 23 L311 - 316 1990 E
 $Ar^{2+} + He, Ar \rightarrow Ar^{3+}$
translational energy spectroscopy
0.2 keV/amu
dominant contribution of ions in long-lived highly excited states
- 90E63 Kikjani, B.I. Lomsadze, R.A. Mosulishvili, N.O. Gochitashvili, M.R. Lavrov, V.M.
Ionization and charge transfer in collisions of Li^+ with Ar, Ne and He in the energy range 0.5 - 7.0 keV.
Sov. Phys. - JETP 71 51 - 56 1990 E
 $Li^+ + B \rightarrow Li (B = He, Ne, Ar)$
condenser-method
0.07 - 1 keV/amu

- 90E26 Kusakabe, T, Mizumoto, Y, Katsurayama, K, Tawara, H.
Electron capture by C^+ , N^+ and O^+ ions in collisions with H_2 molecules and He atoms at low keV energies.
J. Phys. Soc. Japan 59 1987 - 1994 1990 E
 C^+ , N^+ , O^+ + $He, H_2 \rightarrow C, N, O$
growth method
 $5 \times 10^{-2} - 1$ keV/amu
controlled electron energy ion source used. : contribution of metastable ions.
- 90E25 Kusakabe, T, Yoneda, H, Mizumoto, Y, Katsurayama, K.
Charge transfer cross sections of $^3He^{2+}$ ions in collisions with He atoms and H_2 molecules in the energy range of 1 - 10 keV.
J. Phys. Soc. Japan 59 1218 - 1224 1990 E
 $He^{2+} + B \rightarrow He^+; He$ (B = He, H_2)
growth method
0.33 - 3.3 keV/amu
- 90E27 Kwong, V.H.S, Gibbons, T.T, Fang, Z, Jiang, J, Knocke, H, Jiang, Y, Ruger, B, Huang, S, Braganza, E, Clark, W, Gardner, L.D.
Experimental apparatus for production, cooling and storing multiply charged ions for charge-transfer measurements.
Rev. Sci. Instr. 61 1931 - 1939 1990 E
 $W^{2+} + Ar \rightarrow W^+; N^{2+} + N_2 \rightarrow N^+$
ion-trapping method
thermal energy
rate coefficient
- 90E28 MacAdam, K.B, Gray, L.G, Rolles, R.G.
Projectile n distributions following charge transfer of Ar^+ and Na^+ in a Na Rydberg target.
Phys. Rev. A 42 5269 - 5281 1990 E
 $A^+ + Na(nl) \rightarrow A(n)$ (A = Ar, Na)
laser-excited target + field ionization
- 90E31 Martin, S, Denis, A, Desesquelles, J, Ouerdane, Y.
Rydberg transition emission after multi-electron capture in low-energy collisions of Ar^{q+} with He, Ne and Ar.
Phys. Rev. A 42 6564 - 6569 1990 E
 $Ar^{q+} + B \rightarrow Ar^{r+}$ (r = 7 - 4) (B = He, Ne, Ar)
photon spectroscopy
4.5 keV/amu
transition energies determined

- 90E30 Martin, S, Denis, A, Querdane, Y, Salmoun, A, El Motassadeq, A, Desesquelles, J.
Multi-electron capture in Kr^{18+} collisions with Kr and Ar at low energies by Rydberg transition spectroscopy.
Phys. Rev. Letters 64 2633 - 2636 1990 E
 $Kr^{18+} + B \rightarrow Kr^{(18-q)+}$ (q = 2 - 6; B = Ar, Kr)
photon spectroscopy
4 keV/amu
emission cross sections given
- 90E65 Martínez, H, de Urquidío, J, Cisneros, C, Alvarez, I.
Single and double electron capture of H^+ in SE_0 in the energy range 1 to 5 keV
Phys. Letters A 146 517 - 521 1990 E
 $H^+ + SF_6 \rightarrow H^0, H^+$
1 - 5 keV/amu
angular distributions
- 90E29 Mathur, D, Rajgara, F.A, Badrinathan, C.
State-diagnosed charge stripping in low-energy collisions of ground-state and highly excited N^+ ions with He.
Phys. Rev. A 42 5282 - 5285 1990 E
 $N^+(2p^2 \ ^3P, 2pnl) + He \rightarrow N^{2+}(2p \ ^2P_{1/2}) + He + e$
translational energy spectroscopy
0.14 keV/amu
- 90E32 McLaughlin, T.K, Wilson, S.M, McCullough, R.W, Gilbody, H.B.
State-selective electron capture by 2 - 8 keV O^{2+} recoil ions in H, H_2 and He.
J. Phys. B 23 737 - 744 1990 E
 $O^{2+} + B \rightarrow O^+(nl)$ (B = H, H_2 , He)
translational energy spectroscopy
0.13 - 0.50 keV/amu
no cross section given
- 90E33 Mokler, P.H, Rousch, S, Warczak, A, Stachura, Z, Kambara, T, Müller, A, Schuch, R, Schulz, M.
Single transfer-excitation resonance observed via the two-photon decay in He-like Ge^{30+} .
Phys. Rev. Letters 65 3108 - 3111 1990 E
 $Ge^{30+} + H_2 \rightarrow Ge^{29+}(1s2s \ ^1S_0 - 1s^2 \ ^1S_1)$
photon-photon coincidence technique
 $1.2 \times 10^4 - 1.9 \times 10^4$ keV/amu

- 90E34 Monce, M.N.
Formation of He(3D) by electron capture in collisions of He⁺ with various polyatomic molecules.
Phys. Rev. A 42 2453 - 1990 E
He⁺ + B → He(3D - 2P) (B = H₂, N₂, O₂, CO₂, N₂O, CH₄, C₂H₂, C₂H₄, C₂H₆)
photon spectroscopy
25 - 75 keV/amu
photon-emission cross sections
- 90E35 Nicolai, P. Chaboi, M. Rozet, J.P. Politis, M.F. Chetoui, A. Stephan, C. Touati, A. Vernhet, D. Wohrer, K.
Contribution of intrashell excitation to the l-mixing of excited states of one-electron ions in solids.
J. Phys. B 23 3609 - 3627 1990 E
Kr³⁶⁺ + C, Al, Cu (foil) → Kr²⁹⁺(nl)
photon spectroscopy
3.3x10⁴ keV/amu
- 90E36 Pedersen, E.H. Giese, J.P.
Electron capture by fast protons in Ar : cross sections for capture from the M-shell.
Phys. Rev. A 41 4831 - 4836 1990 E
H⁺ + Ar → H + Arⁿ⁺
recoil-projectile coincidence method
8x10² - 3.5x10³ keV/amu
- 90E37 Posthumus, J.H. Morgenstern, R.
He-like ions colliding on H₂ : an analysis of the 1s²3l3l' electron spectra.
J. Phys. B 23 2293 - 2304 1990 E
N²⁺(1s²), O⁶⁺(1s²) + H₂ → N³⁺(1s²3l3l'), O⁴⁺(1s²3l3l')
Electron spectroscopy
1.7 - 7.7 keV/amu
- 90E38 Poulsen, J. Andersen, T. Cowan, R.D. Dahl, P. Hansen, J.E. Engholm Pedersen, J.
Electron detachment and excitation processes in F-He, Ne collisions : electron and optical emission from excited F and F states.
J. Phys. B 23 457 - 469 1990 E
F⁺ + He, Ne → F
2.6x10⁻² - 0.79 keV/amu
optical emission cross sections given also
- 90E39 Reese, C. Ebel, M.
Occupation of fine structure levels in electron capture of Ar²⁺ ions from various alkali atoms.
J. Phys. B 23 3869 - 3880 1990 E
Ar²⁺ + B → Ar⁺(3p⁴ (1D, 3P) nl) + B⁺ (B = Na, K, Rb, Cs)
photon spectroscopy
5.7x10⁻² - 1.6x10⁻¹ keV/amu
- 90E40 Richter, C. Doweck, D. Houver, J.C. Andersen, N.
Collision spectroscopy with aligned and oriented atoms : III. effects of initial orbital alignment on H⁺-Na(3p) charge transfer.
J. Phys. B 23 3925 - 3932 1990 E
H⁺ + Na(3p) → H(n=2 ; n>3)
translational energy spectroscopy
0.5 - 2 keV/amu
only relative cross sections
- 90E42 Roncin, P. Adjouri, C. Gaboriaud, M.N. Guillemot, L. Barat, M. Andersen, N.
Observation of orientation propensity for electron capture in multiply-charged ion-atom collisions.
Phys. Rev. Letters 65 3261 - 3264 1990 E
B³⁺ + He → B²⁺(2p → 2s)
photon spectroscopy (polarizer)
0.2 - 1.7 keV/amu
- 90E41 Roncin, P. Gaboriaud, M.N. Guillemot, L. Laurent, H. Ohtani, S. Barat, M.
Electron capture by multiply charged ions on a helium target ; a population mechanism for minor channels.
J. Phys. B 23 1215 - 1223 1990 E
C⁴⁺ + He → C³⁺; C⁶⁺ + He → C⁵⁺(nl) ; N⁶⁺ + He → N⁵⁺(nl) ; O⁶⁺ + He → O⁵⁺(nl) ; O⁸⁺ + He → O⁷⁺(nl) ; O⁸⁺ + He → O⁶⁺(n, n')translational energy spectroscopy + recoil ion coincidence
0.5 keV/amu
angular distribution
- 90E43 Sadilek, M. Vancura, J. Farnik, M. Herman, Z.
Beam scattering study of the charged transfer process N²⁺ (He, He⁺) N⁺ at low collision energies.
Int. J. Mass Spectro. Ion Proc. 100 197 - 207 1990 E
N²⁺(²P) + He → N⁺(1D, ³P) + He⁺
~ 10⁻² keV/amu

- 90E44 Sakaue, H.A., Kanai, Y., Ohta, K., Kushima, M., Inaba, T., Ohtani, S., Wakiya, K., Suzuki, H., Takayanagi, T., Kambara, T., Danjo, A., Yoshino, M., Awaysa, Y.
Autoionization of $C^{4+}(2lnl')$ measured by electron spectroscopy in collisions of C^{6+} with He.
J. Phys. B 23 L401 - 405 1990 E
 $C^{6+} + He \rightarrow C^{4+}(2lnl')$
electron spectroscopy
5 keV/amu
- 90E45 Sataka, M., Yagishita, A., Nakai, Y.
Measurements of charge-changing cross sections in collisions of He and He²⁺ and with H₂, O₂, CH₄, CO and CO₂.
J. Phys. B 23 1225 - 1234 1990 E
He + B → He²⁺, He³⁺; He²⁺ + B → He, He²⁺ (B = H₂, O₂, CH₄, CO, CO₂)
growth method
75 - 450 keV/amu
- 90E46 Schauer, M.M., Jefferts, S.R., Dunn, G.H.
Nonresonant charge transfer in the threshold region for $^3He^+ + ^4He^+ \leftrightarrow ^3He + ^4He^+$
Phys. Rev. A 42 5332 - 5337 1990 E
 $^3He^+ + ^4He \leftrightarrow ^3He + ^4He^+$
Penning trap
8 ~ 80 K
rate coefficient rates given
- 90E47 Schultz, D.R., Olson, R.E., Reinhold, C.O., Keiboh, S., Keiboh, C., Schmidt-Böcking, H., Ullrich, J.
Coincident charge state production in $F^{6+} + Ne$ collisions.
J. Phys. B 23 3839 - 3847 1990 E
 $F^{6+} + Ne \rightarrow F^{5+}, F^{4+} + Ne^+$
projectile + recoil coincidence technique
 $5 \times 10^2 - 7.9 \times 10^2$ keV/amu
also $F^{6+} + Ne \rightarrow F^{7+} + Ne^{2+}$
- 90E49 Schweinzer, J., Winter, H.
Single electron capture from alkali atoms by slow doubly charged ions: I. He²⁺ (0.5 - 6 keV)-Li, Na, K-one-electron processes.
J. Phys. B 23 3881 - 3898 1990 E
He²⁺ + B → He⁺(nl) + B⁺ (B = Li, Na, K)
translational energy spectroscopy
0.125 - 1.5 keV/amu
- 90E48 Schweinzer, J., Winter, H.
Single electron capture from alkali atoms by slow doubly charged ions: II. Ne²⁺, Ar²⁺ (0.5 - 6 keV)-Li, Na, K-two-electron processes.
J. Phys. B 23 3899 - 3908 1990 E
Ne²⁺(2p⁴3p, 1D, 3S) + B → Ne⁺{(2p⁴3p, 1D, 3S)nl} : Ar²⁺(3p⁴3p, 1D, 3S) + B → Ar⁺{(3p⁴3p, 1D, 3S)nl} (B = Li, Na, K)
translational energy spectroscopy
 $2.5 \times 10^{-2} - 0.3$ keV/amu (Ne) ; $1.25 \times 10^{-2} - 0.15$ keV/amu (Ar)
- 90E50 Shah, M.B., Gilbody, H.B.
Ionization and electron capture in collisions of H⁺ and He²⁺ ions with carbon monoxide.
J. Phys. B 23 1491 - 1499 1990 E
 $A^{2+} + CO \rightarrow A^{2+,3+} + CO^+$; $C^+ + O, C + O^+, CO^{2+}, C^+ + O^+, C^{2+}; A^{2+} + CO^+, C^+ + O, C + O^+ (A = H, He)$
projectile-recoil coincidence method
10 - 98 keV/amu (H) ; 6.7 - 65 keV/amu (He)
- 90E51 Stolterfoht, N., Swenson, J.K., Havener, C.C., Meyer, F.W.
Electron-correlation effects in double-electron capture collisions of 60 keV C⁶⁺ with He.
Phys. Rev. A 42 5396 - 5405 1990 E
 $C^{6+} + He \rightarrow C^{4+}(nl'n'l')$
zero-degree electron spectroscopy
5 keV/amu
- 90E52 Tawara, H., Tonuma, T., Kumagai, H., Matsuo, T.
Multiply charged carbon ions and their production mechanisms in MeV/amu Ar⁶⁺ (q = 14 - 4) + CH₄ collisions.
Phys. Scripta 42 434 - 438 1990 E
 $Ar^{6+} + CH_4 \rightarrow Ar^{(q+1)+}, Ar^{(q+2)+}, Ar^{(q+3)+}, Ar^{(q+4)+}$
projectile + recoil ion coincidence
 10^3 keV/amu
also multiply charged carbon ion production cross sections given
- 90E53 Tu, S., Church, D.A.
Electron transfer collisions of Be²⁺ with H₂ and Be.
Chem. Phys. Letters 174 301 - 303 1990 E
Be²⁺ + H₂, Be → Be⁺
ion trap technique
thermal energies
rate coefficients at thermal energies

- 90E54 Vermeeren, L., Lieveus, P., Silverans, R.E.
Velocity-dependent neutralization cross sections of Ba^+ ground and metastable states by Na.
Phys. Rev. A 42 3901 - 3906 1990 E
 $Ba^+(5d^2D_{3/2}, 2D_{5/2} 6s) + Na \rightarrow Ba$
laser-pumping technique
- 90E55 Warczak, A., Stachura, Z., Szymanski, A., Stöhliker, Th., Kozhuharov, C., Livingston, A.E., Mokler, P.H., Reusch, S.
Evidence for resonant two-electron capture and excitation in collisions of H-like Ge with Ne.
Phys. Letters A 146 122 - 127 1990 E
 $Ge^{31+} + Ne \rightarrow Ge^{29+}$
X-ray-projectile coincidence technique
4.5 - 11.5x10³ keV/amu
- 90E56 Wilson, S.M., McLaughlin, T.K., McCullough, R.W., Gilbody, H.B.
State-selective electron capture by slow S^{2+} recoil ions in H, H₂ and He.
J. Phys. B 23 1315 - 1323 1990 E
 $S^{2+} + H, H_2, He \rightarrow S^{2+}(nl)$
translational energy spectroscopy
0.075 - 0.28 keV/amu
no cross sections given
- 90E57 Wilson, S.M., McLaughlin, T.K., McCullough, R.W., Gilbody, H.B.
State selective electron capture by slow S^{2+} recoil ions in atomic and molecular hydrogen.
J. Phys. B 23 2969 - 2976 1990 E
 $S^{2+} + H, H_2 \rightarrow S^+(nl)$
translational energy spectroscopy
0.06 - 0.25 keV/amu
no cross section given
- 90E58 Xu, Y., Moran, T.F., Thomas, E.W.
Charge-transfer reactions of ground-state $C^+(^2P)$ and metastable-state $C^+(^4P)$ ions with H₂ molecules.
Phys. Rev. A 41 1408 - 1412 1990 E
 $C^+(^2P, ^4P) + H_2 \rightarrow C^0$
beam attenuation + growth method
8x10⁻⁴ - 4x10⁻² keV/amu
- 90E59 Xu, Y., Thomas, E.W., Moran, T.F.
Charge transfer reactions of ground $O^+(^4S)$ and metastable $O^+(^2D, ^2P)$ ions with H₂ molecules.
J. Phys. B 23 1235 - 1243 1990 E
 $O^+(^4S, ^2D, ^2P) + H_2 \rightarrow O$
10⁻³ - 3x10⁻² keV/amu
metastable state cross sections cross sections.
Zourcos, T.J.M., Bhailla, C.P., Lee, D.H., Richard, P.
Effects of alignment and interference in resonant transfer and excitation for F^{6+} and O^{3+} collisions with H₂ in zero-degree Auger measurements.
Phys. Rev. A 42 678 - 681 1990 E
 $F^{6+} + H_2 \rightarrow F^{3+}$; $O^{3+} + H_2 \rightarrow O^{4+}$
zero-degree electron spectroscopy
250 - 2000 keV/amu
- 90T45 Abramov, D.I., Ovchinnikov, S.Y., Solovev, E.A.
Quasi classical expression for parameters which determine non adiabatic transitions in a Z_1eZ_2 basis
Phys. Rev. A 42 6366 - 6378 1990 T
general formalism
adiabatic approx.
- 90T 1 Allan, R.J., Courbin, C., Salas, P., Wannan, P.
State-selective effects in the differential cross section for electron capture from laser-excited sodium atoms by protons.
J. Phys. B 23 L461 - 466 1990 T
 $H^- + Na(3p) \rightarrow H(nl=2p)$
MO + CTMC
5x10⁻² - 1 keV/amu
- 90T 2 Almeida, D.P., Langford, M.L.
Double electron capture in a Landau-Zener model : a reaction window.
Int. J. Mass Spectro. Ion Proc. 96 331 - 339 1990 T
 $F^+ + Ne, Ar \rightarrow F^0$; $O^+ + Ar \rightarrow O^0$; $I^+ + Mg \rightarrow I^0$; $C^{4+} + He \rightarrow C^{2+}$
Landau-Zener model
- 90T41 Ast, H., Lucide, H.J., Dreizler, R.M.
Optical potentials in ion-atom collisions: II. effective one-electron systems.
J. Phys. B 23 2305 - 2320 1990 T
 $H(1s) + B \rightarrow H(2s, 2p), H^+$ (B = He, Ne, Ar); $H(2s) + B \rightarrow H^+, H(nl)$
truncated coupled-channel calculations
1 - 10² keV/amu

- 90T 4 Avakov, G.U. Ashurov, A.R. Blokhinisev, L.D. Kadyrov, A.S. Mukhamedzhanov, A.M. Poleyayeva, M.V.
Three-body approach to the atomic reactions of electron transfer II. calculation of total cross sections.
J. Phys. B 23 4151 - 4164 1990 T
 $\text{H}^+ + \text{H}(1s), \text{He}(1s^2) \rightarrow \text{H}(nlm) ; \text{He}^{2+} + \text{H}(1s) \rightarrow \text{He}^+(nlm)$
Fadeev three-body approach
 $0.1 - 10^3 \text{ keV/amu (H}^+); 0.1 - 10^2 \text{ keV/amu (He}^{2+})$
- 90T 3 Avakov, G.V. Ashurov, A.R. Blokhinisev, L.D. Mukhamedzhanov, A.M. Poleyayeva, M.V.
Three-body approach to the atomic reactions of electron transfer I. theory.
J. Phys. B 23 2309 - 2326 1990 T
Alt-Grassberger-Sandhas three-body equations
- 90T 5 Badnell, N.R.
L-shell resonant transfer and excitation in niobium ions.
Phys. Rev. A 42 204 - 208 1990 T
 $\text{Nb}^{38+} + \text{H}_2 \rightarrow \text{Nb}^{(q-1)+} + \text{H} \quad (q = 28 - 32)$
impulse approx.
 $1.5 \times 10^3 - 15 \times 10^3 \text{ keV/amu}$
- 90T 6 Badnell, N.R.
K-shell resonant transfer excitation and excitation in calcium ions.
Phys. Rev. A 42 209 - 213 1990 T
 $\text{Ca}^{18+}(q = 10 - 12, 16 - 19) + \text{H}_2 \rightarrow \text{Ca}^{(q-1)+}$
impulse approx.
 $9 \times 10^3 - 19 \times 10^3 \text{ keV/amu}$
- 90T 7 Badnell, N.R.
Anisotropic radiative emission effects on deduced resonant-transfer-excitation cross sections.
Phys. Rev. A 42 3795 - 3800 1990 T
hyperfine structure effect on anisotropic radiation
- 90T 8 Baer, M. Ng, C.Y.
A three-dimensional quantum mechanical study of the $\text{H}_2 + \text{H}_2^+$ system : calculation of reactive and charge transfer cross sections.
J. Chem. Phys. 93 7787 - 7799 1990 T
 $\text{H}_2^+(v=0) + \text{H}_2(v=0) \rightarrow \text{H}_2 + \text{H}_2^+$
Infinite order sudden approx. (IOSA)
 $1.25 \times 10^{-4} - 2.5 \times 10^{-4} \text{ keV/amu}$

- 90T46 Barany, A.
Barrier model describing collisions of highly charged ions
Phys. Scripta 42 280 - 284 1990 T
general review
- 90T42 Barrachina, R.O.
Collisional electron capture to the continuum of neutral projectiles.
J. Phys. B 23 2321 - 2332 1990 T
 $\text{He} + \text{B} \rightarrow (\text{He} + e) + \text{B}^+$
ab initio calculation
75 keV/amu
narrower than He^+
- 90T47 Belkic, D. Mancav, I.
Single electron capture from carbon by completely stripped projectiles
Phys. Scripta 42 285 - 292 1990 T
 $\text{A}^{Z+} + \text{C} \rightarrow \text{A}^{(Z-1)+}(nl) + \text{C}^+(\text{K}^{-1})$
CBI
 $150 - 2.0 \times 10^4 \text{ keV/amu (H)} ; 75 - 2250 \text{ keV/amu (He)} ; 100 - 3000 \text{ keV/amu (Li)}$
- 90T43 Bhailla, C.P.
Angular distribution of Auger electrons and photons in resonant transfer and excitation in collisions of ions with light targets.
Phys. Rev. Letters 64 1103 - 1106 1990 T
 $\text{F}^{8+} + \text{H}_2 \rightarrow \text{F}^{7+}(2p^2 \text{ } ^1\text{D})$
 $1 \times 10^3 \text{ keV/amu}$
non-isotropic distributions of Auger electrons and photons
- 90T 9 Chen, M.H.
Resonant transfer and excitation in collisions of Ca^{18+} with H_2 and He targets.
Phys. Rev. A 42 5228 - 5231 1990 T
 $\text{Ca}^{18+}(q = 16 - 19) + \text{B} \rightarrow \text{Ca}^{(q-1)+}(\text{B} = \text{H}_2, \text{He})$
Impulse approximation with MCDF
 $3.5 \times 10^3 - 10^4 \text{ keV/amu}$
- 90T10 Courbin, C. Allan, R.J. Salas, P. Wahnon, P.
Total and differential charge transfer cross sections in $\text{H}^+ + \text{Na}(3s)$ or $\text{Na}^+(3p)$ collisions.
J. Phys. B 23 3909 - 3924 1990 T
 $\text{H}^+ + \text{Na}(3s, 3p) \rightarrow \text{H}(n=2) + \text{Na}^+$
MO
 $0.5 - 5 \text{ keV/amu}$

- 90T11 Crothers, D.S.F. Kunseath, K.M.
Target continuum distorted-wave theory for collisions of fast protons with atomic hydrogen.
J. Phys. B 23 L365 - 371 1990 T
 $H^+ + H \rightarrow H + H^+$
 5×10^3 keV/amu
differential cross sections
- 90T12 Datta, S.K. Crothers, D.S.F. McCarroll, R.
The relation between the Coulomb-Born and the boundary-corrected first-order Born approximations for electron capture.
J. Phys. B 23 479 - 493 1990 T
 $H^+ + Ne \rightarrow H + Ne^+(K^{-1})$
Coulomb-Born, boundary-corrected Born
 $10^3 - 6 \times 10^3$ keV/amu
- 90T13 Decker, F.
Second Born approximation for relativistic electron capture : exact Monte Carlo calculations for C^{6+} -Au and Ar^{18+} -Ag collisions.
Phys. Rev. A 41 6552 - 6554 1990 T
 $C^{6+} + Au \rightarrow C^{3+}(1s) + Au^+(K)$; $Ar^{18+} + Ag \rightarrow Ar^{17+}(1s) + Ag^+(K)$
second OBK approx.
 $4 \times 10^3, 1 \times 10^6$ keV/amu (Ar)
- 90T14 Dube, L.J. Mensour, B. Dewangan, D.P. Chakraborty, H.S.
Comment on the analytic evaluation of the BIB cross sections.
J. Phys. B 23 L711 - 714 1990 T
analytic evaluation of 1s-1s electron transfer
- 90T15 Erea, L.F. Mendez, L. Riera, A.
Modified molecular treatment of $He^+ + H^+$ collisions up to $v=2.5$ a.u.
Europhys. Letters 13 43 - 48 1990 T
 $He^+ + H^+ \rightarrow He^{2+} + H$; $He^{2+} + H^+ + e$
MO
5 - 150 keV/amu
- 90T16 Fritsch, W. Kimura, M. Lane, N.F.
Comparative molecular-orbital and atomic-orbital study of electron transfer and excitation in $He^+ + Na(3s)$ collisions at energies of 0.05 to 20 keV/amu.
Phys. Rev. A 41 508 - 511 1990 T
 $He^+ + Na(3s) \rightarrow$
AO, MO
0.05 - 20 keV/amu
also excitation to 3p state studied
- 90T17 Fritsch, W. Tawara, H.
Calculation of electron transfer cross sections in $Si^{16+} + H$ ($q = 4 - 14$) collisions at energies of 0.5 - 14 keV/amu.
Nucl. Fusion 30 373 - 382 1990 T
 $Si^{16+} + H \rightarrow Si^{(q-1)+}(nl)$ ($q = 4, 6, 7-14$)
AO
0.5 - 14 keV/amu
 $n=6$ dominant
- 90T18 Furlan, R.J. Russek, A.
Electron excitation in collisions of H_2^+ on He.
Phys. Rev. A 42 6436 - 6442 1990 T
 $H_2^+(1\sigma_g) + He(1s^2) \rightarrow H_2(1\sigma_g^2) + He^+(1s)$; $H_2(1\sigma_g, 1\sigma_u) + He^+(1s)$
MO
0.2 - 6 keV/amu
- 90T19 Gargaud, M. McCarroll, R. Lennon, M.A. Wilson, S.M. McCullough, R.W. Gilbody, H.B.
One-electron capture by slow Al^{2+} ions in atomic and molecular hydrogen.
J. Phys. B 23 505 - 511 1990 T
 $Al^{2+} + H, H_2 \rightarrow Al^+(total)$
E : recoil ions from vapor ; T : MO
0.01 - 2 keV/amu
- 90T20 Ghanurco, F.A. Palma, A. Sempirini, E. Stefani, F. Baer, M.
Coupled quantum treatment of vibrationally inelastic and vibronic charge transfer in proton- O_2 collisions.
Phys. Rev. A 42 3926 - 3939 1990 T
 $H^+ + O_2 \rightarrow H + O_2^+(v)$
infinite-order sudden approx.
 2.3×10^2 keV/amu

- 90T21 Grozdanov, T.P. Solovov, E.A.
Charge exchange, excitation and ionization via hidden avoided crossings.
Phys. Rev. A 42 2703 - 2718 1990 T
 $\text{He}^{2+} + \text{H}(1s) \rightarrow \text{He}^+ + \text{H}^+$; $\text{H}^+ + \text{He}^+(1s) \rightarrow \text{H} + \text{He}^{2+}$
asymptotic theory (nonadiabatic transition)
0.2 - 2.5 keV/amu
also ionization, excitation cross sections given
- 90T22 Hahn, Y. Dalgarno, A.
Production of negative hydrogen ions in neutral H + H collisions.
Phys. Rev. A 41 4783 - 4790 1990 T
 $\text{H}(1s) + \text{H}(1s) \rightarrow \text{H}^+ + \text{H}^-$; $\text{H}(2s) + \text{H}(1s) \rightarrow \text{H}^+ + \text{H}^-$
distorted wave theory
0.2 - 2×10^2 keV/amu
- 90T23 Hansen, J.P. Kocbach, L. Dubois, A. Nielsen, S.E.
Orientation and alignment effects for capture in multiply charged ion-atom collisions.
Phys. Rev. Letters 64 2491 - 2494 1990 T
 $\text{B}^{3+}(1s^2) + \text{He} \rightarrow \text{B}^{2+}(1s^2 2p)$
coupled-channel calculation
0.25 - 625 keV/amu
capture probability, orientation parameter, alignment angle as a function of impact parameter and of velocity.
- 90T24 Harel, C. Jouin, H.
Autoionizing double capture in N^{7+} on helium collisions at low energies.
Europhys. Letters 11 121 - 126 1990 T
 $\text{N}^{7+} + \text{He}(1s^2) \rightarrow \text{N}^{6+}(\text{nl}) + \text{He}^+(1s)$; $\text{N}^{3+}(\text{n'l}, \text{n}^{\prime\prime\prime}) + \text{He}^{2+}$
MO
0.72 - 4.6 keV/amu
- 90T25 Jakubassa-Amundsen, D.H.
Relativistic second-order Born theory for electron capture.
Phys. Rev. A 42 653 - 654 1990 T
semiclassical theory
- 90T26 Kumar, A. Lane, N.F. Kimura, M.
Selective-state charge transfer in a collision between an alpha particle and ground-state Na: a molecular-state approach.
Phys. Rev. A 42 3861 - 3864 1990 T
 $\text{He}^{2+} + \text{Na} \rightarrow \text{He}^+(\text{n} = 3) + \text{Na}^+$
semiclassical IP with MO
0.1 - 10 keV/amu
- 90T27 Luc-Koenig, E. Bauche, J.
Radiative and non-radiative decays of doubly-excited configurations in Ar^{r+} spectrum.
J. Phys. 23 1763 - 1782 1990 T
 $\text{Ar}^{r+} \rightarrow \text{Ar}^{r+}(1s^2 2s^2 2p^n \text{nl} \text{n'l}'; 1s^2 2s^2 2p^n \text{nl} \text{n'l}')$
configuration-average method
energy level, wave length, radiative, non-radiative transition probabilities
- 90T48 Macek, J.H. Barrachina, R.O.
Born expansions and charged particle scattering
Comm. At. Mol. Phys. 24 287 - 297 1990 T
higher order terms in Born expansions
- 90T28 Mandal, C.R. Mandal, M. Mukherjee, S.C.
K-shell capture by He^{2+} and Li^{3+} on carbon and neon.
Phys. Rev. A 42 1803 - 1805 1990 T
 $\text{He}^{2+} + \text{B} \rightarrow \text{He}^+(1s, 2s, 2p, \text{total}) + \text{B}^-(\text{K}^-)$; $\text{Li}^{3+} + \text{B} \rightarrow \text{Li}^{2+}(1s, 2s, 2p, \text{total}) + \text{B}^-(\text{K}^-)$ (B=C, Ne)
peaking impulse approx.
 $25 - 10^3$ keV/amu (He); $1.1 \times 10^3 - 3 \times 10^3$ keV/amu (Li)
- 90T29 Martinez, A.E. Rivarola, R.D.
Second-order distorted-wave approximations for charge exchange.
J. Phys. B 23 4165 - 4180 1990 T
 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(1s) + \text{H}^+$; $\text{H}^+ + \text{Ar}(1s) \rightarrow \text{H}(1s) + \text{Ar}^+$
second-order CDW-EISA
 5×10^3 keV/amu (H); $10^3 - 2 \times 10^4$ keV/amu (Ar)
- 90T30 Mendez, L. Cooper, I.L. Dickinson, A.S. Mo, O. Riera, A.
Molecular treatment of mutual neutralization in slow $\text{Li}^+ + \text{H}^+$ collisions.
J. Phys. B 23 2797 - 2810 1990 T
 $\text{Li}^+ + \text{H} \rightarrow \text{Li}(1s^2 \text{nl}) + \text{H}(1s)$ (nl = 2s, 2p, 3s)
MO

- 90T31 Meng, L. Reinhold, C.O. Olson, R.E.
Subshell electron capture in collisions of fully stripped ions with He and H₂ at intermediate energies.
Phys. Rev. A 42 5286 - 5291 1990 T
A^{Z+} + He, H₂ → A^{Z-1+}(nl) (A = H, He, Li, C, O, Ne, Si, P)
CTMC
20 - 2x10³ keV/amu
- 90T32 Mo, O. Riera, A.
Charge exchange in He⁺ + Na(3p) collisions.
J. Phys. B 23 L373 - 377 1990 T
He⁺ + Na(3p) → He + Na⁺
MC
0.2 - 1 keV/amu
- 90T33 Nielsen, S.E. Hansen, J.P. Dubois, A.
Propensity rules for orientation in singly charged ion-atom collisions.
J. Phys. B 23 2595 - 2612 1990 T
H⁺ + Na(3s,3p) → H(2s,2p)
AO + IP with ETF
0.25 - 225 keV/amu
- 90T34 Pascale, I. Olson, R.E. Reinhold, C.O.
State-selective capture in collisions between ions and ground- and excited state alkali metal atoms.
Phys. Rev. A 42 5305 - 5314 1990 T
Na⁺ + Na(28d) → Na(nlm) ; N⁺, Arⁿ⁺ + Cs(6s) → N⁺(nlm), Arⁿ⁺(nlm)
CTMC
- 90T35 Schmidt, A. Horbatsch, M. Dreizler, R.M.
Semiclassical phase space description of ionization and capture for ions colliding with hydrogen-like targets.
J. Phys. B 23 2327 - 2340 1990 T
H⁺ + B → H + B⁺; H⁺ + B⁺ + e (B = H, He, Li²⁺) ; A^Z + H → A^{Z-1+} + H ; A^{Z+} + H⁺ + e (A = He, Li, C, Ne) : Li³⁺ + Li⁴⁺ → Li²⁺ + Li³⁺ ; Li³⁺ + Li³⁺ + e
semiclassical calculation
10 - 10³ keV/amu
- 90T36 Shingal, R. Bransden, B.H.
Neutralization in H⁺ + H and ion pair production in H + H collisions.
J. Phys. B 23 1203 - 1214 1990 T
H⁺ + H → H + H ; H + H → H⁺ + H⁻
coupled-channel calculation
0.15 - 50 keV/amu
- 90T37 Sliim, H.A. Heck, E.L. Bransden, B.H. Flower, D.R.
Calculated cross sections for electron capture by protons from helium into the H(n=3) level.
J. Phys. B 23 L611 - 617 1990 T
H⁺ + He → H(n=3)
semiclassical impact parameter method with AO
0.02 - 0.15 keV/amu
- 90T49 Stary, C. Lüftlde, H.J. Dreizler, R.M.
Optical, potential description of collisions of p and anti-p with alkali atoms
J. Phys. B 23 263 - 277 1990 T
p, anti-p + Na(3s) ; Li(2s) → Na(3l), Na⁺ ; Li(2p), Li⁺
Optical potential approach
1 - 10⁴ keV/amu
- 90T38 Stoddeu, C.D. Monkhorst, H.J. Szalowicz, K.
Muon reactivation in muon-catalyzed d-t fusion from accurate p-He⁺ stripping and excitation cross sections.
Phys. Rev. A 41 1281 - 1292 1990 T
H⁺ + He⁺ → H + He²⁺
Sturmian method
70 - 3x10³ keV/amu
- 90T44 Szotter, L.
Comment on observation of electron capture into continuum states of neutral atoms.
Phys. Rev. Letters 64 2835 1990 T
general comments
- 90T39 Taubjerg, K. Barrachina, R.O. Macek, J.H.
Perturbation theory for strongly interacting atomic system.
Phys. Rev. A 41 207 - 219 1990 T
H⁺ + Ar → H⁰ + Ar^{+(K)}
Strong potential Born approx.
10³ - 2x10⁴ keV/amu

90T40

Toshima, N. Eichler, J.

Distorted-wave approximations for relativistic atomic collisions.

Phys. Rev. A 41 5221 - 5224 1990 T

$H^+ + H \rightarrow H(1s) ; U^{92+} + U^{91+} \rightarrow U^{91+}(1s)$

distorted-wave approx.

10^2 keV/amu (H^+) ; 5×10^5 keV/amu (U^{92+})

spin flip cross sections given

- 91E.1 Andersson, L.R. Cederquist, H. Barany, A. Liljeby, L. Biedermaier, C. Levin, J.C. Keller, N. Elston, S.B. Gibbons, J.P. Kimura, K. Sellin, I.A. Simultaneous single-electron capture and projectile-core excitation enhanced through configuration interaction in very slow Ar^{6+} -He collisions. Phys. Rev. A 43 4075 - 4078 1991 E
 $Ar^{6+} + He \rightarrow Ar^{5+}(3s^2 4s, 3s^2 4p, 3s 3p 3d)$
 E : position-sensitive method ; T : multichannel Landau-Zener model
 1.6×10^{-3} - 1.3×10^{-2} keV/amu
 angular distribution
- 91E.2 Atan, H. Steckelmacher, W. Lucas, M.W. Single electron loss and single electron capture for 0.6 - 2.2 MeV colliding with rare gases. J. Phys. B 24 2559 - 2569 1991 E
 $He^+ + B \rightarrow He^{2+}, He^0$ (B = He, Ne, Ar)
 growth method
 125 - 550 keV/amu
- 91E.3 Aumayr, F. Gieler, M. Unterreiter, E. Winter, H. State-selective electron capture by He^{2+} ions from laser-excited $Na^*(3p)$. Europhys. Letters 16 557 - 561 1991 E
 $He^{2+} + Na(3p) \rightarrow He^+(n=4,5)$; $He^{2+} + Na(3s) \rightarrow He^+(n=3)$
 translational energy spectroscopy
 1.5 keV/amu
- 91E.4 Belyaev, V.A. Dubrovin, M.M. Khlopkin, A.N. Measurement of the effective charge exchange cross section of hydrogen atoms on triply charged carbon ions. Sov. J. Plasma Phys. 17 337 - 341 1991 E
 $C^{3+} + H \rightarrow C^{2+}$
 merged-beam method
 1.5×10^{-3} - 0.7 keV/amu
- 91E.5 Bernstein, E.M. Kanal, A. Zaharakis, K.E. Clark, M.W. Tamis, J.A. Ferguson, S.M. Badnell, N.R. Resonant transfer excitation in collisions of F^{6+} and Mg^{6+} with H_2 . Phys. Rev. A 44 4210 - 4214 1991 E
 $F^{6+}, Mg^{6+}(1s^2 2s) + H_2 \rightarrow F^{5+}, Mg^{5+}(1s^2 n l \Gamma')$
 X-ray-particle coincidence technique
 1.90×10^2 - 2×10^3 keV/amu (F) ; 1.3×10^3 - 2.5×10^3 keV/amu (Mg)
- 91E.58 Bochkova, O.P. Ivakin, I.A. Kuligin, A.V. Ostrovskii, V.N. Tolmachev, Yu.A. Charge exchange with ion excitation in the $He^+ - Cd$ system Opt. Spectrosc. (USSR) 70 9 - 13 1991 E
 $He^+ + Cd \rightarrow He + Cd^*(nl ; n=5-10)$; $He^+(2s) + Cd^*(5s5p \ ^1P_1) \rightarrow Cd^{2+}(7l, 10l)$
 E : pulsed electron beam technique ; T : Mo model
 thermal velocities
 rate coefficients
- 91E.6 Boujdema, M. Cornille, M. Dubau, J. Moretto-Cappelle, P. Bordenave-Montesquieu, A. Beroit-Catin, P. Gleizes, A. Investigation of double capture in $Ne^{8+} + He, H_2$ by electron spectroscopy at 80 keV II. experimental results. J. Phys. B 24 1713 - 1737 1991 E
 $Ne^{8+}(1s^2) + He, H_2 \rightarrow Ne^{6+}(1s^2 3l n l' ; 1s^2 4l n l')$
 electron spectroscopy
 4 keV/amu
- 91E.7 Campbell, E.E.B. Witte, R. Hertel, I.V. Integral alignment of $Na(3p)$ in resonant charge transfer collisions. J. Phys. B 24 4245 - 4247 1991 E
 $Na^+ + Na(3p) \rightarrow Na(3p\sigma, \pi, \pi')$
 laser-excited technique
 4×10^{-3} - 1×10^{-1} keV/amu
 relative cross section
- 91E.59 Cederquist, H. Barany, A. Absolute experimental and model cross sections for slow ions of very high charge colliding with He Phys. Scripta T30 94 - 100 1991 E
 a review/modified classical over-barrier model
- 91E.8 Cederquist, H. Transfer excitation in slow collisions between ions of very high charge and two-electron targets. Phys. Rev. A 43 2306 - 2310 1991 E
 $Xe^{6+}(q = 10 - 31) + He \rightarrow Xe^{(q-1)+} + He^{2+}$; $Xe^{6+ 2h} + He^{2+}$
 E : growth method ; T : extended over-barrier model
 $3 \times 10^{-2} \times q$ (keV/amu)

- 91E9 Cederquist, H.
Radiative stabilization following transfer of two electrons to Xe^{n+} (qS35) in slow collisions with He and Xe.
Z. Phys. D 21 S99 - 104 1991 E
review
- 91E12 Cheng, S. Cocke, C.L. Frohne, V. Kamber, E.Y. Varghese, S.L.
Electron capture by O^{2+} from aligned molecular deuterium.
Nucl. Instr. Meth. in Phys. Res. B 56/57 78 - 81 1991 E
 $O^{2+} + D_2 \rightarrow O^{2+}$
recoil-ion-projectile ion coincidence technique
625 keV/amu
- 91E11 Cherkani, C.H. Sz%u#lu#cs, S. Hus, H. Brouillard, F.
Transfer ionization in He^{2+} - H⁻ collisions: measurements of the exothermicity and theoretical interpretation.
J. Phys. B 24 2367 - 2377 1991 E
 $He^{2+} + H^- \rightarrow He^+ + H^+ + e$
E. merged beam technique; T. semiclassical calculation
single electron capture at large theta + resonant Penning ionization at small theta.
- 91E10 Cherkani, M.H. Szics, S. Terno, M. Hus, H. Brouillard, F.
Transfer ionization in He^{2+} - H⁻ collisions : cross section measurements in the energy range 0.2 - 1300 eV.
J. Phys. B 24 209 - 218 1991 E
 $He^{2+} + H^- \rightarrow He^+ + H^+ + e$
merged beam technique with coincidence
 5×10^{-3} - 0.4 keV/amu
- 91E13 Cline, R.A. Westerveld, W.B. Rislley, J.S.
Measurement of electron-transfer cross sections for intermediate-energy H⁺ - He collisions.
Phys. Rev. A 43 1611 - 1613 1991 E
 $H^+ + He \rightarrow H(3l) + He^+$
photon spectroscopy
25 - 100 keV/amu
- 91E14 Cornille, M. Ludac, T. Hitz, D. Bliman, S. Heckman, G.A. Knystautas, E.J.
Spectroscopic study of low-velocity charge-exchange collisions of S^{n+} ions with H₂ and He targets.
Phys. Rev. A 43 115 - 120 1991 E
 $S^{n+} + H_2, He \rightarrow S^{(n-1)+}, S^{(n-2)+}(nl)$
photon spectroscopy
2 keV/amu
no absolute cross sections
- 91E60 Dhuitcq, D. Benoit, C.
Vibrational excitation in proton-hydrogen collisions at medium energies
J. Phys. B 24 3599 - 3611 1991 E
 $H^+ + H_2(X^1\Sigma_g^-, v=0) \rightarrow H^+ + H_2(X^1\Sigma_g^+, v)$; $H + H_2^+$
translational energy spectroscopy
0.09 - 1.0 keV/amu
angular distributions
- 91E15 Donnelly, A. Geddes, J. Gilbody, H.B.
Balmer alpha emission in collisions of H⁺, He⁺ and He²⁺ with hydrogen atoms.
J. Phys. B 24 165 - 172 1991 E
 $H^+, He^+, He^{2+} + H \rightarrow H$ (Balmer-alpha)
crossed-beam method
 $2.5 - 10^2$ keV/amu
charge transfer is important at low H⁺ + H collisions.
- 91E16 Donnelly, A. Geddes, J. Gilbody, H.B.
Balmer alpha emission in collisions of He⁺ and He²⁺ ions with hydrogen.
J. Phys. B 24 3403 - 3408 1991 E
 $He^+, He^{2+} + H_2 \rightarrow H^+(n = 3 \rightarrow 2)$
 $2.5 - 25$ keV/amu (He⁺); $17 - 67$ keV/amu (He²⁺)
dissociative electron capture
- 91E17 Doweik, D. Houwer, J.C. Richter, C. Andersen, N.
Collision spectroscopy with aligned and oriented atoms IV. neutralization in H - Na(3s,3p) collisions.
Z. Phys. D 18 231 - 234 1991 E
 $H + Na(3s,3p) \rightarrow H$
translational energy spectroscopy + laser excitation
0.15 - 1.5 keV/amu

- 91E18 Dupeyrat, G. Marquette, J.B. Rowe, B.R. Rebrton, C.
Reactions of $Ar^{2+}(^3P)$ ions with some neutrals at 30K.
Int. J. Mass Spectro. Ion Proc. 103 149 - 156 1991 E
 $Ar^{2+}(^3P) + B \rightarrow Ar^+ (B = He, Ar, H_2, N_2, O_2, CO_2)$
30K
rate coefficients at 30K.
- 91E19 Gao, R.S. Johnson, L.K. Smith, G.J. Hakes, C.L. Smith, K.A. Lane, N.F. Stebbings, R.F. Kimura, M.
Collisions between H^+ and H_2 at kilo-electron-volt energies: absolute differential cross sections for small-angle direct, single- and double-charge-transfer scattering.
Phys. Rev. A 44 5599 - 5604 1991 E
 $H^+ + H_2 \rightarrow H, H^+$
E: scattering experiment; T: MO model
0.5, 1.5, 5.0 keV/amu
angular distribution
- 91E22 Gieler, M. Aumayr, F. Hutteneder, M. Winter, H.
Laser enhanced L α emission from (50eV - 15 keV) H^+ - Na collisions.
J. Phys. B 24 4419 - 4429 1991 E
 $H^+ + Na(3s, 3p) \rightarrow H^*(2p, 2s \rightarrow 1s)$
photon-spectroscopy + laser-excitation
0.05 - 15 keV/amu
- 91E20 Gieler, M. Aumayr, F. Ziegelwanger, P. Winter, H. Fritsch, W.
L α emission from (0.1 - 20 keV) H^+ impact on Li, Na and K.
Phys. Rev. A 43 127 - 133 1991 E
 $H^+, D^+ + B \rightarrow H, D(2p\text{-Lyman-alpha}) (B = Li, Na, K)$
photon spectroscopy
0.1 - 20 keV/amu
- 91E21 Gieler, M. Ziegelwanger, P. Aumayr, F. Winter, H. Fritsch, W.
Experimental and theoretical investigation of electron capture and target excitation in (1 - 20 keV) H^+ - K collisions.
J. Phys. B 24 647 - 655 1991 E
 $H^+ + K(4s) \rightarrow H + K^+; H^+ + K^+(4p \rightarrow 4s)$
growth + photon spectroscopy
1 - 20 keV/amu
- 91E61 Gord, J.R. Freiser, B.S. Buckner, S.W.
Kinetic energy release in thermal ion-molecule reactions: the Nb^{2+} (benzene) single charge transfer reaction
J. Chem. Phys. 94 4282 - 4290 1991 E
 $Nb^+ + C_6H_6 \rightarrow Nb^+$
Fourier transform ion cyclotron resonance method
rate coefficient at thermal velocities
- 91E23 Hansen, S.B. Gray, L.G. Hordal-Pedersen, E. McAdam, K.B.
Velocity dependence of total charge transfer from state-selected Na Rydberg targets.
J. Phys. B 24 L315 - 320 1991 E
 $Na^+ + Na(n, l) \rightarrow Na(n'l'm') + Na^+(n' = 22 - 41)$
laser-excited target
relative cross sections
- 91E24 Higgins, M.J. Latimer, C.J.
The production of highly excited xenon atoms in charge exchange collisions.
J. Phys. B 24 2571 - 2578 1991 E
 $Xe^+ + B \rightarrow Xe^*(n=24-43) + B^+ (B = He, Ne, Ar, CH_4); H^+ + Ne \rightarrow H^*(n=24-43)$
field-ionization technique
- 91E62 Hippler, R. Plotzke, O. Harbich, W. Madeheim, H. Kleinpoppen, H. Lutz, H.O.
Electron dipole moments of $H(n=2)$ induced in H^+ - He and H - He collisions
Phys. Rev. A 43 2587 - 1991 E
 $H^+ + He \rightarrow H(n=2)$
Lyman-alpha spectroscopy/quenching by external field
5 - 25 keV/amu
 $H + He \rightarrow H(n=2)$
- 91E25 Hoekstra, R. de Heer, F.J. Morgenstern, R.
State-selective electron capture in collisions of He^{2+} with H .
J. Phys. B 24 4025 - 4048 1991 E
 $He^{2+} + H \rightarrow He^+(2p \rightarrow 1s; 3p \rightarrow 1s; 4p \rightarrow 1s; n=3 \rightarrow 2; 4 \rightarrow 3; n=4s, 4p, 4d)$
2 - 13 keV/amu
- 91E26 Hoekstra, R. de Heer, F.J. Morgenstern, R.
Photons shedding light upon basic charge exchange processes.
Z. Phys. D 21 S81 - 85 1991 E
review

- 91E27 Holt, R.A. Prior, M.H. Randall, K.L. Hutton, R. McDonald, J. Schneider, D.
Magnetic substrates populated by double-electron capture.
Phys. Rev. A 43 607 - 610 1991 E
 $C^{5+} + He \rightarrow C^{3+}(1s2l^2 1L) \rightarrow C^{4+}(1s^2) + e$
electron spectroscopy
1.5 - 5 keV/amu
relative population among L
- 91E28 Hopkins, C.J. Dunn, K.F. Gilbody, H.B.
Ionization and charge transfer in collisions of protons with Ba^+ and Sr^+ ions.
J. Phys. B 24 2379 - 2385 1991 E
 $H^+ + B^+ \rightarrow H + B^{2+}; H^+ + B^{2+} + e (B = Ba^+, Sr^+)$
crossed beam method
50 - 500 keV/amu
- 91E29 Hughes, I.G. Dunn, K.F. Gilbody, H.B.
Electron capture in $H^+ - Ti^+$ collisions.
J. Phys. B 24 L485 - 487 1991 E
 $H^+ + Ti^+ \rightarrow H + Ti^{2+} + (n-2)e (n \geq 2)$
crossed-beam technique
 $2 \times 10^2 - 5 \times 10^2$ keV/amu
dominant transfer ionization
- 91E30 Hultsitz, H.P., Reiberg, B., Meyerhof, W.E., Balloev, A., Alonso, J.R., Blumentfeld, L., Dillard, B.A., Gould, H., Guardala, N., Kricha, C.F., Mofslaha, M.A., Rabadan-Brown, M.E., Ruda, R.S., Schweppke, J., Spooner, D.W., Suresh, K., Thibergot, P., Wagner, H.E.
Electron-electron interaction in projectile electron loss.
Phys. Rev. A 44 1712 - 1724 1991 E
 $Li^{2+}, C^{3+}, O^{7+} + H_2, He \rightarrow Li^{3+}, C^{6+}, O^{8+}; Au^{32+}, Au^{73+} + B \rightarrow Au^{53+}, Au^{76+} (B = H_2, He, C, N_2); U^{86+}, U^{90+} + H_2, He \rightarrow U^{87+}, U^{91+}$
 $7.5 \times 10^2 - 4 \times 10^3$ keV/amu
- 91E31 Hutton, R. Schneider, D. Prior, M.H.
Isoelectronic study of double-electron capture in slow ion-atom collisions.
Phys. Rev. A 44 243 - 252 1991 E
 $Si^{12+}, Ar^{16+}, Sc^{12+}, Ti^{13+}, Fe^{17+}, Cu^{20+} + He \rightarrow Si^{13+}, Ar^{17+}, Sc^{10+}, Ti^{11+}, Fe^{15+}, Cu^{18+}$
Auger-electron spectroscopy
1.4 keV/amu
Auger electron spectra; no cross section given
- 91E32 Irvine, A.D. Latimer, C.J.
Charge transfer reactions of ground state O^+ ions with H_2 molecules.
J. Phys. B 24 L145 - L147 1991 E
 $O^+(^4S) + H_2 \rightarrow O + H_2^+$
photoionization source + growth technique
 $6 \times 10^3 - 6 \times 10^4$ keV/amu
- 91E33 Koslowski, H.R., Lebius, H., Stalmlmer, V., Fink, R., Wiesemann, K., Huber, B.A.
Collisions of doubly charged nitrogen molecules with rare gas atoms.
J. Phys. B 24 5023 - 5034 1991 E
 $N_2^{2+}(c^3\Sigma_u^+(v=0,1)) + B \rightarrow N_2^+(X^2\Sigma_g^+(v')) (B = He, Ne, Ar)$
Translational energy spectroscopy
 1×10^2 keV/amu
- 91E34 Kristensen, F.G. Horsdal, E.
Electron capture from Ar by fast protons: capture from the M subshell.
Phys. Rev. A 44 1604 - 1612 1991 E
 $H^+ + Ar \rightarrow H + Ar^+(3s3p^6\ ^2S); H + Ar^{2+}(3s3p^5\ ^1P, ^3P); H + Ar^{3+}(3s3p^4\ ^4P, ^2D, ^2P); H + Ar^{4+}(3s3p^3\ ^3D)$
photon-ion coincidence
100 - 800 keV/amu
- 91E35 Lee, D.H., Richard, P., Sanders, J.M., Zouros, T.J.M., Shinnpaugh, J.L., Varghese, S.L.
KLL resonant transfer excitation to $F^{6+}(1s2l^2l')$ intermediate states.
Phys. Rev. A 44 1636 - 1643 1991 E
 $F^{7+}(1s^2, 1s2s) + H_2, He \rightarrow F^{6+}(1s2l^2l')$
zero-degree electron spectroscopy
 $2.5 \times 10^2 - 2 \times 10^3$ keV/amu
- 91E36 Liu, C.J., Dunford, R.W., Berry, H.G., Church, D.A.
Alignment of Ne^{8+} following electron capture by Ne^{8+} ions in a sodium target.
Phys. Rev. A 43 572 - 574 1991 E
 $Ne^{8+} + Na \rightarrow Ne^{7+}(n = 9-8); 8->7)$
photon spectroscopy
4.8 - 32.8 keV/amu
linear polarization measured; no cross section

- 91E37 Lorent, V, Brouillard, F, Cornet, A, Urbain, X.
Electron capture by H(3l) atoms in collisions with Ne and Ar atoms.
J. Phys. B 24 219 - 226 1991 E
H(3l) + Ne, Ar → H⁺
laser-assisted technique
0.6 - 3 keV/amu
- 91E38 Martin, S.J, Stevens, J, Pollack, E.
Single-electron capture and direct scattering in He²⁺ + D₂O₂ and N₂
Phys. Rev. A 43 3503 - 3508 1991 E
He²⁺ + B → He⁺ (B = D₂O₂, N₂)
translational energy spectroscopy
0.5 - 1 keV/amu
angular distribution measured
- 91E39 Nakai, Y, Satake, M.
Electron capture and loss cross sections in collisions of C atoms with He.
J. Phys. B 24 L89 - 91 1991 E
C + He → C⁺, C²⁺, C³⁺
growth technique
25 - 125 keV/amu
- 91E40 Okuno, K, Soejima, K, Kaneko, Y.
Application of mini-EBIS to cross section measurements of single and double electron capture in low energy collisions of C⁴⁺, N⁴⁺ and O⁴⁺ with He.
Nucl. Instr. Meth. B 53 387 - 394 1991 E
A⁴⁺ + He → A³⁺, A²⁺ (A = C, N, O)
OPIG + growth method
3x10⁻³ - 1x10⁻¹ keV/amu
- 91E41 Paraneswaran, R, Bhalla, C.P, Walch, B.P, DePaola, B.D.
Resonant transfer and excitation in collisions of C³⁺ with H₂ and He targets.
Phys. Rev. A 43 5929 - 5933 1991 E
C³⁺ + H₂, He → C⁴⁺(2l, n'l')
zero-degree electron spectroscopy
333 - 833 keV/amu
- 91E42 Raphaelian, M.L.A, Berry, H.G, Mansour, N, Schneider, D.
Non-resonant transfer and excitation in Ne⁶⁺ - He collisions at intermediate energies.
Phys. Rev. A 43 4071 - 4074 1991 E
Ne⁶⁺(1s²2s²) + He → Ne⁶⁺(1s²2s n l' l'')
zero-degree electron spectroscopy
15 - 60 keV/amu
no cross sections given
- 91E43 Reese, C, Elbel, M.
Reply to comment on occupation of fine structure levels in electron capture of Ar²⁺ ions from various alkali atoms.
J. Phys. B 24 L191 1991 E
- 91E44 Richter, C, Doweck, D, Houver, J.C.
Collision spectroscopy with aligned and oriented atoms : V neutral particle production in H₂⁺ - Na(3s) and H₂⁺ - Na(3p) collisions.
J. Phys. B 24 L213 - 218 1991 E
H₂⁺ + Na(3s, 3p) → H₂(B¹Σ_u⁺, c³Π_u, C¹Π_u)
translational energy spectroscopy
0.25 - 2 keV/amu
- 91E45 Roncin, P, Gaboriaud, M.N, Barat, M.
Mechanism of true double electron capture by multiply charged ions.
Europhys. Letters 16 551 - 556 1991 E
A^{q+} + B → A^{(q-2)+} (A = N⁷⁺, O⁷⁺, O⁸⁺, Ne⁸⁺, Ar⁸⁺, Ar⁹⁺, Ar¹¹⁺; B = He, Ar, Kr, Xe)
translational energy spectroscopy
1 keV/amu
angle-differential cross sections
- 91E46 Roncin, P, Laurent, H, Guillemot, L, Gaboriaud, M.N, Barat, M.
Two electron processes in charge exchange reactions involving multiply charged ions.
Z. Phys. D 21 S93 - 98 1991 E
review

- 91E47 Sakabe, S. Izawa, Y. Hashida, M. Naka, T. Sudo, T. Mochizuki, T. Yamanaka, T. Nakai, S.
New cross-beam technique for charge transfer cross section measurement using a pulsed ion beam produced by laser photoionization.
Rev. Sci. Instr. 61 3678 - 3685 1991 E
Gd⁺ + Gd -> Gd + Gd⁺
crossed-beam technique
6x10⁻⁴ - 6x10⁻³ keV/amu
- 91E63 Sakane, H.A., Awaya, Y., Danjo, A., Kambara, T., Kanai, Y., Nabeshima, T., Nakamura, N., Ohtani, S., Suzuki, H., Takayanagi, T., Wakiya, K., Yamada, I., Yoshino, M.
Ejected electron spectra from doubly-excited states(2nl¹) of He-like ions produced by the B²⁺, C⁶⁺ - He collisions
J. Phys. B 24 3787 - 3795 1991 E
B²⁺, C⁶⁺ + He -> B³⁺, C⁷⁺(2nl¹)
zero-degree Auger electron spectroscopy
4.5 keV/amu
- 91E49 Schuch, R., Justiniano, E., Schulz, M., Datz, S., Dittner, P.F., Giese, J.P., Krause, H.F., Shōne, H., Vane, R.
Population of highly excited intermediate resonance states by electron transfer and excitation.
Phys. Rev. A 43 5180 - 5183 1991 E
S¹²⁺ + H₂ -> S¹⁴⁺
X-ray - X-ray coincidence technique
4.7x10³ - 7.0x10³ keV/amu
Kr-Kr Kr-Kr Kr-Kv X-ray coincidences
- 91E48 Schuch, R., Justiniano, E., Vogt, H., Decos, G., Gruen, N.
Double electron capture of He²⁺ from He at high velocity.
J. Phys. B 24 L133 - L138 1991 E
He²⁺ + He -> He + He²⁺
E : growth method ; T : CDW
3.75x10² - 1.5x10³ keV/amu
angular cross sections at 1.5 MeV
- 91E50 Schulze, R., Melcher, F., Hagemann, M., Kridener, S., Krüger, J., Salzborn, E., Reinhold, C.O., Olson, R.E.
Mutual ionization in H⁺ - H⁺ collisions.
J. Phys. B 24 L7 - L12 1991 E
H⁺ + H⁺ -> H⁰ + H⁰ + 2e ; H + H⁺ + 3e
crossed-beam technique with coincidence
1.5 - 90 keV/amu
- 91E51 Schweinzer, J., Winter, H.
Comments on occupation of fine structure levels in electron capture of Ar²⁺ ions from various alkali atoms.
J. Phys. B 24 L189 - 190 1991 E
Ar²⁺ + B -> Ar⁺ (B = Na, K, Rb, Cs)
- 91E52 Shah, M.B., Gillbody, H.B.
Screening-antiscreening effects in one-electron loss by fast Li⁺ and Li²⁺ ions in collisions with H₂, H₂ and He.
J. Phys. B 24 977 - 982 1991 E
Li⁺ + B -> Li²⁺ (B = H₂); Li²⁺ + B -> Li³⁺ (B = H, H₂, He)
growth method
43 - 386 keV/amu
- 91E53 Smith, G.J., Johnson, L.K., Gao, R.S., Smith, K.A., Stebbings, R.F.
Absolute differential cross sections for electron capture and loss by kilo-electron-volt hydrogen atoms.
Phys. Rev. A 44 5647 - 5652 1991 E
H + B -> H⁺, H⁺ (B = H₂, N₂, O₂, Ar, He)
2.0 - 5.0 keV/amu
angular distribution
- 91E54 Suraud, M.G., Hoekstra, R., de Heer, F.J., Bonnet, J.J., Morgenstern, R.
State-selective electron capture into nl subshells in slow collisions of C³⁺ and N⁶⁺ with He and H₂ studied by photon emission spectroscopy.
J. Phys. B 24 2543 - 2558 1991 E
C³⁺ + H₂ -> C⁴⁺(3l;4l) ; C³⁺, N⁶⁺ + He, H₂ -> C⁴⁺, N⁷⁺(2p, 3p, 4p -> 1s)
photon spectroscopy
- 91E64 Swenson, J.K., Burgdörfer, J.B., Meyer, F.W., Havener, C.C., Gregory, D.C., Stolterfoht, N.
Coulomb path interference in low energy ion-atom collisions
Phys. Rev. Letters 66 417 - 420 1991 E
He⁺ + He -> e
E : electron spectroscopy ; T : semiclassical approx.
2.5 keV/amu

- 91E55 Tani, M., Hishikawa, A., Okasaka, R.
The g-u interference oscillations observed in the emission cross sections and the optical polarizations in He⁺ - He collisions
J. Phys. B 24 1359 - 1376 1991 E
He⁺ + He → He*(3l) + He⁺
photon spectroscopy
0.5 - 20 keV
- 91E55 Tanis, J.A., Bernstein, E.M., Clark, M.W., Ferguson, S.M., Price, R.N.
Target ionization accompanied by projectile electron loss in fast O⁶⁺ + He collisions.
Phys. Rev. A 43 4723 - 4726 1991 E
O⁶⁺ + He → O⁵⁺, O⁷⁺; O⁷⁺ + He → O⁶⁺, O⁸⁺
projectile-recoil ion coincidence technique
6.25x10² - 2.5x10³ keV/amu
- 91E57 Underwood, T.A., Breinig, M., Gaitner, C.C.
Production of doubly excited projectile states in collisions of 0.1 MeV/u Ag⁴⁺ ions with He, H₂ and Ar targets.
Phys. Rev. A 44 1668 - 1676 1991 E
Ag⁴⁺ + B → Ag³⁺, Ag⁵⁺, Ag⁶⁺, Ag^{6*} (B = He, H₂, Ar)
electron spectroscopy
10² keV/amu
- 91E56 Unterreiter, E., Schweinzer, J., Winter, H.
Single electron capture for impact of (0.5 - 9 keV) C²⁺ on H₂, Ar and H₂
J. Phys. B 24 1003 - 1016 1991 E
C²⁺(2s² 1S, 2s2p ³P^o) + He, Ar, H₂ → C⁺
growth + attenuation technique
5x10² - 4.6x10¹ keV/amu
- 91T 1 Alston, S.
Generalized distorted-wave Born approximation for electron capture in ion-ion collisions.
Phys. Rev. A 43 5874 - 5877 1991 T
distorted-wave Born approx.
general formalism
- 91T 2 Amezian, K., Bacchus-Montabone, M.C.
Ab-initio molecular treatment of single electron capture process for the O⁶⁺ + He collision.
Indian J. Phys. 65B 217 - 225 1991 T
O⁶⁺ + H → O⁵⁺(3s, 3p, 3d)
MO + semiclassical
0.5 - 7.1 keV/amu
- 91T 3 Andersson, L.R., Gargaud, M., McCarroll, R.
Electron capture in slow O⁵⁺/H collisions.
J. Phys. B 24 2073 - 2082 1991 T
O⁵⁺(1s²2s) + H → O⁴⁺(1s²2snl ; nl = 4s, 4p, 4d)
(0.03 - 1.15)x10⁻³ eV/amu
- 91T 4 Bacchus-Montabone, M.C., Courbin, C., McCarroll, R.
State-selective electron capture by O²⁺ from He.
J. Phys. B 24 4409 - 4417 1991 T
O²⁺(2s²2p² 3P) + He → O⁺(2s²2p³ 2P, 2D)
MO ab-initio calculation
25x10⁻³ - 0.625 keV/amu
- 91T 5 Badnell, N.R.
Double X-ray emission following resonant transfer and excitation in collisions of H-like ions with H₂.
Phys. Rev. A 44 1554 - 1558 1991 T
S¹⁺, Ge³¹⁺ + H₂ → S¹⁺(nl, n'l'), Ge³⁰⁺(nl, n'l')
Kr-K α Kr-K β Kr-K γ coincidence
- 91T 6 Baur, G.
Comment on 'Feynman-Monte Carlo calculations of electron capture at relativistic collider energies'.
Phys. Rev. A 44 4767 - 4768 1991 T
general formulation

- 91T7 Belkic, D.
Exact second-order Born approximation with correct boundary conditions for symmetric charge exchange.
Phys. Rev. A 43 4751 - 4770 1991 T
 $H^+ + H(1s) \rightarrow H + H^+$
second-order Born approx. with correct boundary.
60, 100, 125, 500 keV/amu
angular distribution
- 91T8 Belkic, D.
Electron transfer from hydrogen like atoms to partially and completely stripped projectiles: CDW approximation.
Phys. Scripta 43 561 - 571 1991 T
 $A^Z + H(1s) \rightarrow A^{Z-1}(n)$ ($A = H, He, Li, Be, B, C, N, O$); $Li^{R+} + H \rightarrow Li^{(R-1)+}(\text{total})$ ($q = 3,2$); $B^{R+} + H \rightarrow B^{(R-1)+}(\text{total})$ ($q = 5,4,3,2$); $C^{R+} + H \rightarrow C^{(R-1)+}(\text{total})$ ($q = 6,5,4,3,2$); $N^{R+} + H \rightarrow N^{(R-1)+}(\text{total})$ ($q = 7,6,5,4,3,2$); $O^{R+} + H \rightarrow O^{(R-1)+}(\text{total})$ ($q = 8,7,6,5,4,3,2$)
CDW approx.
 $10^2 - 10^4$ keV/amu (H); $6 - 6 \times 10^2$ keV/amu (O)
scaling as $\sigma(\text{total})/Z^3 \cdot F(\text{keV/amu})$
- 91T61 Belyaev, A.K., Zagrebin, A.L., Tserkovnyi, S.I.
Partial cross sections and rate constants of charge transfer processes of helium ions by mercury atoms
Opt. Spectrosc. (USSR) 70 453 - 456 1991 T
 $He^+ + Hg(6s^2 \ ^1S_0) \rightarrow He(1s^2) + Hg^+(6d \ ^2D_{3/2,5/2}; 7p \ ^2P_{1/2,3/2})$
Pseudopotential method
thermal velocities
- 91T9 Botcher, C., Rhoades-Brown, M.J., Strayer, M.R.
Approximate analytic formula used to estimate electron capture cross sections at relativistic energies.
Phys. Rev. A 44 4709 - 4770 1991 T
general discussions
- 91T10 Boudjema, M., Cornille, M., Dubau, J., Moretto-Capelle, P., Bordenave-Montesquieu, A., Benoit-Cattin, P., Gletzes, A.
Investigation of double capture in $Ne^{6+} + He, H_2$ by electron spectroscopy at 80 keV I Theory.
J. Phys. B 24 1695 - 1712 1991 T
 $Ne^{6+}(1s^2) + He, H_2 \rightarrow Ne^{6+}(1s^2 3lnl'; 1s^2 4lnl')$
AUTOLSI method
peak energy, autoionization probabilities, radiative probabilities for Ne^{6+}
- 91T11 Brown, G.J.N., Crothers, D.S.F.
Phase-integral half-way-house variational continuum distorted waves.
J. Phys. B 24 173 - 194 1991 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
CDW
 $10 - 10^3$ keV/amu
- 91T12 Campbell, E.E.B., Hertel, I.V., Nielson, S.E.
Electron translation factors in orienting charge transfer collisions.
J. Phys. B 24 3825 - 3836 1991 T
 $Na^+ + Na(3p) \rightarrow Na(3p) + Na^+$
semiclassical theory + ETF
- 91T14 Chen, Z., Lin, C.D.
State-selective double capture in collisions with helium atoms at low energies II. ejected electron
J. Phys. B 24 4231-4244 1991 T
 $C^{6+} + He \rightarrow C^{4+}(2l3l'); O^{8+} + He \rightarrow O^{6+}(3l3l')$
IEA
5 keV/amu
Auger electron spectra
- 91T13 Chen, Z., Shingal, R., Lin, C.D.
State-selective double capture in collisions of bare ions with helium atoms at low energies I. total cross sections.
J. Phys. B 24 4215 - 4230 1991 T
 $C^{6+} + He \rightarrow C^{4+}(2l3l', 3l4l'); C^{8+} + He \rightarrow C^{6+}(n=2,3,4); O^{8+} + He \rightarrow O^{6+}(n=3, n'=3; n=3, n'=4); O^{8+} + He \rightarrow O^{7+}$
IEA for double capture/AO for single capture
5 keV/amu (C)
- 91T15 Decker, F., Eichler, J.
Exact second-order Born calculations for relativistic electron capture.
Phys. Rev. A 44 377 - 387 1991 T
 $C^{6+} + B \rightarrow C^{5+}(K) + B^+(K)$ ($B = Au$); $Ne^{10+}, Ar^{18+} + B \rightarrow Ne^{8+}(K), Ar^{17+}(K) + B^+(K)$ ($B = Cu, Ag, Ta, Au$)
second-order Born approx.
 $4 \times 10^5 - 10 \times 10^7$ keV/amu
also angular distribution

- 91T16 Decker, F. Eichler, J.
Second-order Born calculations for electron capture in relativistic U + U collisions.
Phys. Rev. A 44 2195 - 2197 1991 T
 $U^{92+} + U^{91+} \rightarrow U^{91+} + U^{92+}$
relativistic second-order OBK
 $5 \times 10^5 - 10 \times 10^7$ keV/amu
- 91T62 Deco, G Grün, N.
An approximate description of the double capture process in $He^{2+} + He$ collisions with static correlation
Z. Phys. D 18 339 - 343 1991 T
 $He^{2+} + He \rightarrow He + He^{2+}$
CDW
0.125 - 1.5 MeV/amu
angular distributions
- 91T17 Dubois, A. Hansen, J.P. Lundsgaard, M. Nielsen, S.E.
Orientation and alignment effects in H⁻-Na collisions.
J. Phys. B 24 L269 - 274 1991 T
 $H^+ + Na(3s) \rightarrow H(1s, 2s, 2p, n=3, \text{total})$
AO impact parameter method
3.20 keV/amu
also excitation to Na(3p)
- 91T18 Dunseath, K.M. Crothers, D.S.F.
Transfer and ionization processes during the collision of fast H⁺, He²⁺ nuclei with helium.
J. Phys. B 24 5003 - 5022 1991 T
 $H^+, He^{2+} + He \rightarrow H, He^+ + He^+ + e; H, He^+ + He^{2+} + He \rightarrow He + He^{2+}$
100 - 1600 keV/amu
also H⁺, He²⁺ + He \rightarrow He⁺
- 91T20 Errea, L.F. Herrero, B. Mendez, L. Mo, O. Riera, A.
Charge exchange and excitation in C³⁺ + H collisions I. molecular calculations.
J. Phys. B 24 4049 - 4060 1991 T
 $C^{3+} + H \rightarrow C^{2+}$
MO
no cross sections given
- 91T21 Errea, L.F. Herrero, B. Mendez, L. Riera, A.
Charge exchange and excitation in C³⁺ + H collisions II. partial and total cross section calculations.
J. Phys. B 24 4061 - 4075 1991 T
 $C^{3+} + H \rightarrow C^{2+}(\text{total}, 1s^2 2s 3s, 1s^2 2s 3p, 1s^2 2s 3d, 1s^2 2p^2)$
MO
0.04 - 9 keV/amu
- 91T19 Errea, L.F. Maidagan, J.M. Mendez, L. Riera, A.
Use of plane-wave translational factors in the molecular approach to atomic collisions.
J. Phys. B 24 L387 - 392 1991 T
 $He^{2+} + H \rightarrow He^+(2s, 2p, \text{total}) + H^+; He^+ + H^+ \rightarrow He^{2+} + H$
MO + plane-wave TF
- 91T59 Errea, L.F. Mendez, L. Riera, A.
Offsetting the Difficulties of the molecular model of atomic collisions in the intermediate velocity range.
Phys. Rev. A 43 3578 - 3586 1991 T
 $H^+ + He^+ \rightarrow H(1s) + He^{2+}$
MO + translation factor
1.75 - 40 keV/amu
also $H^+ + He^+(1s) \rightarrow H^+ + He^{2+} + e$
- 91T63 Fojon, O. Maidagan, J.M.
Electron capture and molecular resonance
J. Phys. B 24 2529 - 2542 1991 T
 $H^+ + CH_4 \rightarrow H^0; H^+ + N_2 \rightarrow H^0; H^+ + N_2 \rightarrow H^0; H^+ + {}^{20}Ne \rightarrow H^0; H^+ + {}^{22}Ne \rightarrow H^0$
peaking impulse approx.
at resonances
- 91T22 Foster, C. Cooper, J.L. Dickinson, A.S. Flower, D.R. Mendez, L.
Charge transfer in slow collisions of Ne²⁺ with H.
J. Phys. B 24 3433 - 3444 1991 T
Ne²⁺ + H
rate coefficients

- 91T65 Fritsch, W.
Theoretical investigation of electron transfer in collisions between atomic hydrogen and the closed-3p-shell ions of Ti, Cr and Fe
Phys. Scripta T37 75 - 79 1991 T
Ti⁴⁺ + H → Ti³⁺(3d,4l,5l,total) ; Cr⁶⁺ + H → Cr⁵⁺(3d,4d,5l,n=6,total) ; Fe⁸⁺ + H → Fe⁷⁺(n=4,5l,6l,total)
AO
0.5 - 100keV/amu
- 91T64 Fritsch, W., Shingai, R., Lin, C.D.
Close-coupling study of electron excitation in 1-300 keV/u He²⁺ - H collisions
Phys. Rev. A 44 5686 - 5692 1991 T
He²⁺ + H(1s) → He²⁺ + H⁺(n=2,3)
close-coupling method
1 - 300 keV/amu
line emission n=2 → 3
- 91T23 Gayet, R., Hansen, J., Martinez, A., Rivarola, R.
CDW and CDW-EIS investigations in an independent electron approximation for the resonant double electron capture by swift He²⁺ in helium.
Z. Phys. D 18 345 - 350 1991 T
He²⁺ + He → He + He²⁺
CDW / CDW + EIS
25 - 750 keV/amu
- 91T24 Gravielle, M.S., Miraglia, J.E.
Eikonal impulse approximation in electron capture processes.
Phys. Rev. A 44 7299 - 7306 1991 T
H⁺ + H, He → H⁰(1s,2s,2p,3s) ; H⁺ + B → H + B⁺(K) (B = C, Ne, Ar)
eikonal impulse approx.
- 91T66 Grozdanov, T.P., Satovev, E.A.
Separated- and united-atom limits for dynamical adiabatic states
Phys. Rev. A 44 5605 - 5610 1991 T
general formalism
- 91T25 Hansen, J.P., Dubois, A., Nielsen, S.E.
Orientation and alignment in H⁺-H collisions.
Phys. Rev. A 44 6130 - 6132 1991 T
H⁺ + H → H⁺
50, 100 keV/amu
also H⁺ + H⁺(2p)
- 91T26 Harel, C., Jouin, H., Pons, B.
Double capture in C⁶⁺-He collisions at low impact energies.
J. Phys. B 24 L425 - 436 1991 T
C⁶⁺ + He → C³⁺(nl), C⁴⁺(2ln^l) ; n^l=3,4,5 ; 3l3^l)
OEDM
0.56 - 7.56 keV/amu
n³-scaling
- 91T27 Horbatsch, M.
Theory of multiple ionization and capture in energetic ion-atom collisions.
Z. Phys. D 21 S63 - 67 1991 T
review
- 91T29 Jain, A., Shingai, R., Zouros, T.J.M.
State-selective nonresonant transfer excitation in 50-400 keV ³He⁺ + H₂ and He collisions.
Phys. Rev. A 43 1621 - 1624 1991 T
³He⁺(1s) + H₂, He → He^m(2s² ¹S ; 2s2p ¹P ; 2p² ¹D)
semi-classical IP
12.5 - 125 keV/amu
- 91T28 Jakubassa-Amundsen, D.H.
The impulse approximation for electron transfer in reactive nucleus-atom collisions.
J. Phys. B 24 3019 - 3044 1991 T
H⁺ + C → H + C⁺(K)
LA
5x10² - 1x10³ keV/amu
angular distribution

- 91T30 Janev, R.K.
Unified cross section scaling for electron capture from excited hydrogen atoms by multi-charged ions.
Phys. Letters A 160 67 - 70 1991 T
analytical scaling formula
- 91T31 Joutin, H. Harel, C.
Electron capture in He²⁺-metastable H(2s) low energy collisions.
J. Phys. B 24 3219 - 3227 1991 T
He²⁺ + H(2s) -> He⁺(3l ; 4) + H⁺
PSS with CTF
- 91T32 Katsolis, K. Maynard, G. Janev, R.K.
Charge transfer and ionization cross sections for collisions of Ti⁹⁺, Cr⁸⁺, Fe⁸⁺ and Ni⁸⁺ ions with atomic hydrogen.
Phys. Scripta T37 80 - 80 1991 T
Ti⁹⁺(q = 4 - 11) + H -> Ti^{(q-1)+}; Cr⁸⁺(q = 4,6,8,10,13) + H -> Cr^{(q-1)+}; Fe⁸⁺(q = 4-6,8,10,12,15,20,26) + H -> Fe^{(q-1)+}; Ni⁸⁺(q = 4-6,8,10,12,14,17) + H -> Ni^{(q-1)+}
CTMC
10 - 10³ keV/amu
scaling $\sigma/\Omega - E/\Omega^{1/2}$, also ionization cross sections
- 91T34 Kimura, M.
H(n=2 and 3) density matrices resulting from low-to-intermediate-energy collisions of H⁺ ions with He atoms : the atomic-orbital-molecular-orbital matching approach.
Phys. Rev. A 44 R5339 - 5342 1991 T
H⁺ + He -> H⁺(n=2,3)
AO+MO
1 - 100 keV/amu
- 91T33 Kimura, M. Lane, N.F.
Theoretical study of charge transfer in He⁺ + H₂ collisions in the milli-electron volt region.
Phys. Rev. A 44 259 - 263 1991 T
He⁺ + H₂ -> He + H₂⁺; He + H⁺ + H
MO
10 - 500 K
rate coefficient given
- 91T38 Kuang, Y.R.
Model-potential OBK approximation for K-shell electron capture in asymmetric collisions.
Phys. Rev. A 44 1613 - 1619 1991 T
H⁺ + B -> H + B⁺(K⁻¹) (B = C,N,O,Ne,Ar) ; He²⁺ + Ne -> He⁺ + Ne⁺(K⁻¹)
OBK
2x10² - 1x10⁴ keV/amu
- 91T35 Kuang, Y.R.
Electron capture in collisions of H⁺ and He²⁺ projectiles with hydrogen ions.
J. Phys. B 24 L103 - 108 1991 T
H⁺, He²⁺ + B -> H, He⁺ (B = Be³⁺, B⁴⁺, C⁵⁺, N⁶⁺, O⁷⁺)
modified two orthogonal-state expansion method
50 - 500 keV/amu
- 91T36 Kuang, Y.R.
Electron capture in collisions between protons and the ions He⁺ and Li²⁺ calculated using a new united-atom model.
J. Phys. B 24 1645 - 1653 1991 T
H⁺ + He⁺, Li²⁺, Li⁺ -> H + He²⁺, Li³⁺, Li²⁺
united-atom model
30 - 200 keV/amu
- 91T37 Kuang, Y.R.
Modified Oppenheimer-Brinkman-Kramers approximation for K-shell capture in asymmetric collisions.
J. Phys. B 24 4993 - 5001 1991 T
H⁺ + B -> H + B⁺(K⁻¹) (B = N,O,Ne) ; He²⁺ + Ne -> He⁺ + Ne⁺(K⁻¹)
modified OBK
100 - 4000 keV/amu (H) ; 200 - 2000 keV/amu (He)
- 91T39 Kunikeev, Sh.D. Senashenko, V.S. Sidorovich, V.A.
Production of autoionizing states of fast charged particles by double electron capture.
Nucl. Inst. Meth. B 53 122 - 126 1991 T
He²⁺ + He -> He^{**}(2s² 'S; 2p² 'D, 2s2p 'P)
Independent model + quantum mechanical calculation
37 - 125 keV/amu
e-e correlation effect included

- 91T60 Kurpick, P. Heinemann, D. Sepp, W.D. Fritcke, B.
Influence of occupation number of single particle levels on K-K charge transfer in collisions of 90 keV Ne^{8+} on Ne.
Z. Phys. D 22 407 - 409 1991 T
 $\text{Ne}^{8+} + \text{Ne} \rightarrow \text{Ne}^{8+} + \text{Ne}^{7+}$
coupled channel calculation
4.5 keV/amu
- 91T40 Liu, C.J. Dunford, R.W.
Depolarization following electron capture by highly charged ions in a polarized target.
J. Phys. B 24 2059 - 2071 1991 T
General theory
- 91T41 Macek, J.H.
Some remarks on strong-potential-Born expansions for ion-atom collisions.
J. Phys. B 24 5121 - 5132 1991 T
strong potential-Born approx.
- 91T42 Meyerhof, W.E. Hülksötter, H.P. Dai, Q. McGuire, J.H. Wang, Y.D.
Projectile electron loss with a molecular hydrogen target.
Phys. Rev. A 43 5907 - 5918 1991 T
 $A^{(Z-1)+} + \text{H}_2 \rightarrow A^{Z+}$ ($A = \text{H}, \text{He}, \text{Li}, \text{C}, \text{O}$)
plane-wave Born approx.
 $1 \times 10^2 - 3.5 \times 10^3$ keV/amu
- 91T43 Montenegro, E.C. Meyerhof, W.E.
Target screening effect on the projectile electron loss probability.
Phys. Rev. A 44 7229 - 7233 1991 T
 $\text{C}^{3+}, \text{C}^{4+} + \text{He} \rightarrow \text{C}^{4+}, \text{C}^{6+}$
time-dependent SCA
 $5 \times 10^2 - 4 \times 10^3$ keV/amu
- 91T44 Nagy, O. Macek, J.H. Miraglia, J.E.
Impulse approximation in proton-hydrogen collisions.
Phys. Rev. A 43 5991 - 5996 1991 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}^*(nl) + \text{H}^+$ ($nl = 1s, 2s, 2p, 3s$)
peaked-impulse approximation
 5×10^3 keV/amu
angular distribution
- 91T45 Ostrovsky, V.N.
On the mechanisms for creation of the electron orbital polarization in the charge exchange processes.
J. Phys. B 24 L507 - 512 1991 T
 $\text{B}^{3+} + \text{He} \rightarrow \text{B}^{2+}(2p) + \text{He}^+$
quasi-molecular approx.
polarization due to time lag between electron orbital momentum and internuclear
- 91T46 Riesselmann, K. Anderson, L.W. Durand, L. Anderson, C.J.
Classical impulse approximation for the electron loss from H(1s) or H⁻ projectile passing through various gas targets.
Phys. Rev. A 43 5934 - 5945 1991 T
 $\text{H} + \text{B} \rightarrow \text{H}^+$; $\text{H} + \text{B} \rightarrow \text{H}, \text{H}^+$ ($\text{B} = \text{He}, \text{Ne}, \text{Ar}, \text{Kr}, \text{Xe}, \text{H}, \text{N}, \text{O}$)
classical impulse approx.
 $9 \times 10^2 - 1.4 \times 10^6$ keV/amu
- 91T47 Saha, B.C. Lane, N.F. Kimura, M.
Molecular-state treatment of $\text{He}^+(2p)$ excitation through electron capture in He^{2+} - H_2 collisions at low energies.
Phys. Rev. A 44 R1 - 4 1991 T
 $\text{He}^{2+} + \text{H}_2 \rightarrow \text{He}^+(2p)$
semi-classical MO
0.3 - 23 keV/amu
- 91T48 Salin, A.
Some remarks on the theory of high energy electron capture in ion-atom collisions.
Comm. At. Mol. Phys. 26 1 - 10 1991 T
- 91T67 Schultz, D.R. Meng, L. Reinhold, C.O. Olson, R.E.
 $\text{Fe}^{8+} + \text{H}, \text{H}_2$ and He electron loss and $\text{He}^{2+} + \text{H}(n=1,2)$ electron capture cross sections: processes of interest in fusion plasmas
Phys. Scripta T37 89 - 93 1991 T
 $\text{Fe}^{8+}(q=1,3,5,12,26) + \text{H} \rightarrow \text{H}^+$; $\text{Fe}^{8+}(q=1,3,5,12,26) \text{H}_2 \rightarrow \text{H}_2, \text{H}^+ + \text{H}^+$; $\text{Fe}^{8+}(q=1,5,12,26) + \text{He} \rightarrow \text{He}^+, \text{He}^{2+}$; $\text{He}^{2+} + \text{H}(n=1,2) \rightarrow \text{He}^+(n)$
CTMC
50 - 500keV/amu(Fe); 30 - 100keV/amu(He)

- 91T49 Shimakura, N. Kimura, M.
Electron capture in collisions of N^{5+} ions with H atoms from the meV to keV energy regions.
Phys. Rev. A 44 1659 - 1667 1991 T
 $N^{6+} + H \rightarrow N^{5+}$
quantum-mechanical + semiclassical
 $10^{-5} - 10^1$ keV/amu
 $nl=4s, 4p$ the most dominant
- 91T50 Shingal, R. Lin, C.D.
Calculation of two-electron transition cross sections between fully stripped ions and helium atoms.
J. Phys. B 24 251 - 264 1991 T
 $A^{Z+} + He \rightarrow A^{(Z-1)+} + He^{2+} + e$ (A = He, Li, C, O, F)
coupled-channel semiclassical IP model with travelling AO
40 - 300 keV/amu (He) ; 40 - 400 keV/amu (Li) ; $10^2 - 10^3$ keV/amu (C) ; 200 - 1000 keV/amu (O) ; 250 - 1500 keV/amu (F)
- 91T51 Shingal, R. Lin, C.D.
 $H(n=2 \text{ and } 3)$ density matrices produced in proton-helium collisions at intermediate energies.
J. Phys. B 24 963 - 975 1991 T
 $H^+ + He \rightarrow H(n=2, n=3) + He^+$
multichannel semiclassical IP + travelling AO
15 - 100 keV/amu
- 91T52 Slim, H.A. Heck, E.L. Bransden, B.H. Flower, D.R.
Ionization and charge transfer in proton-helium collisions.
J. Phys. B 24 L421 - 424 1991 T
 $H^+ + He \rightarrow H + He^+$
semiclassical impact parameter method
25 - 100 keV/amu
also ionization cross sections given
- 91T53 Slim, H.A. Heck, E.L. Bransden, B.H. Flower, D.R.
Charge transfer and excitation in proton-helium collisions.
J. Phys. B 24 1683 - 1694 1991 T
 $H^+ + He \rightarrow H(nl = 1s, 2s, 2p, 3s, 3p, 3d)$
semiclassical impact parameter method
10 - 235 keV/amu
- 91T54 Taulbjerg, K.
Status of the theory of electron capture in ion-atom collisions at low and intermediate energies.
Z. Phys. D 21 577 - 580 1991 T
review
- 91T55 Toshima, N. Eichler, J.
Identification of Thomas peaks in coupled channel calculations for charge transfer.
Phys. Rev. Letters 66 1050 - 1053 1991 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+$
coupled-channel calculation
 5×10^3 keV/amu
- 91T68 Wang, J. Reinhold, C.O. Burgdörfer, J.
Electron loss at backward observation angles
Phys. Rev. A 44 7243 - 7251 1991 T
 $H^0 + Ar \rightarrow e ; He^+ + Ar \rightarrow e$
Impulse approx.
500, 800 keV/amu
angular+energy distributions of electrons
- 91T69 Wang, Y.D. McGuire, J.H.
Orientation dependence in electron capture to arbitrary projectile n states from molecular hydrogen.
Phys. Rev. A 44 367 - 372 1991 T
 $O^{8+} + H_2 \rightarrow O^{7+}(n)$
two-center approx.
 $5 \times 10^2 - 1.25 \times 10^3$ keV/amu
- 91T77 Winter, T.G.
Electron transfer and ionization in proton-helium collisions studied using a Sturmian basis.
Phys. Rev. A 44 4353 - 4367 1991 T
 $H^+ + He \rightarrow H(nl) \quad nl = 2s, 2p, 3s, 3p, 3d, \text{total}$
coupled-channel approx. with Sturmian basis
50 - 200 keV/amu
 $H^+ + He \rightarrow H^+ + He^+$

91758

Yu, R.K.

Electron capture in collisions between protons and the ions He^+ and Li^{+2} calculated using a new united atom model.

J. Phys. 24 1645 - 1653 1991 T

$\text{H}^+ + \text{He}^+ \rightarrow \text{H}(\text{total}, 1s); \text{H}^+ + \text{Li}^+, \text{Li}^{2+} \rightarrow \text{H}(\text{total}, 1s)$

impact parameter method + united-atom model

30 - 200 keV/amu

- 92E 1 Ali, R. Frohne, V. Cocks, C.L. Stockli, M. Cheng, S. Raphaelian, M.L.A.
Q-value measurements in charge-transfer collisions of highly charged ions with atoms by recoil longitudinal momentum spectroscopy.
Phys. Rev. Letters 69 2491 - 2494 1992 E
 $Ar^{15+} + Ar \rightarrow Ar^{(i+1)+} (k = 1, 2) + Ar^+(i = 1 - 5)$
recoil longitudinal momentum spectroscopy
1.25 keV/amu
- 92E 2 Andersson, L.R., Cederquist, H. Barany, A. Liljeby, L. Biedermann, C. Levin, J.C. Keller, N. Elston, S.B. Gibbons, J.P. Sellin, L.A.
One- and two-electron capture in slow Ar^{6+} -He collisions.
Phys. Rev. A 45 R4 - 7 1992 E
 $Ar^{6+} + He \rightarrow Ar^+(3p4s; 3p4p)$
translational energy spectroscopy
 $1.5 \times 10^{-2} - 3.0 \times 10^{-3}$ keV/amu
Angular distributions
- 92E 3 Andriamonje, S. Chevallier, M. Cohen, C. Cue, N. Dauvergne, D. Dural, J. Genre, R. Girard, Y. Kirsch, R. L'Hoir, A. Poizat, J.C. Quere, Y. Remillieux, J. Schmaus, D. Toulemonde, M.
RTE measurement with Xe^{20+} ions channelled in a Si crystal.
Phys. Letters A 164 184 - 190 1992 E
 $Xe^{20+} + Si < 110 > \rightarrow Xe^{11+}$
(3.3 - 4.3) $\times 10^4$ keV/amu
- 92E 4 Aumayr, F. Glaier, M. Schweinzer, J. Winter, H.
Electron capture in He^{2+} collisions with aligned $Na^+(3p)$ atoms.
Phys. Rev. Letters 68 3277 - 3280 1992 E
 $He^{2+} + Na^+(3p) \rightarrow He^+(n=4)$
translational energy spectroscopy
0.5 - 3.0 keV/amu
- 92E 48 Beijers, J.P.M. Hoekstra, R. Morgenstern, R. de Heer, F.J.
State-selective electron capture and core excitation in slow Ne^{6+} -He collisions.
J. Phys. B 25 4851 - 4864 1992 E
 $Ne^{6+}(1s^2 2s^2 \ ^1S; 1s^2 2s 2p \ ^3P^o) + He \rightarrow Ne^{5+}(1s^2 2s^2 \ ^3S; 1s^2 2s 2p 3l)$
photon spectroscopy
0.07 - 1.2 keV/amu
- 92E 5 Beijers, J.P.M. Hoekstra, R. Schlatmann, A.R. Morgenstern, R. de Heer, F.J.
State-selective electron capture in slow collisions of C^{6+} and O^{6+} with He.
J. Phys. B 25 463 - 474 1992 E
 $C^{6+} + He \rightarrow C^{5+}(n=3 \rightarrow 2; n=4 \rightarrow 2); O^{6+} + He \rightarrow O^{5+}(3s, 3p, 3d)$
photon-spectroscopy
 $6 \times 10^{-2} - 1.5$ keV/amu (O) ; 0.3 - 1.8 keV/amu (C)
- 92E 6 Bliman, S. Barany, A. Bonnetoy, M. Bonnet, J.J. Chassevent, M. Fleury, A.G. Hitz, D. Knystautas, E.J. Nordgren, J. Rubensson, J.E. Suraud, M.G.
Single and double charge exchange collision spectroscopy of O^{6+} + He at 3.8 keV/amu.
J. Phys. B 25 2065 - 2080 1992 E
 $O^{6+}(1s^2; 1s2s) + He \rightarrow O^{5+}(1s^2nl; 1s2l3l), O^{4+}(1s^2nl^2nl^2)$
photon spectroscopy
3.8 keV/amu
- 92E 7 Bliman, S. Nordgren, J. Knystautas, E.J. Suraud, M.G.
Rydberg level population in the electron capture collision O^{6+} + He at low velocity.
J. Phys. B 25 L435 - 438 1992 E
 $O^{6+}(1s^2) + He \rightarrow O^{5+}(1s^2nl)$ (n = 3 - 7)
photon spectroscopy
3.75 keV/amu
- 92E 8 Bliman, S. Suraud, M.G. Hitz, D. Huber, B.A. Lebius, H. Cornille, M. Rubensson, J.E. Nordgren, J. Knystautas, E.J.
Collision spectroscopy of Ar^{6+} + He at low velocities ($v < 1$ a.u.).
Phys. Rev. A 46 1321 - 1332 1992 E
 $Ar^{6+} + He \rightarrow Ar^{5+}, Ar^{6+}$
photon spectroscopy
0.2 keV/amu
- 92E 10 Boduch, P. Chantepie, M. Hennecart, D. Husson, X. Lecler, D. Druetta, M. Wilson, M.
Spectroscopic analysis of visible and near UV light emitted in 120 keV Kr^{6+} -He and Kr^{6+} - H_2 collisions.
Phys. Scripta 46 337 - 342 1992 E
 $Kr^{6+} + He, H_2 \rightarrow Kr^{7+}(nl), Kr^{6+}(nl^2nl^2)$
photon spectroscopy
1.4 keV/amu
emission cross sections

- 92E9 Boduch, P. Chantepie, M. Hamecart, D. Husson, X. Kucal, H. Lecler, D. Stollerfoht, N.
Spectroscopic analysis of visible and near UV light emitted by Ar^{2+} and Ar^{4+} ions produced in $Ar^{2+} + He$ and $Ar^{2+} + H_2$ collisions at 120 keV.
Phys. Scripta 45 203 - 211 1992 E
 $Ar^{2+} + He, H_2 \rightarrow Ar^{2+}, A^{4+} (h\nu)$
photon spectroscopy
3 keV/amu
photon transitions
- 92E11 Bordenave-Montesquieu, D. Dagnac, R.
Single-electron capture for 2 - 8 keV incident energy and direct scattering at 6 keV in He^{2+} -He collisions.
J. Phys. B 25 2573 - 2586 1992 E
 $He^{2+} + He \rightarrow He^+$
translational energy spectroscopy
0.5 - 2 keV/amu
angular scattering
- 92E13 Cederquist, H. Beebe, E. Biedermann, C. Engstrom, L. Engstrom, A. Gao, H. Hutton, R. Levin, J.C. Liljeby, L. Pajek, M. Quinteros, T. Selberg, N. Sigray, P.
Increase of true double-electron-capture cross sections in slow $Xe^{6+} - (Xe, He)$ collisions at very high q .
Phys. Rev. A 46 2592 - 2595 1992 E
 $Xe^{6+} + B \rightarrow Xe^{(q,2+)}$ ($q = 15 - 42$)
projectile + recoil ion coincidence
 $3 \times 10^{-3} q$ keV/amu
- 92E12 Cederquist, H. Beebe, E. Biedermann, C. Engstrom, A. Gao, H. Hutton, R. Levin, J.C. Liljeby, L. Quinteros, T. Selberg, N. Sigray, P.
On the role of transfer excitation in slow $Xe^{6+} - He, Xe$ ($15 \leq q \leq 45$) collisions
J. Phys. B 25 L69 - 75 1992 E
 Xe^{6+} ($q = 15 - 42$) + $He, Xe \rightarrow Xe^{(q,1+)}, Xe^{(q,2+)}$
projectile-recoil ion coincidence
0.25 - 1.0 keV/amu
- 92E14 Clark, M.W. Tanis, J.A. Bernstein, E.M. Badnell, N.R. DuBois, R.D. Graham, W.G. Morgan, T.J. Plano, V.L. Schlachter, A.S. Stockli, M.P.
Cross sections for resonant transfer and excitation in $Fe^{6+} + H_2$ collisions.
Phys. Rev. A 45 7846 - 7850 1992 E
 $Fe^{6+}(q=23,24,25) + H_2 \rightarrow Fe^{(q,1)+}$
X-my + projectile coincidence
 $5.9 \times 10^3 - 9.4 \times 10^3$ keV/amu
- 92E15 Fremont, F. Sommer, K. Lecler, D. Hickam, S. Boduch, P. Husson, X. Stollerfoht, N.
Angular distribution of Auger-electron emission following double electron capture in $C^{6+} + He$ collisions.
Phys. Rev. A 46 222 - 229 1992 E
 $C^{6+} + He \rightarrow C^{4+}(2ln^1)$
electron spectroscopy
5 keV/amu
- 92E16 Frieling, G.J. Hoekstra, R. Smulders, E. Dickson, W.J. Zinoviev, A.N. Kuppens, S.J. de Heer, F.J.
Cross sections for l-selective electron capture into the $He^+(n=4)$ shell in intermediate energy collisions of He^{2+} with H and H_2 .
J. Phys. B 25 1245 - 1255 1992 E
 $He^{2+} + H, H_2 \rightarrow He^+(n=4, 4s, 4p, 4d, 4f; n=4 \rightarrow n=3)$
photon spectroscopy
27 - 132 keV/amu
- 92E17 Gao, R.S. Dutta, C.M. Lane, N.F. Smith, K.A. Stebbings, R.F. Kimura, M.
Experimental and theoretical studies of the $He^{2+} + He$ system : differential cross sections for direct, single and double-charge-transfer scattering at keV energies.
Phys. Rev. A 45 6388 - 6394 1992 E
 $He^{2+} + He \rightarrow He^+, He$
E : position sensitive detection ; T : quantum-mechanical MO
0.5 - 3.3 keV/amu
angular distribution
- 92E55 Gaunt, D.M. Darzmann, K.
Velocity dependence of electron-capture particle cross sections and alignment in low-energy collisions of Ne^{6+} and Ar^{6+} with atomic Na.
Phys. Rev. A 46 5580 - 5593 1992 E
 $Ne^{6+} + Na \rightarrow Ne^{7+}(nlm, n=9-8) + Na^+$; $Ar^{6+} + Na \rightarrow Ar^{7+}(n=9-8) + Na^+$
photon-spectroscopy technique
polarization measured
- 92E49 Gieler, M. Aumayr, F. Windholz, L.
Coherent population trapping probed by charge exchange reactions.
Phys. Rev. Letters 69 3452 - 3454 1992 E
 $He^{2+} + Na(3s, 3p) \rightarrow He^+$
translational spectroscopy
2.5 keV/amu

- 92E56 Herrmann, R. Prior, M.H. Dörner, R. Schmidt-Böcking, H. Lyeis, C.M. Wille, U.
Multiple electron transfer in slow Ne^{q+} -Ne collisions.
Phys. Rev. A 46 5631 - 5642 1992 E
 $\text{Ne}^{q+} + \text{Ne} \rightarrow \text{Ne}^{q+}(q=8-4) + \text{Ne}^+(i=2-7)$
projectile-recoil ion coincidence technique
4.5 keV/amu
angular distribution ($\theta = 12 - 75$ mrad)
- 92E50 Hoekstra, R. Summers, H.P. de Heer, F.J.
Charge transfer in collisions of protons with helium.
Supplement to Nucl. Fusion 3 63 - 69 1992 E
 $\text{H}^+ + \text{He} \rightarrow \text{H}(\text{total}, 2s, 2p, 3s, 3p, 3d)$
0.3 - 500 keV/amu
evaluated data
- 92E18 Hoekstra, R. Wolfrum, E. Beijers, J.P.M. de Heer, F.J. Winter, H. Morgenstern, R.
Electron capture into $\text{He}^+(4l)$ states in collisions of He^{2+} on Li.
J. Phys. B 25 2587 - 2596 1992 E
 $\text{He}^{2+} + \text{Li} \rightarrow \text{He}^+(4s, 4d, 4f)$
photon spectroscopy
0.8 - 9.75 keV/amu
 $n=4 \rightarrow 3$ photon emission
- 92E19 Houver, J.C. Doweck, D. Richter, C. Andersen, N.
Strong right-left asymmetry observed in charge transfer from circular atomic states near the matching velocity.
Phys. Rev. Letters 68 162 - 165 1992 E
 $\text{H}^+ + \text{Na}(3p, m_l = \pm 1) \rightarrow \text{H}(n=2) + \text{Na}^+$
laser-excited beam technique
1.0 keV/amu
asymmetry parameter
- 92E20 Hvelplund, P. Bjornelund, S.K. Knudsen, H. Tawara, H.
Electron capture in collisions between medium velocity multiply charged ions and H_2 and H_2 .
Phys. Scripta 45 231 - 237 1992 E
 $\text{Dy}^{q+} + \text{H}_2 \rightarrow \text{Dy}^{(q-1)+}(q = 4 - 20)$; $\text{Re}^{q+} + \text{H}_2 \rightarrow \text{Re}^{(q-1)+}(q = 6 - 20)$; $\text{Ta}^{q+} + \text{H}_2 \rightarrow \text{Ta}^{(q-1)+}(q = 4 - 21)$; $\text{Au}^{q+} + \text{H}_2 \rightarrow \text{Au}^{(q-1)+}(q = 3 - 24)$; $\text{U}^{q+} + \text{H}_2 \rightarrow \text{U}^{(q-1)+}(q = 4 - 25)$
100 keV/amu (Dy, Ta, Re, U); 25 - 100 keV/amu (Au)
- 92E59 Jalbert, G. Coelho, L.F.S. de Castro Faria, N.Y.
 H^+ formation from collisional destruction of fast H_3^+ ions in noble gases
Phys. Rev. A 46 3840 - 3845 1992 E
 $\text{H}_3^+ + \text{He}, \text{Ne}, \text{Ar}, \text{Xe} \rightarrow \text{H}^+$
growth technique
4 - 7 a.u.
- 92E52 Janev, R.K.
Cross section scaling for one- and two-electron loss processes in collisions of helium atoms with multiply charged ions.
Supplement to Nucl. Fusion 3 71 - 78 1992 E
empirical formula
scaling formula
Kraystauts, E.J. Bliman, S.L.
Spectroscopy of highly charged ions using complementary techniques
Phys. Scripta T40 65 - 69 1992 E
 $\text{O}^{6+} + \text{He}, \text{H}_2 \rightarrow \text{O}^{5+}, \text{O}^{4+}(nl)$; $\text{Ar}^{7+} + \text{He}, \text{He}_2 \rightarrow \text{Ar}^{6+}, \text{Ar}^{5+}(nl)$; $\text{Ar}^{8+} + \text{He}, \text{H}_2 \rightarrow \text{Ar}^{7+}, \text{Ar}^{6+}(nl)$
photon spectroscopy
- 2 keV/amu
no cross sections given; photon spectra comparison with beam foil spectra
- 92E21 Kravis, S.D. Church, D.A. Johnson, B.M. Meron, M. Jones, K.W. Levin, J.C. Sellin, I.A. Azuma, Y. Berrah-Mansour, N. Berry, H.G. Druetta, M.
Electron transfer from H_2 and Ar to stored multiply charged Ar ions produced by synchrotron radiation.
Phys. Rev. A 45 6379 - 6387 1992 E
 $\text{Ar}^{q+}(q=3-6) + \text{H}_2, \text{Ar} \rightarrow \text{Ar}^{(q-1)+}$
Penning ion trap
thermal energies
- 92E51 Krishnamurthi, V. Krishnamurthy, M. Marathe, V.R. Mathur, D.
Translational energy spectroscopic and quantum chemical study of $\text{CS}^{q+}(q=1,2)$ radicals: charge stripping and dissociation.
J. Phys. B 25 5149 - 5162 1992 E
 $\text{CS}^{q+}(q=1,2) + \text{He} \rightarrow \text{CS}^{(q-1)+}, \text{C}^+ + \text{S}, \text{C} + \text{S}^+, \text{C}^+ + \text{S}^+$
translational energy spectroscopy
0.07 keV/amu

- 92E22 Kwong, V.H.S, Fang, Z, Jiang, Y, Gibbons, T.T, Gardner, L.D.
Measurement of thermal-energy charge transfer rate coefficient of Mo^{6+} and argon.
Phys. Rev. A 46 201 - 205 1992 E
 $\text{Mo}^{6+} + \text{Ar} \rightarrow \text{Mo}^{5+}$
ion trapping technique
thermal energy
rate coefficient
- 92E23 Lebius, H, Huber, B.A.
Electron-electron interaction in slow charge exchange collisions.
Z. Phys. D 23 61 - 66 1992 E
 $\text{Ar}^{2+}(2p^6 1S; 2p^5 3s^1 P) + \text{He} \rightarrow \text{Ar}^{3+}$
translational energy spectroscopy
0.2 keV/amu
- 92E25 Martin, S, Denis, A, Ouerdane, Y, Carre, M.
Coincidence measurements between photons, projectiles and recoil ions in low energy $\text{Kr}^{18+} + \text{Kr}$ collisions : autoionizing and radiative effect of multi-excited states.
Phys. Letters A 65 441 - 446 1992 E
 $\text{Kr}^{18+} + \text{Kr} \rightarrow \text{Kr}^{16+}, \text{Kr}^{15+} + \text{Kr}^{r+} (r = 2 - 10)$
photon-projectile-recoil ion coincidence
4 keV/amu
- 92E24 Martin, S, Denis, A, Ouerdane, Y, Carre, M, Buchet-Poulizac, M.C, Dessequelles, J.
Rydberg spectroscopy of single-electron capture in low-energy collisions of Ar^{8+} and Ar^{9+} with cesium.
Phys. Rev. A 46 1316 - 1320 1992 E
 $\text{Ar}^{8+}(1s^2 2s^2 2p^3 3s) + \text{Cs} \rightarrow \text{Ar}^{7+}(1s^2 2s^2 2p^3 3s) + \text{Cs} \rightarrow \text{Ar}^{8+}(1s^2 2s^2 2p^3 3s^2 \eta_1 = 8-12) + \text{Cs} \rightarrow \text{Ar}^{9+}(1s^2 2s^2 2p^3 3s^2 \eta_1 = 8-12)$
photon spectroscopy
0.2 and 4 keV/amu
- 92E26 McCullough, R.W, McLaughlin, T.K, Koizumi, T, Gilbody, H.B.
State-selective one-electron capture by 8 keV He^{2+} ions in collisions with oxygen atoms.
J. Phys. B 25 L193 - 197 1992 E
 $\text{He}^{2+} + \text{O}_2 \rightarrow \text{He}^+$
translational energy spectroscopy
2 keV/amu
- 92E27 McLaughlin, T.K, McCullough, R.W, Gilbody, H.B.
State-selective electron capture by slow C^{4+} ions in collisions with H and H_2 .
J. Phys. B 25 1257 - 1264 1992 E
 $\text{C}^{4+} + \text{H}, \text{H}_2 \rightarrow \text{C}^{3+}(1s^2 3s, 3p, 3d)$
translational energy spectroscopy
4 - 16 keV
- 92E28 Mokler, P.H, Stohlker, Th, Kozuharov, C, Stachura, Z, Warczak, A.
Radiative electron capture : a tool for structure studies of heavy few-electron ions.
Z. Phys. D 21 127 - 200 1992 E
 $\text{Ge}^{31+} + \text{H}_2 \rightarrow \text{Ge}^{30+}$
Photon measurement
 $4 \times 10^3 - 12 \times 10^3$ keV/amu
- 92E29 Montenegro, E.C, Sigaud, G.M, Meyerhof, W.E.
Intermediate-velocity atomic collisions V. Electron capture and loss in C^{3+} and O^{3+} collisions with H_2 and He.
Phys. Rev. A 45 1575 - 1582 1992 E
 $\text{C}^{3+} + \text{B} \rightarrow \text{C}^{2+}, \text{C}^{4+}; \text{O}^{3+} + \text{B} \rightarrow \text{O}^{2+}, \text{O}^{4+} (\text{B} = \text{H}_2, \text{He})$
growth method
125 - 333 keV/amu (C) ; 94 - 250 keV/amu (O)
- 92E61 Ogura, K, Arisawa, T, Shibata, T.
Charge transfer cross sections for heavy atom (in Japanese)
Shin-kuu (Vacuum) 35 301 - 304 1992 E
 $\text{Ga}^+ + \text{Ga} \rightarrow \text{Ga} + \text{Ga}^+$
laser-evaporation/ionization method
 $10^2 - 10^3$
- 92E30 Okuno, K, Soejima, K, Kaneko, Y.
Single- and double-electron capture in $^3\text{He}^{2+}$ - H_2 collisions at low energies from 1 to 2000 eV.
J. Phys. B 25 L105 - 108 1992 E
 $^3\text{He}^{2+} + \text{H}_2, \text{He} \rightarrow \text{He}^+, \text{He}^0$
attenuation method
 $0.3 \times 10^{-3} - 0.7$ keV/amu

- 92E31 Panev, G.S. Vitanov, N.V.
Total charge transfer cross sections in collisions of Sr⁺ ions with Mg and Ca atoms.
J. Phys. B 25 L23 - 27 1992 E
Sr⁺ + Mg, Ca → Sr
growth method
2.8x10⁻³ - 1.5x10⁻² keV/amu
- 92E53 Peart, B. Hayton, D.A.
Merged beam measurements of mutual neutralization of H⁺ and H⁻ ions.
J. Phys. B 25 5109 - 5119 1992 E
H⁺ + H⁻ → H + H
merged-beam technique
0.003 - 0.5 keV/amu
- 92E54 Phaneuf, R.A. Janev, R.K. Tawara, H. Kimura, M. Krstic, P.S. Peach, G. Mazing, M.A.
Status and critical assessment of the database for collisions of Be⁹⁺ and B⁸⁺ ions with H, H₂, He.
Supplement to Nucl. Fusion 3 105 - 112 1992 E
Be⁹⁺(q=1-4), B⁸⁺(q=1-5) + T → Be^{(q-1)+}, B^{(q-1)+}, (T = H, H₂, He)
T : evaluation
- 92E32 Posthumus, J.H. Lukey, P. Morgenstern, R.
The influence of angular momentum on double electron capture by highly charged ions.
J. Phys. B 25 987 - 999 1992 E
C⁶⁺ + H₂ → C⁴⁺(3131⁺) ; O⁸⁺ + He → O⁶⁺(3131⁺)
electron spectroscopy
96 keV
- 92E33 Posthumus, J.H. Morgenstern, R.
Coincidences between electrons and target ions to identify capture channels in collisions of multiply charged ions on gas targets.
Phys. Rev. Letters 68 1315 - 1318 1992 E
Ar⁹⁺ + Ar → Ar⁽⁹⁻ⁿ⁾⁺ (n = 2 - 6)
electron-recoil ion coincidence technique
2.7 keV/amu
electron energy spectra ; no cross sections
- 92E57 Posthumus, J.H. Morgenstern, R.
Multiple electron capture in slow Ar⁹⁺ and C⁵⁺ on Ne, studied by e⁻Ne⁹⁺ coincidences.
J. Phys. B 25 4533 - 4552 1991 E
C⁵⁺ + Ne → C⁽⁵⁻ⁱ⁾⁺ + Neⁱ⁺ (i = 2,3) ; Ar⁹⁺ + Ne → Ar⁽⁹⁻ⁱ⁾⁺ + Neⁱ⁺ (i = 2 - 5)
e-recoil ion coincidence technique
6.7 keV/amu (C) ; 2.7 keV/amu (Ar)
- 92E62 Reid, C.J.
State compositions of beams of C⁺, O⁺, S⁺ and Cl⁺ ions determined using charge-inversion spectroscopy
J. Phys. B 25 475 - 490 1992 E
C⁺ + Xe → C⁻ ; O⁺ + Kr, Xe → O⁻ ; S⁺ + NO → S⁻ ; Cl⁺ + Xe → Cl⁻
translational energy spectroscopy
- 92E63 Reid, C.J.
Sequential electron capture reactions and state compositions of beams of first-row diatomic cations
J. Phys. B 25 4249 - 4271 1992 E
O₂⁺, NO⁺, CF⁺, CH⁺, NH⁺, CN⁺ + Xe → O₂⁻, NO⁻, CF⁻, CH⁻, NH⁻, CN⁻
translational energy spectroscopy
0.5 keV/amu
many cations include a fraction of metastable states
- 92E34 Roller-Lutz, Z. Finek, K. Wang, Y. Lutz, H.O.
Angle-differential measurement of H(2p) electron capture in H⁺ collision with Na(3s) and laser-excited Na(3p) atoms.
Phys. Letters A 169 173 - 176 1992 E
H⁺ + Na(3s), Na(3p) → H(2p)
laser-excited Na target
1 keV/amu
angular distribution (0.05 - 0.3)
- 92E35 Saito, M. Imai, M. Iwasawa, K. Sakura, N. Imanishi, N. Fukuzawa, F.
Cross sections of charge exchange for fast He ions passing through Zn vapor.
J. Phys. Soc. Japan 61 2748 - 2753 1992 E
He + Zn → He⁺, He²⁺ ; He⁺ + Zn → He⁺, He⁰ ; He²⁺ + Zn → He⁺, He⁰
growth technique
200 - 500 keV/amu

- 92E36 Sakabe, S. Izawa, Y. Hashida, M. Nakai, S. Yamanaka, C.
Symmetric charge transfer cross sections for gadolinium in the energy range 10 - 1000 eV.
Phys. Rev. A 45 252 - 258 1992 E
Ga⁺ + Ga → Ga + Ga⁺
laser-evaporation/ionization method
6x10⁻⁵ - 6x10⁻³ keV/amu
- 92E37 Schlatmann, A. Hoekstra, R. Folkerts, H.O. Morgenstern, R.
Electron capture and excitation in He²⁺-Na collisions.
J. Phys. B 25 3155 - 3164 1992 E
He²⁺ + Na → He⁺(n = 4→3; 5→3; 4→2; 3→2) + Na*(3p→3s; 4p→3s; 4d→3p)
photon spectroscopy
2 - 9 keV/amu
photon emission cross sections
- 92E38 Schulz, M. Blankenship, D.M. Bross, S.W. Gaus, A.D. Gay, T.J. Htwe, W. Park, J.T. Peacher, J.L.
State-selective capture in collisions of protons with noble gases.
Phys. Rev. A 46 3870 - 3876 1992 E
H⁺ + B → H(2p) (B = He, Ne, Ar)
Lyman-alpha-H coincidence technique
50 keV/amu
angular distribution
- 92E39 Seely, D.G. Bross, S.W. Gaus, A.D. Edwards, J.W. Schulz, D.R. Gay, T.J. Park, J.T. Peacher, J.L.
Angular-differential cross sections for H(2p) formation in intermediate-energy proton-helium collisions.
Phys. Rev. A 45 R1287 - 1290 1992 E
H⁺ + He → H(2p)
E : photon-projectile coincidence ; T : CTMC
25 - 100 keV/amu
angular distributions
- 92E40 Shah, M.B. McCallion, P. Itoh, Y. Gilbody, H.B.
Electron capture and ionization in collisions of fast H⁺ and He²⁺ ions with magnesium atoms.
J. Phys. B 25 3693 - 3708 1992 E
H⁺, He²⁺ + Mg → H, He⁺ + Mgⁱ⁺ (i = 1 - 4)
projectile-recoil ion coincidence technique
90 - 2000 keV/amu (H) ; 43 - 500 keV/amu (He)
- 92E41 Shinpaugh, J.L. Sanders, J.M. Hall, J.M. Lee, D.H. Schmidt-Böcking, H. Tipping, T.N. Zouros, T.J. Richard, P.
Electron capture and target ionization in collisions of bare projectile ions incident on helium.
Phys. Rev. A 45 2922 - 2928 1992 E
A^{Z+} + He → A^{(Z-1)+} + He⁺, A^{(Z-1)+} + He²⁺ + e, A^{Z+} + He⁺ + e, A^{Z+} + He²⁺ + 2e (A = C, N, O, F)
projectile-recoil ion coincidence method
25x10² - 2x10³ keV/amu
- 92E42 Soejima, K. Latimer, C.J. Okuno, K. Kobayashi, N. Kaneko, Y.
Cross sections for single and multiple electron capture in low energy collisions of C⁴⁺ with H₂O₂ and N₂.
J. Phys. B 25 3009 - 3014 1992 E
C⁴⁺ + H₂O₂, N₂ → C³⁺, C²⁺, C⁺
3x10⁻⁴ - 0.7 keV/amu
- 92E58 Stöhlker, Th. Kozhuharov, Ch. Mokler, P.H. Olson, R.E. Stachura, Z. Warczak, A.
Single and double electron capture in collisions of highly ionized, decelerated Ge ions with Ne.
J. Phys. B 25 4522 - 4532 1992 E
Ge³¹⁺ + Ne → Ge³⁰⁺, Ge²⁹⁺
E : growth-method ; T : CTMC
(4 - 12)x10³ keV/amu
- 92E43 Stöhlker, Th. Kozhuharov, C. Livingston, A.E. Mokler, P.H. Stachura, Z. Warczak, A.
Radiative electron capture into K-, L- and M-shell of decelerated hydrogenic Ge projectiles.
Z. Phys. D 23 121 - 125 1992 E
Ge³¹⁺ + H₂ → Ge³⁰⁺
radiative capture technique
4.5x10³ - 10x10³ keV/amu
- 92E44 Suraud, M.G. Bilman, S. Hitz, D. Rubensson, J.E. Nordgren, J. Bonnet, J.J. Bonnetoy, M. Chassevent, M. Fleury, A. Cornille, M. Knysiautas, E.J. Barany, A.
Slow collisions of O⁶⁺ with H₂ at 3.8 keV/amu.
J. Phys. B 25 2363 - 2381 1992 E
O⁶⁺ + H₂ → O⁵⁺(1s²n^l) ; O⁴⁺(1s²n^ln^{l'})
photon spectroscopy
3.8 keV/amu
relative cross sections

- 92E45 Vermeeren, L. Lievens, P. Buekenhoudt, A. Silverans, R.E.
Charge exchange collisions between alkaline-earth ions and alkaliatoms.
J. Phys. B 25 1009 - 1019 1992 E
Ba(5d,6s) + Na,Rb,Cs → Ba; Sr(4d,5s) + Na,Rb → Sr; Cr(3d,4s) + Na → Ca
laser-excited target technique
0.5 - 30 keV
- 92E46 Wolfrum, E. Hoekstra, R. de Heer, F.J. Morgenstern, R. Winter, H.
Absolute visible light emission cross sections for electron capture from Li atoms by
slow, highly charged ions.
J. Phys. B 25 2597 - 2606 1992 E
C⁶⁺, Ne⁸⁺(q=6,7,8,9) + Li → C⁵⁺(n=8->7,7->6), Ne^{(q+1)+}(n=10->9,9->8,8->7)
photon spectroscopy
1 - 9 keV/amu
300 - 600 nm photons
- 92E47 Wolfrum, E. Schweinzer, J. Winter, H.
Suppressed electron capture in slow O⁺(⁴S^o,²D^o,²P^o) - He collisions.
Phys. Rev. A 45 R4218 - 4221 1992 E
O⁺(⁴S^o,²D^o,²P^o) + He → O⁰(³P)
translational energy spectroscopy + attenuation method
0.06 - 0.38 keV/amu
- 92I62 Amezian, K. Bacchus-Montabonel, M.C.
Ab initio molecular calculation of the SHE²⁺ and SH²⁺ multicharged ions
Chem. Phys. Letters 199 487 - 490 1992 T
S²⁺ + H₂, He → S⁺
ab initio calculation
Potential energy curves
- 92T 1 Avakov, G.V. Blokhinisev, L.D. Kadyrov, A.S. Mukhamedzhanov, A.M.
Electron capture in proton collisions with alkali atoms as a three-body problem.
J. Phys. B 25 213 - 219 1992 T
H⁺ + Li → H(nl; n=1-5, total); H⁺ + Na → H(2s,2p; total); H⁺ + K, Rb → H(total)
Impact parameter method with Fadeev three-body approach
5x10⁻² - 5x10 keV/amu
- 92T26 Bacchus-Montabonel, M.C.
Theoretical study of electron-capture processes in the collision of the metastable N²⁺
(1s2s) multicharged ion on a He target.
Phys. Rev. A 46 217 - 221 1992 T
N²⁺(1s2s) + He → N¹⁺(1s2nl=3s,3p,3d) + He → N⁴⁺(1s²) + He → N⁴⁺(1s²nl=3s,3p,3d)
MD
3.5 keV/amu
- 92T 3 Bachau, H. Gayet, R. Hanssen, J. Zerkarka, A.
Transfer and excitation in ion-atom collisions at high impact velocities; a unified
continuum distorted wave treatment of resonant and non-resonant modes in a four-
body approach: II application to the collision S¹⁵⁺(1s) + H(1s).
J. Phys. B 25 839 - 852 1992 T
S¹⁵⁺ + H, Be³⁺, Ne⁹⁺, S¹⁵⁺ → S¹⁴⁺(nl,n'l)
CDW-4B
2x10³ - 2.3x10⁴ keV/amu
- 92T 2 Bachau, H. Roncin, P. Harel, C.
Stabilization of autoionizing states during ion-atom collisions.
J. Phys. B 25 L109 - 115 1992 T
O⁸⁺ + H₂ → O⁶⁺(n,n')
- 92T53 Belkic, D. Gayet, R. Salin, A.
Cross sections for electron capture by fully stripped ions from atomic hydrogen.
At. Data and Nucl. Data Tables 51 59 - 150 1992 T
A^{z+} + H(1s) → A^{(z-1)+}(nlm) + H⁺ (A = H, He, Li, Be, B, C, O)
CDW method
40 - 10000 keV/amu
- 92T54 Belkic, D. Mancev, I.
Formation of H⁻ by double charge exchange in fast proton-helium collisions.
Phys. Scripta 45 35 - 42 1992 T
H⁺ + He → H⁻ + He²⁺
CDW approx.
20 - 1000 keV/amu
- 92T 4 Chen, M.H.
Resonant transfer and excitation in collisions of chlorine-like ions with H₂ targets.
Phys. Rev. A 45 4604 - 4609 1992 T
Fe¹⁸⁺, Nb²⁴⁺, La⁴⁰⁺ + H₂ → Fe¹⁸⁺, Nb²⁴⁺, La³⁹⁺
Impulse approx. + Multi-configuration Dirac-Fock method
535 - 2100 keV/amu (Fe); 1.4x10³ - 4.1x10³ keV/amu (Nb); 2.9x10³ - 5.8x10³
keV/amu (La)

- 92T 5 Choudhury, K.S. Sural, D.P.
Electron capture in ground and excited states in proton-alkali-metal-atom collisions.
J. Phys. B 25 853 - 867 1992 T
 $H^+ + B \rightarrow H(1s, 2s, 2p) + B^+$ ($B = Na, K, Rb, Cs$)
Impulse approx.
50 - 500 keV/amu
angular differential cross sections
- 92T163 Corcchs, S.E. Dubé, L.J. Maitagan, J.M. Rivarola, R.D. Salin, A.
Uniqueness of the minimal form of Coulomb asymptotic behavior in atomic collisions
J. Phys. B 25 2027 - 2036 1992 T
Impact parameter approx.
- 92T27 Crothers, D.S.F. O'Rourke, S.F.C.
Half-way house variational continuum distorted waves and anisotropy in electron capture to the continuum: The Thomas double scattering limit.
J. Phys. B 25 2351 - 2362 1992 T
CDW approx.
analytical expressions obtained
- 92T 6 Datta, S.
Electron capture by fast protons from carbon, neon and argon in the Coulomb Born approximation.
J. Phys. B 25 1001 - 1008 1992 T
 $H^+ + B \rightarrow H + B^+(K)$ ($B = C, Ne, Ar$)
Coulomb-Born approx.
 $10^2 - 2 \times 10^3$ keV/amu (C); $3 \times 10^2 - 7 \times 10^3$ keV/amu (Ne); $1 \times 10^3 - 2 \times 10^4$ keV/amu (Ar)
- 92T64 Dewangan, D.B. J. Eichler
The Z-expansion method of Macek and Coulomb boundary conditions
Comm. At. Mol. Phys. 27 317 - 333 1992 T
- 92T28 Dutta, C.M. Lane, N.F. Kimura, M.
Theoretical study of non resonant ${}^3He^+ + {}^4He \leftrightarrow {}^3He + {}^4He^+$ charge transfer in the threshold region.
Phys. Rev. A 46 3889 - 3892 1992 T
 ${}^3He^+ + {}^4He \rightarrow {}^3He + {}^4He^+$; ${}^4He^+ + {}^3He \rightarrow {}^4He + {}^3He^+$
quantum mechanical cal.
 $2.5 \times 10^7 - 1 \times 10^4$ keV/amu
- 92T29 Ermalaev, A.M.
Mutual neutralization in collisions between negative hydrogen ions and singly-charged positive ions II: He^+ and Li^+ projectile at low-keV energies.
J. Phys. B 25 3133 - 3144 1992 T
 $He^+(1s) + H \rightarrow He(1snl; n=2,3,4) + Li^+(1s^2) + H \rightarrow Li(1s^2nl; n=2,3,4)$
two-center AO
0.25 - 25 keV/amu (He^+); 0.07 - 25 keV/amu (Li^+)
- 92T55 Errea, L.F. Harel, C. Jouin, H. Maitagan, J.M. Mendez, L. Pons, B. Riera, A.
Plane-wave and common-translation-factor treatments of $He^{2+} + H$ collisions at high velocities.
Phys. Rev. A 46 5617 - 5630 1992 T
 $He^{2+} + H \rightarrow He^+(n=1,2,3)$
MO + Plane-wave + common translation factor method
also excitation to $H(n=2,3)$
- 92T 7 Errea, L.F. Lopez, A. Mendez, L. Riera, A.
Elastic, inelastic and charge exchange differential cross sections in $He^+ + H$ collisions.
J. Phys. B 25 811 - 824 1992 T
 $He^+ + H \rightarrow He + H^+$
MO with translation factor
0.4 - 6 keV/amu
angle-differential cross sections
- 92T30 Fritsch, W.
An improved model description for single electron capture processes from H_2 molecules.
Phys. Letters A 166 238 - 242 1992 T
 $H^+ + H_2 \rightarrow H(\text{total}, 2s, 2p)$
close-coupling AO calculation with one-electron potential + two-electron wave function
1.5 - 100 keV/amu
- 92T31 Fritsch, W.
Model description for single-electron transfer in slow-ion- H_2 -molecule collisions: studies for H^+ , He^{2+} and C^{4+} projectiles.
Phys. Rev. A 46 3910 - 3917 1992 T
 $H^+ + H_2 \rightarrow H(2p)$; $He^{2+} + H_2 \rightarrow He^+, He^+(2s)$; $C^{4+} + H_2 \rightarrow C^{3+}(n=3, 3s, 3p, 3d)$
one-electron potential model + close-coupling calculation
1 - 50 keV/amu (H); $1 - 10^2$ keV/amu (He); 4 - 30 keV/amu (C)

- 92T32 Fritsch, W. Lin, C.D.
One- and two-electron capture in collisions of slow B^{4+} and Be^{4+} ions with helium.
Phys. Rev. A 45 6411 - 6416 1992 T
 $B^{4+} + He \rightarrow B^{3+}(2s,2p), B^{2+}(2l2l')$; $Be^{4+} + He \rightarrow Be^{3+}(2s,2p), Be^{2+}(2l,2l')$
two-center AO
1.5 - 30 keV/amu
- 92T56 Fukuda, H. Ishihara, T.
Distorted atomic-orbital expansion for slow ion-atom collisions.
Phys. Rev. A 46 5531 - 5538 1992 T
 $He^{2+} + H \rightarrow He^{+}(n=2,2s,2p) + H^{+}$
distorted AO model
(5 - 50) $\times 10^{-3}$ keV/amu
- 92T10 Gayet, R. Hanssen, J.
Transfer and excitation in ion-atom collisions at high impact velocities; a unified continuum distorted wave treatment of resonant and non-resonant modes in a four body approach.
J. Phys. B 25 825 - 837 1992 T
general theory
CDW-4B method
- 92T57 Glass, J.T. McCann, J.F. Crothers, D.S.F.
Electron capture at semi-relativistic energies: distorted wave models.
J. Phys. B 25 L541 - 544 1992 T
general discussion
DW approx.
- 92T 8 Gravielle, M.S. Miraglia, J.E.
Double-electron capture as a two-step process.
Phys. Rev. A 45 2965 - 2973 1992 T
 $He^{2+} + He(1s^2) \rightarrow He(1s^2) + He^{2+}; Li^{3+} + He(1s^2) \rightarrow Li^{+}(1s^2); B^{4+} + He(1s^2) \rightarrow B^{3+}(1s^2)$
DW approx.
50 - 700 keV/amu
angular distributions also
- 92T34 Hahn, Y.
Transfer excitation with shake-up and target charge effects.
Phys. Letters A 169 458 - 462 1992 T
 $F^{6+} + H_2 \rightarrow F^{3+}$
inclusion of shake-up and target charge
 $7 \times 10^2 - 2.4 \times 10^4$ keV/amu
- 92T 9 Hansen, J.P.
Dynamics of single- and double-electron capture in C^{4+} -He collisions.
J. Phys. B 25 L17 - 22 1992 T
 $C^{4+} + He \rightarrow C^{3+}(2s,2p,2s^2,2s2p,n=3); C^{2+}$
two-center closed-coupling method
0.75 - 1.1×10^4 keV/amu
- 92T11 Hansen, J.P. Dubois, A. Nielsen, S.E.
Partial cross sections and correlation effects in B^{3+} -He collisions.
Phys. Rev. A 45 184 - 189 1992 T
 $B^3 + He \rightarrow B^{2+}(2s;2p)$
one-electron model/two-electron model
1 - 500 keV/amu
- 92T58 Hansen, J.P. Nielsen, S.E. Dubois, A.
Trajectory-interference effects in ion-atom collisions.
Phys. Rev. A 46 R5331 - 5333 1992 T
 $H^{+} + H \rightarrow H(2p_{\pm 1}); He^{2+} + H \rightarrow He^{+}(2p_{\pm 1}) + H^{+}$
eikonal approx.
50 keV/amu
angular distribution, orientation parameters
- 92T33 Hansen, J.P. Taulbjerg, K.
Electron correlation in highly-charged ion collisions.
Phys. Rev. A 45 R4214 - 4217 1992 T
 $C^{3+} + He \rightarrow C^{3+}(1s2l2l')$
coupled-channel method
2 - 6 keV/amu
- 92T12 Harel, C. Jouin, H.
Double capture into autoionizing states in $F^{8+} + He$ collisions at low impact energies.
J. Phys. B 25 221 - 237 1992 T
 $N^{7+}, O^{6+}, Ne^{5+} + He \rightarrow N^{3+}, O^{6+}, Ne^{6+}(nl,n'l')$
OEEM
0.8 - 9 keV/amu

- 92T13 Jackson, D. Slim, H.A. Bransden, B.H. Flower, D.R.
Excitation and charge transfer in He⁺-H collisions.
J. Phys. B 25 L127 - 130 1992 T
³He⁺ + H → He + H⁺
AO
7 - 300 keV
He⁺ + H → He⁺ + H⁺(2p)
- 92T60 Kürpick, P. Ludde, H.J. Sepp, W.D. Fricke, B.
Application of inclusive probability theory to heavy ion-atom collisions.
Z. Phys. D 25 17 - 21 1992 T
Ne⁸⁺ + Ne → Ne⁸⁺(1s²) + Ne⁺(K)
inclusive probability theory + independent particle model
130 keV/amu
- 92T35 Kazansky, A.K.
The rotation-Stark mechanism of creating large-L Rydberg states in double charge exchange.
J. Phys. B 25 L381 - 387 1992 T
production of large L Rydberg states
- 92T59 Krstic, P.S. Radmilovic, M. Janev, R.K.
Charge exchange, excitation and ionization in slow Be⁴⁺ + H and B³⁺ + H collisions.
Supplement to Nucl. Fusion 3 113 - 125 1992 T
Be⁴⁺, B³⁺ + H(n=1,2) → Be³⁺(total,n)
superpromotion model
0.2 - 100 keV/amu
- 92T14 Kuang, Y.R.
Electron capture by protons and alpha particles from two-electron targets.
J. Phys. B 25 199 - 221 1992 T
H⁺, He²⁺ + B²⁺(1s²) → H(1s), He⁺(1s) (B = He, Be, B, C, N, O) ; He²⁺ + Li(1s²) → He⁺(1s) + Li⁺(K⁻¹)
two-orthogonal state expansion method
20 - 2000 keV/amu
scaling $\sigma^*Z_1^2Z_p^3 - (E/25)^*Z_p^2$
- 92T36 Kumikeev, Sh.D. Senashenko, U.S.
Effect of the target core on electron capture into the continuum of a fast neutral atom.
Sov. Phys. -JETP 75 452 - 446 1992 T
He + He → He + He⁺
target ion core model
25 - 125 keV/amu
- 92T61 Kürpick, P. Sepp, W.D. Fricke, B.
Inclusive probability calculations for the K-vacancy transfer in collisions of S¹⁵⁺ on Ar.
J. Phys. B 25 5431 - 5437 1992 T
S¹⁵⁺(1s) + Ar → S¹⁴⁺(1s²) + Ar⁺(K)
CC with relativistic HFS
146 - 500 keV/amu
- 92T15 Lewartowski, E. Coubin, C.
Classical model of electron capture from oriented sodium atoms.
J. Phys. B 25 L63 - 68 1992 T
H⁺ + Na⁺(3p_m) → CTMC
1 - 3 keV/amu
- 92T37 Lundsgaard, M.F.V. Lin, C.D.
Reduced close-coupling calculations for electron capture processes in collisions of multiply charged ions with atoms.
J. Phys. B 25 L429 - 434 1992 T
C⁶⁺ + H → C⁵⁺(n=4,5)
semiclassical IP
0.1 - 30 keV/amu
- 92T65 Macek, J.
Reply to "Some remarks on the theory of high energy electron capture in ion-atom collisions"
Comm. At. Mol. Phys. 27 177 - 183 1993 T
- 92T38 Macek, J. Ovchinnikov, S.Y.
Anomalous n dependence of low energy electron capture from atomic hydrogen by multicharged ions.
Phys. Rev. Letters 69 2357 - 2359 1992 T
O⁷⁺ + H(n) → O⁶⁺ + H⁺
(8 - 800) × 10⁻³ keV/amu
σ - n⁷

- 92T139 Martinez, A.E. Bullrich, J.A. Maidagan, J.M. Rivarola, R.D.
The continuum distorted-wave-ekonal initial state model for single electron capture in ion-atom collisions.
J. Phys. B 25 1883 - 1891 1992 T
H⁺ + H₁He → H(2s,2p)
continuum CDW-ekonal approx.
20 - 10³ keV/amu
- 92T140 Marxer, H. Briggs, J.S.
Total cross sections for K-K electron transfer in fast ion-atom collisions ; the impulse and strong potential Born approximations.
J. Phys. B 25 3823 - 3848 1992 T
H⁺ + B → H(1s) + B^{+(K⁻¹)} (B = C, Ne, Ar) ; He²⁺ + Ne → He^{+(1s)} + Ne^{+(K⁻¹)} ; Li³⁺ + C → Li^{2+(1s)} + C^{+(K⁻¹)} ; C⁺ + Ar → C^{3+(1s)} + Ar^{+(K⁻¹)}
strong potential Born , IP approx.
300 - 15000 keV/amu
- 92T16 Maynard, G. Janev, R.K. Katsonis, K.
Electron capture and ionization in collisions of multicharged neon ions with atomic hydrogen.
J. Phys. B 25 437 - 444 1992 T
Ne^{q+} + H → Ne^{(q-1)+} + H⁺ (q = 3 - 10)
CTMC
10 - 10³ keV/amu
also Ne^{q+} + H → Ne^{q+} + H⁺ + e ; scaling over q/energy
- 92T17 McCann, J.F.
The distorted-wave impulse approximation for electron capture processes at intermediate collision energies.
J. Phys. B 25 449 - 461 1992 T
H⁺ + H → H + H⁺ ; Li³⁺ + Ne → Li²⁺ + Na^{+(K⁻¹)}
DW-impulse approx.
50 - 800 keV/amu (H); 2x10² - 6x10³ keV/amu (Li)
- 92T66 Mo, O. Riera, A.
On Na atom excitation in low energy H + Na collisions
J. Phys. B. 25 1101 - 104 1992 T
H + Na(3s) → H + Na(3p;4s)
MO with common translation factor
- 92T41 Moisewitsch, B.L.
Ultra-high relativistic energy limit for electron capture.
J. Phys. B 25 L487 - 489 1992 T
3rd order OBK approx.
- 92T42 Moisewitsch, B.L.
Fine structure constant expansions for electron capture.
J. Phys. B 25 3015 - 3020 1992 T
H⁺ + H → H + H⁺; C⁶⁺ + Au → C^{5+(1s)} + Au^{+(K⁻¹)}; Ne¹⁰⁺ + B → Ne^{9+(1s)} + B^{+(K⁻¹)}
(B = Al, Zn, Ag, Ta, Au); Ar¹⁸⁺ + B → Ar^{17+(1s)} + B^{+(K⁻¹)} (B = Cu, Ag, Ta, Au)
1st and 2nd Born + ekonal approx.
10⁴ - 10⁶ keV/amu (H); 4x10⁵ - 10x10⁵ keV/amu
- 92T43 O'Rourke, S.F.C. Crothers, D.S.F.
Half way house variational continuum distorted wave theory : high energy cross sections in the distorted wave perturbation approximation.
Z. Phys. D 24 165 - 169 1992 T
H⁺ + H → H(1s) + H⁺
CDW approx. + perturbation theory
- 92T67 Olson, R.E. Pascale, J. Hoekstra, R.
Lineemission from C⁶⁺, O⁸⁺ + Lielelectron capture collisions
J. Phys. B 25 4242 - 4247 1992 T
C⁶⁺, O⁸⁺ + Li(2s) → C^{5+(nl)}, O^{7+(nl)} + Li⁺
CTMC
1 - 10keV/amu
maximum at n=7 for C⁶⁺ and at n=8-9 for O⁸⁺
- 92T44 Pleksman, M. Ovchinnikov, S.Yu.
Asymptotic dependence of the electron capture cross section on the n quantum number in slow He²⁺-H collisions.
J. Phys. B 25 L373 - 380 1992 T
He²⁺ + H → He^{+(n : n≤30)}
superpromotion model
1 - 25 keV/amu

- 92T18 Sakabe, S. Izawa, Y.
Simple formula for the cross sections of resonant charge transfer between atoms and their positive ions at low impact velocity.
Phys. Rev. A 46 1704 1992 T
 $A^+ + A \rightarrow A + A^+$
impact parameter method
 4.7×10^{-5} - 46 keV/amu
correction to Phys. Rev. A 45 (1992) 2086
- 92T19 Salin, A.
Comments on strong potential Born expansions for ion-atom collisions.
J. Phys. B 25 L137 - 143 1992 T
strong potential Born approx.
- 92T46 Schultz, D.R. Reinhold, C.O. Olson, R.E.
Classical calculation of high-energy electron capture in 5 MeV proton-hydrogen collisions.
Phys. Rev. A 46 666 - 669 1992 T
 $H^+ + H \rightarrow H$
CTMC
 5×10^3 keV/amu
angular distribution
- 92T45 Schulz, D.R. Reinhold, C.O. Olson, R.E. Seely, D.G.
Differential cross sections for state-selective electron capture in 25 - 100 keV proton-helium collisions.
Phys. Rev. A 46 275 - 283 1992 T
 $H^+ + He \rightarrow H(2s, 2p, 3s, 3p, 4s, 4p)$
CTMC
25 - 100 keV/amu
- 92T20 Shimakura, N. Itoh, M. Kimura, M.
Molecular treatment of electron capture in collisions of N^{4+} ions with H atoms.
Phys. Rev. A 45 267 - 275 1992 T
 $N^{4+} + H \rightarrow N^{3+}(2s3s; 2s3p; 2s3d; 2p3s)$
MO
 1×10^{-3} - 10 keV/amu
- 92T47 Shimakura, N. Koizumi, S. Suzuki, S. Kimura, M.
Molecular treatment of electron capture in atomic collisions in the me-to-keV-energy regime : collisions of C^{3+} ions with H atoms and the effect of core electrons.
Phys. Rev. A 45 7876 - 7882 1992 T
 $C^{3+}(1s) + H \rightarrow C^{2+}(1snl)$
quantum mechanical + MO methods
 1×10^{-5} - 0.8 keV/amu
- 92T21 Sizun, M. Grimbert, D. Sidis, V. Baer, M.
Vibrational state-to-state calculations of $H^+ + O_2$ charge transfer collisions.
J. Chem. Phys. 96 307 - 325 1992 T
 $H^+ + O_2(X^3\Sigma_g^-; v) \rightarrow H + O_2(X^3\Pi_g^-; v')$
quantal infinite order sudden approx. + vibronic semiclassical approx.
 2×10^{-2} keV/amu
also $H^+ + O_2(X^3\Sigma_g^-; v')$
- 92T23 Toshiima, N.
Absence of the Thomas peak in the classical-trajectory Monte Carlo calculations for proton-hydrogen collisions in the MeV region.
Phys. Rev. A 45 R2663 - 1992 T
 $H^+ + H \rightarrow H + H^+$
CTMC
 2.8×10^3 , 5×10^3 keV/amu
- 92T48 Toshiima, N. Eichler, J.
Nonperturbative treatment of the Thomas mechanism in electron capture.
Phys. Rev. A 46 2564 - 2571 1992 T
 $H^+ + H \rightarrow H + H^+$
nonperturbative coupled-channel calculation
($1 - 5$) $\times 10^3$ keV/amu
angular distributions
- 92T49 Toshiima, N. Igarashi, A.
Second Born approximation differential cross sections for p + H and p + He charge exchange collisions.
Phys. Rev. A 45 6313 - 6317 1992 T
 $H^+ + H \rightarrow H + H^+$; $H^+ + He \rightarrow H + He^+$
exact 2nd Born approx.
 1×10^3 - 2.8×10^3 keV/amu (H); 2.8×10^3 - 7.4×10^3 keV/amu (He)

- 92T22 Toshima, N. Shingal, R. Lin, C.D.
Orientation parameters and dipole moments of $\text{He}^+(n=2)$ states in $\text{He}^+ + \text{H}$ collisions : comparison of CTMC and close-coupling results.
J. Phys. B 25 L11 - 15 1992 T
 $\text{He}^2+ + \text{H} \rightarrow \text{He}^+(n=2)$
CTMC + closed-coupling expansion
10, 25, 50 keV/amu
- 92T50 Vaeck, N. Hansen, J.E.
Competition between radiative and non-radiative decay processes in triply-excited $3l3'l''$ and doubly-excited $2lnl'$ states in nitrogen ions.
J. Phys. B 25 3267 - 3282 1992 T
 $\text{N}^{7+} + \text{Ar} \rightarrow \text{N}^{6+}(3l3'l''), \text{N}^{5+}(2lnl')$
CI approx.
radiative and non-radiative decay rates
- 92T51 Vaeck, N. Hansen, J.E.
Calculations of autoionization rates for double-Auger decay of multiply-excited states in nitrogen.
J. Phys. B 25 3613 - 3619 1992 T
double-Auger rates for $\text{N}(\text{K}^{-2})$ states
- 92T24 Vitinov, N. Panev, G.
Generalization of the Demkov formula in near-resonant charge transfer.
J. Phys. B 25 239 - 248 1992 T
 $\text{Li}^+ + \text{Na} \rightarrow \text{Li}; \text{K}^+ + \text{Rb} \rightarrow \text{K}$
generalized Demkov formula
- 92T68 Wang, J. Reinhold, C.O. Burgdörfer, J.
Electron-electron interaction and two-center effects in projectile ionization at backward emission Angles
Phys.Rev.A. 45 4507 - 4518 1992 T
 $\text{He}^+, \text{He} + \text{He} \rightarrow$
CDW-EIS approx.; CTMC
500 keV/amu
- 92T25 Winter, T.G.
Coupled-Sturmian and perturbative treatments of electron transfer and ionization in high energy p-He⁺ collisions.
Phys. Rev. A 45 1562 - 1568 1992 T
 $\text{H}^+ + \text{He}^+ \rightarrow \text{H} + \text{He}^{2+}; \text{H}^+ + \text{He}^{2+} + \text{e}$
coupled-Sturmian approx.
225 - 2000 keV/amu
- 92T52 Zygelman, B. Cooper, D.L. Ford, M.J. Dalgarno, A. Gertraut, J. Raimondi, M.
Charge transfer of N^{4+} with atomic hydrogen.
Phys. Rev. A 46 3846 - 3854 1992 T
 $\text{N}^{4+} + \text{H} \rightarrow \text{N}^{3+}(2s3l) (l = 0,1,2)$
close-coupling MO calculation
0.007 - 0.6 keV/amu
also rate coefficient

- 93E 1 Afrosimov, V.V., Barash, D.F., Basalaev, A.A., Gushchina, N.A., Lozhkin, K.O., Nikulin, V.K., Panov, M.N., Stepanov, I. Yu.
Single- and double-electron capture from many-electron atoms by alpha particles in the MeV energy range
JETP 74 554 - 742 1993 E
 $\text{He}^{2+} + \text{B} \rightarrow \text{He}^+ \text{He}^0$ (B = He, Ne, Ar, Kr, Xe, N₂)
E: growth method; T: target CDW method
100 - 2.5x10³ keV/amu
- 93E 2 Ali, R., Cocke, C.L., Raphaelian, M.L.A., Stockli, M.
On the radiative stabilization in slow double-electron capture collisions of highly charged ions with neutral atoms
J. Phys. B 26 L177 - 184 1993 E
 $\text{Kr}^{q+}(q=1,3-34) + \text{Ar} \rightarrow \text{Kr}^{(q-2)+} + \text{Ar}^{2+}(q=6-17) + \text{Ar} \rightarrow \text{Ar}^{(q-2)+}$
projectile-recoil ion coincidence
10 keV/amu
- 93E 3 Ali, R., Cocke, C.L., Raphaelian, M.L.A., Stockli, M.
Angular distributions in charge-transfer collisions of 50keV Ar¹⁵⁺ with Ar
J. Phys. B 26 L685 - 692 1993 E
 $\text{Ar}^{15+} + \text{Ar} \rightarrow \text{Ar}^{14+} + \text{Ar}^{1+}(i=1,2,3,4) + \text{Ar}^{13+} + \text{Ar}^{15+}$
TOF coincidence technique
1.25 keV/amu
halo-scattering, angular distribution
- 93E 4 Alsmour, B., Urbain, X., Brouillard, F., Cornet, A.
Formation of H⁺ in the collision of H(3s) with helium and neon
J. Phys. B 26 1317 - 1327 1993 E
 $\text{H}(3s) + \text{He}, \text{Ne} \rightarrow \text{H}^+$
translational energy spectroscopy
0.4 - 3.0 keV/amu
cross section ratios for H(2s)/H(3s) and H(2s)/H(1s) given
- 93E 5 Aristov, N., Maring, W., Niedner-Schatteberg, G., Toennies, J.P., Chiu, Y.N., Köppel, H.
Vibrationally resolved inelastic scattering and charge transfer in H⁺ - C₂H₄ collisions
J. Chem. Phys. 99 2682 - 2694 1993 E
 $\text{H}^+ + \text{C}_2\text{H}_4 \rightarrow \text{H} + \text{C}_2\text{H}_4^+$
TOF method
0.03 keV/amu
angular distribution
- 93E 6 Bachau, H., Harel, C., Roncin, P.
Reply to comment on stabilization of autoionizing states during ion-atom collisions
J. Phys. B 26 2981 - 2982 1993 E
 $\text{O}^{8+} + \text{Ar} \rightarrow \text{O}^{6+}(4,4), (4,5)$
TOF method
- 93E 7 Belkacem, A., Gould, H., Feinberg, B., Bossingham, R., Meyerhof, W.E.
Measurement of electron capture from electron-positron pair production in relativistic heavy ion collisions
Phys. Rev. Letters 71 1514 - 1517 1993 E
 $\text{U}^{92+} + \text{Au} \rightarrow \text{U}^{91+} + e^-$
e⁻e⁺ - projectile coincidence
1x10⁶ keV/amu
- 93E 8 Beyer, H.F., Finlayson, K.D., Liesen, D., Indelicato, P., Chantier, C.T., Deslattes, R.D., Schweeppe, J., Bosch, F., Jung, M., Klepper, O., Kolm, W., Mushammer, R., Becker, K., Eickhoff, H., Franke, B., Gruber, A., Nolden, F., Spaeth, P., Stock, M.
X-ray transitions associated with electron capture into bare dysprosium
J. Phys. B 26 1557 - 1567 1993 E
 $\text{Dy}^{64+} + \text{Ar} \rightarrow \text{Dy}^{63+}$
internal gas target
2.92x10⁵ keV/amu
also REC; characteristic X-rays
- 93E 9 Boduch, P., Chantepie, M., Henvecart, D., Husson, X., Jacquest, E., Lecler, D., Duetta, M., Wilson, M.
Investigation of single and double electron capture in Ar⁷⁺ - He, H₂ collisions at 105 keV by photon spectroscopy
Phys. Scripta 47 24 - 31 1993 E
 $\text{Ar}^{7+} + \text{B} \rightarrow \text{Ar}^{6+}(3snl-3snl'; n=4,5; 3p4p \rightarrow 3s5P), \text{Ar}^{7+}(3s^2nl-3s^2nl'; n=6,7; 3s3pnl - 3s3pn'l')$
photon Spectroscopy
2.6 keV/amu
2000 - 6000 Å photon; photon emission cross sections; wave lengths
- 93E10 Bouchama, T., El-Moussaedeg, A., Salmoun, A., Druetta, M., Church, D.A.
Electron capture study of Ar⁷⁺ + He(H₂) by UV spectroscopy
Phys. Scripta 48 527 - 532 1993 E
 $\text{Ar}^{7+}(3s) + \text{He}, \text{H}_2 \rightarrow \text{Ar}^{6+}(3snl, 3pn'l')$
photon Spectroscopy
0.9 - 1.75 keV/amu

- 93E11 Cederquist, H., Biedermann, C., Selberg, N., Beebe, E., Pajek, M., Baramy, A.
Strong onset of ionization in slow Xe^{2+} -Xe collisions at very high q
Phys. Rev. A 47 R4551 - 4554 1993 E
 $Xe^{2+}(q=13-37)$
Ion-ion coincidence technique
0.25 keV/amu
- 93E76 Cheng, S., Cocks, C.L., Frohne, V., Kamber, E.Y., McGuire, J.H., Wang, Y.
Angular distribution of dissociated deuterons by impact of 2 - 16 MeV O^{2+}
Phys. Rev. A 47 3923 - 3929 1993 E
 $O^{8+} + D_2 \rightarrow O^{7+} + D^+ + D$
projectile-recoil coincidence
2 - 16 MeV
- 93E12 Deck, F.J., Hesses, E.A., Lunden, S.R.
Population of high- l sulfur Rydberg levels by ion-Rydberg-atom charge
exchange
Phys. Rev. A 48 4400 - 4404 1993 E
 $S^+ + Rb(10f, 8f) \rightarrow S(n=9, 10)$
laser-excited target technique
0.3 keV/amu
- 93E13 Delon, A., Martin, S., Denis, A., Ouerdane, Y., Carre, M., Deses quelles, J., Buchet
Poulizac, M.C.
High charge states of Xe^{2+} recoil ions ($l=1-15$) produced by multi-capture
processes in low energy Xe^{2+} collisions on Xe
Rad. Eff. and Def. in Solids 126 337 - 340 1993 E
 $Xe^{2+} + Xe \rightarrow Xe^{(2+l)+} + Xe(l=1-5; j=1-15)$
ion-ion coincidence technique
- 1 keV/amu
- 93E14 Fedchak, J.A., Huels, M.A., Doverspike, L.D., Champion, R.L.
Electron detachment and charge transfer for collisions of O⁻ and S⁻ with H
Phys. Rev. A 47 3796 - 3800 1993 E
 $O^-, S^- + H \rightarrow O, S + H^-$
RF-H target
 1×10^{-5} keV/amu
electron detachment
- 93E15 Feinberg, B., Gould, H., Meyerhof, W.E., Bellacera, A., Hüblinger, H.P., Alonso, J.R., Blumentfeld, L., Dillard, E.,
Gundelf, N., Krebs, G.P., McMillan, M.A., Rounton-Brown, M.J., Rude, B.S., Schweppé, J., Spooner, D.W., Street, K.,
Thibierge, R., Wegner, H.
Relativistic electron- and proton-impact ionization of highly stripped heavy ions
determined from projectile-electron loss in H_2 and He
Phys. Rev. A 47 2370 - 2373 1993 E
 $Au^{52+} + H_2, He, N_2 \rightarrow Au^{53+}; U^{86+} + H_2, He \rightarrow U^{87+}$
growth rate method
 $1 \times 10^4, 3.8 \times 10^5$ keV/amu (Au^{52+}); 4.05×10^9 /amu (U^{86+})
- 93E16 Folkerts, H.O., Hoeksra, R., Meng, L., Olson, R.E., Fritsch, W., Morgenstern, R.,
Summers, H.P.
 He^{2+} . He collisions; one-electron capture versus electron removal and target-
ion excitation
J. Phys. B 26 L619 - 624 1993 E
 $He^{2+} + He \rightarrow He^+(n=4 \rightarrow 3) + He^+; He^+ + He^+(n=4 \rightarrow 3)$
photon spectroscopy
1 - 300 keV/amu
- 93E17 Fremont, F., Sommer, K., Hickam, S., Boduch, P., Lecler, D., Stolterfoht, N.
Angular distribution of Auger electron emission following double electron
capture in 90 keV C^{6+} + He collisions
Nucl. Instr. Meth. B 79 3 - 7 1993 E
 $C^{6+} + He \rightarrow C^{4+}(2ln^1)$
Auger-electron spectroscopy
7.5 keV/amu
- 93E18 Fröhne, V., Cheng, S., Ali, R., Raphaelian, M., Cocks, C.L., Olson, R.E.
Measurements of recoil ion longitudinal momentum transfer in multiply ionizing
collisions of fast heavy ions with multi-electron targets
Phys. Rev. Letters 71 696 - 699 1993 E
 $F^{7+} + Ne \rightarrow F^{8+}, F^{7+}, F^{6+} + Ne^+(l=3-8)$
recoil-projectile recoil technique
 1×10^3 keV/amu
also $F^{2+} + Ne \rightarrow F^{3+} + Ne^+(l=1-5)$
- 93E19 Frost, M.J., Kato, S., Bierbaum, U.M., Leone, S.R.
Direct observation of the simultaneous transfer of vibrational energy and charge
in the $N_2^+(v) + N_2$ reaction
J. Chem. Phys. 98 5993 - 5995 1993 E
 $N_2^+(v) + N_2 \rightarrow N_2 + N_2^+(v=1, 2)$
TOF method
 -1×10^{-3} keV/amu

- 93E20 Gaboriaud, M.N., Roncin, P., Bara, M.
Evidence of direct stabilization in two-electron capture by multiply charged ions
J. Phys. B. 26 L303 - 308 1993 E
 $N^{7+} + Kr \rightarrow N^{5+} \rightarrow N^{6+}$; $O^{8+} + Ar \rightarrow O^{6+} \rightarrow O^{7+}$; $Al^{9+} + Ne \rightarrow Al^{7+} \rightarrow Al^{8+}$
coincidence-translational energy spectroscopy
-1 keV/amu
- 93E21 Gieler, M., Aumayer, F., Gagli, R., Neureiter, C., Windhalz, L.
Application of an electro-optical modulator in inelastic collision studies with
laser-excited Na(3p) atoms
J. Phys. B. 26 297 - 303 1993 E
 $He^{2+} + Na(3s), Na^*(3p) \rightarrow He^+$
laser-excited target
2.5 keV/amu
- 93E23 Gieler, M., Aumayer, F., Weber, M., Winter, H.P., Schweinzer, J.
Electron capture by doubly charged ions from laser-excited alkali atoms II. Hg^{2+} -
 $Li^*(2p)$ collisions
J. Phys. B. 26 2153 - 2164 1993 E
 $He^{2+} + Li^*(2p), Li(2s) \rightarrow He^+(nl)$
translational energy spectroscopy + laser-excited target
1.0 - 16 keV/amu
- 93E22 Gieler, M., Aumayer, F., Schweinzer, J., Koppensteiner, W., Husinsky, W.,
Winter, H.P., Lozhkin, K., Hansen, J.P.
Electron capture by doubly charged ions from laser-excited alkali atoms I. Hg^{2+} -
 $Na^*(3p)$ collisions
J. Phys. B. 26 2137 - 2151 1993 E
 $He^{2+} + Na(3s), Na^*(3p) \rightarrow He^+(nl)$
translational energy spectroscopy + laser-excited target
0.5 - 3 keV/amu
effect of polarization
- 93E24 Gonzalez, A.D., Giese, J.P., Horsdal-Pedersen, E.
Atomic-electron capture in the presence of a narrow nuclear resonance:
 $^{40}Ar(p,p)^{40}Ar$ reaction
Phys. Rev. A. 48 3663 - 3669 1993 E
 $H^+ + Ar \rightarrow H(\theta) + Ar^+$
target-floated technique
 1.857×10^3 keV/amu
- 93E25 Hansen, S.B., Ehrenreich, T., Horsdal-Pedersen, E., MacAdam, K.B., Dube, L.J.
Electron capture from circular Rydberg atoms
Phys. Rev. Letters 71 1522 - 1525 1993 E
 $Na^+ + Li(1s^2 nlm) \rightarrow$
laser excitation + field ionization technique
0.1 keV/amu
- 93E26 Hayton, D.A., Peart, B.
Merged beam measurements of the mutual neutralization of O^+O^- and N^+O^- ions
J. Phys. B. 26 2879 - 2885 1993 E
 $O^+ + O^- \rightarrow O + O$; $N^+ + O^- \rightarrow N + O$
merged-beam technique
 $3 \times 10^{-3} - 3 \times 10^{-2}$ keV/amu
- 93E27 Hirzbruch, S.E., Ruth, G., Winkel, E., Heinrich, W.
Response of BP-1 to ^{197}Au heavy ions at 11.3 GeV/nucleon
Nucl. Instr. Meth. B. 74 519 - 522 1993 E
 $Au^{79+} + glass \rightarrow Au^{78+}, Au^{77+}, Au^{76+}$
glass track detector
 1.1×10^8 keV/amu
- 93E29 Hoekstra, R., Beijers, J.P.M., de-Heer, F.J., Morgenstern, R.
Simultaneous electron capture and target ion excitation in collisions of C^{4+} and
 N^{3+} on He
Z. Phys. D. 25 209 - 215 1993 E
 $C^+, N^{3+} + He \rightarrow C^+, N^{4+} + He^*(2p)$; C^+, N^{3+}
photon spectroscopy
0.05 - 7 keV/amu
- 93E28 Hoekstra, R., Olson, R.E., Folkerts, H.O., Wolfrum, E., Pascale, J., de-Heer, F.J.,
Morgenstern, R., Winter, H.
Electron capture from Li by B^{2+}, N^{2+} and Be^+ ions
J.P. hys. B. 26 2029 - 2040 1993 E
 $B^{2+}, N^{2+}, Be^+ + Li \rightarrow B^+(nl), N^{4+}(nl), Be^{3+}(nl)$
E: photon spectroscopy; T: CTMC
1-10 keV/amu

- 93E30 Hughes, M.P., Geddes, J., McCullough, R.W., Gilbody, H.B.
Cross sections for H(3s) formation in electron capture by protons in collisions with H atoms
Nucl. Instr. Meth. B 79 50 - 51 1993 E
H⁺ + H → H(3s) + H⁺
Balmer-alpha spectroscopy
10 - 100 keV/amu
- 93E31 Hutton, R., Hultdt, S., Nyström, B., Heijkenskjöld, F., Glans, P., Larsson, M.O.
Photon spectroscopy following electron capture for the collision systems 10keV/q Kr^{q+} + He(q=7,8,9)
Phys. Scripta 48 569 - 572 1993 E
Kr^{q+}(q=7,8,9) + He → Kr^{(q-1)+}(nl)
photon spectroscopy
- 1 keV/amu
- 93E32 Jacquet, E., Boduch, P., Chantepie, M., Druetta, M., Harnecart, D., Husson, X., Leder, D., Olson, R.E., Pascale, J., Stolterfoht, N., Wilson, M.
120 keV Ar⁶⁺-Li collisions studied by near UV and visible photon spectroscopy
Phys. Scripta 47 618 - 627 1993 E
Ar⁶⁺ + Li → Ar⁷⁺(nl), Ar⁶⁺(nl), Ar⁵⁺(nl) + hv
photon spectroscopy
3 keV/amu
(200 - 600nm) photon emission cross sections given
- 93E33 Jalbert, G., Coelho, L.F.S., de-Castro-Faria, N.V.
Production of neutral fragments from the dissociation of fast H₃⁺ ions
Phys. Rev. A 47 4768 - 4774 1993 E
H₃⁺ + He, Ne, Ar, Xe → H₃⁺ → H, H₂, 2H
growth method
400 - 1230 keV/amu
- 93E35 Kamber, E.Y., Enos, C.S., Brenton, A.G.
Production of measurable Arⁿ⁺ ions by electron-impact ionization of Ar measured by translational energy spectroscopy
Phys. Rev. A 48 338 - 342 1993 E
Arⁿ⁺(3d,nl) + O₂ → Ar^{q+}
translational energy spectroscopy
0.1 keV/amu
- 93E34 Kamber, E.Y., Enos, C.S., Breton, A.G.
Single-electron loss in low energy Arⁿ⁺-He collisions
Nucl. Instr. Meth. B 79 71 - 74 1993 E
Arⁿ⁺ + He → Ar⁽ⁿ⁻¹⁾⁺
translational energy spectroscopy
0.1 keV/amu
- 93E36 Kamber, E.Y., Quintana, E.J., Pollack, E.
State-selective double-electron capture processes for Ar²⁺-Ar collisions
J. Phys. B 26 113 - 120 1993 E
Ar²⁺ + Ar → Arⁿ⁺(nl,theta)
TOF method
0.05 - 0.1 keV/amu
differential scattering
- 93E37 Kato, S., Frost, M.J., Bierbaum, U.M., Leone, S.R.
A selected ion flow tube-laser induced fluorescence instrument for vibrationally state-specific ion-molecule reactions
Rev. Sci. Instr. 64 2808 - 2820 1993 E
N₂⁺(v=0,1,2) + N₂ → N₂ + N₂⁺
laser-induced fluorescence technique
thermal energies
rate constant
- 93E38 Keller, N., Andersson, L.R., Miller, R.D., Westerlind, M., Elston, S.B., Sellin, I.A., Biedermann, C., Cederquist, H.
Angular distributions for double-electron capture in C⁴⁺-He collisions
Phys. Rev. A 48 3684 - 3688 1993 E
C⁴⁺ + He → C²⁺(theta)
recoil ion technique
3x10⁻² - 6x10² keV/amu
Stueckelberg oscillations observed
- 93E39 Kwong, V.H.S., Fang, Z.
Charge transfer between O²⁺ ion and helium at electronvoet energy
Phys. Rev. Letters 71 4127 - 4129 1993 E
O²⁺ + He → O⁺
ion trap
1.5x10⁻⁴ keV/amu
rate coefficients

- 93E40 Lee, A.R., Enos, C.S., Brenton, A.G.
Single charge stripping of B⁺ ions via electron-spin exchange
Phys. Letters A 173 447 - 450 1993 E
B²⁺(2s²1S) + Ne, O₂ → B³⁺(2s²S, 2p²P)
translational energy spectroscopy
0.3 keV/amu
- 93E41 Lee, A.R., Wilkins, A.C.R., Enos, C.S., Brenton, A.G.
Spin conservation in single-electron capture by N²⁺ in He, Ne and Ar
Phys. Rev. A 48 2934 - 2939 1993 E
N²⁺(2s²2p, 2s2p³) + B → N⁺ (B= He, Ne, Ar)
translational energy spectroscopy
0.28 keV/amu
- 93E42 Maleki, S., Raphaelian, M.L.A., Stockli, M.P., Walsh, B.P., DePaola, B.D.
Velocity dependence of absolute cross sections for charge capture by Ar⁷⁺ from
ground-state and excited sodium
Phys. Rev. A 48 1185 - 1188 1993 E
Ar⁷⁺ + Na(3s, 3p) → Ar⁶⁺
laser-excited target technique
1.5 - 27 keV/amu
- 93E43 Manning, M., Price, S.D., Leone, S.R.
Charge transfer and collision-induced dissociation reactions of CF₂²⁺ and CF₂³⁺
with the rare gases at a laboratory collision energy of 49 eV
J. Chem. Phys. 99 8695 - 8704 1993 E
CF₂²⁺ + B → CF₂⁺; CF₂²⁺ + B → CF₂⁺ (B= He, Ne, Ar, Kr, Xe)
E⁺ TOF method; T; Landau-Zener theory
1 - 2 eV/amu
dissociative electron capture also given
- 93E44 Martin, S., Denis, A., Delon, A., Desesquelles, J., Querdane, Y.
Stabilized double electron capture in Kr⁶⁺ (q=17,18) - Kr collisions
Phys. Rev. A 48 1171 - 1993 E
Kr⁶⁺(q=17,18) + Kr → Kr⁴⁺²⁺ → Kr^{(q-1)+} + hv
photon spectroscopy + coincidence
5 keV/amu
- 93E45 Martinez, H., Alvarez, I., Cisneros, C., de-Urguijo, J.
Single electron capture in He⁺ on SF₆ collisions at low keV energies
Nucl. Instr. Meth. B 82 389 - 392 1993 E
He⁺ + SF₆ → He⁰
0.25 - 1.25 keV/amu
Angular distributions also given
- 93E46 McLaughlin, T.K., Hodgkinson, J.M., Tawara, H., McCullough, R.W., Gilbody, H.B.
State-selective electron capture in collisions of slow Fe³⁺ and Fe⁴⁺ ions with H
and He atoms
J. Phys. B 26 3587 - 3594 1993 E
Fe³⁺, Fe⁴⁺ + H, He → Fe^{2+(nl)}, Fe^{3+(nl)}
translational energy spectroscopy
0.1 - 0.3 keV/amu
- 93E47 McLaughlin, T.K., Tanuma, H., Hodykinson, J., McCullough, R.W., Gilbody, H.B.
State-selective electron capture by slow N⁴⁺ ions in collisions with helium
J. Phys. B 26 3871 - 3875 1993 E
N⁴⁺ + He → N^{3+(nl)}
translational energy spectroscopy
0.3 - 2 keV/amu
- 93E49 Montenegro, E.C., Melo, W.S., Jaecks, D.H.
Collective propensity of orientation for multielectron ions in collisions
Phys. Rev. Letters 71 991 - 994 1993 E
He⁺ + Ar → He⁰ + Ar<sup>+(3p⁴4p, ²F_{7/2})
photon-polarization + ion coincidence
0.25 keV/amu
orientation parameter</sup>
- 93E48 Montenegro, E.C., Melo, W.S., Meyerhof, W.E., de-Pinho, A.G.
Intermediate-velocity atomic collisions VI. Screening, antiscreening and related
processes in He⁺ + (H₂, He)
Phys. Rev. A 48 4259 - 4266 1993 E
He⁺ + H₂, He → He²⁺
projectile-recoil ion coincidence technique
37.5 - 1000 keV/amu

- 93E50 Ogura, K., Shibata, T.
Charge transfer cross section for gadolinium
J. Mass Spectrom. Soc. Japan 41 37-45 1993 E
Ga⁺ + Ga → Ga + Ga⁺
evaporated/laser-irradiated target technique
10² - 10³ eV
- 93E51 Parameswaran, R., Watch, B.P., Maleki, S., Bhalta, C.P., DePaola, B.D.
Resonant transfer and excitation in C³⁺ + Li collisions
Phys. Rev. A 47 3801 - 3804 1993 E
C³⁺ + Li → C²⁺
Zero-degree Auger electron spectroscopy
417 - 750 keV/amu
- 93E52 Price, S.D., Rogers, S.A., Leone, S.R.
Charge transfer and collision-induced dissociation reactions of OCS²⁺ and CO₂²⁺ with the rare gases at a laboratory collision energy of 49 eV
J. Chem. Phys. 98 9455 - 9465 1993 E
OCS²⁺, CO₂²⁺ + B → OCS⁺, CO₂⁺ (B=He, Ne, Ar, Kr, Xe)
TOF method
-1x10⁻³ keV/amu
- 93E53 Prior, M.H., Holt, R.A., Schneider, D., Randall, K.L., Hutton, R.
Alignment of magnetic substrates in double-electron capture collisions
Phys. Rev. A 48 1964 - 1974 1993 E
C³⁺(1s) + He → C³⁺(1s2l2l') ; Bⁿ⁺(1s) + He → Bⁿ⁺(1s2l2l')
Auger electron spectroscopy
0.06 - 1.2 keV/amu
- 93E54 Quasicki, S., Farizon-Mazuy, B., Farizon, M., Gaillard, M.J., Gerlic, E., Stern, M., Clouvas, A., Katsanos, A.
Fast negative helium ions produced by double electron capture in single He⁻-He collisions
Phys. Rev. A 48 1204 - 1208 1993 E
He⁻ + He → He⁺
growth method
90 - 300 keV/amu
- 93E55 Quintana, E.J., Heckman, V.R., Pollack, E.
Electron capture in H⁺ + N₂ collisions
Phys. Rev. A 48 3670 - 3673 1993 E
H⁺ + N₂ → H(1s) + N₂⁺
TOF method
0.5 - 3 keV/amu
angular distributions
- 93E56 Raphaelian, M.L.A., Berry, H.G., Berrah, N., Schneider, D.
Double electron capture in Ne⁸⁺ - He collisions intermediate energies
Phys. Rev. A 48 1292 - 1297 1993 E
Ne⁸⁺ + He → Ne⁶⁺(n_l; n_{l'}) → Ne⁷⁺(nⁿlⁿ)
Auger electron spectroscopy
20 - 80 keV/amu
- 93E57 Renwick, S.P., Martell, E.C., Weaver, W.D., Risle, J.S.
Experimental determination of real elements of the density matrix and the dipole moment of H(n=3) atoms produced from 20 - 100 keV H⁺ + Ar
Phys. Rev. A 48 2910 - 2925 1993 E
H⁺ + He, Ar → H(n=3, 3s, 3p, 3d)
Balmer-alpha spectroscopy
20 - 100 keV/amu
- 93E58 Richter, C., Andersen, N., Erenot, J.C., Doweck, D., Houver, J.C., Salgado, J.
Collisional spectroscopy with aligned and oriented atoms VI : a complete density matrix determination for the H⁺ + Na(3p) → H(n=2) + Na⁺ process
J. Phys. B 26 723 - 743 1993 E
H⁺ + Na(3p) → H(n=2) + Na⁺
laser-aligned target
- 93E59 Rogers, S.A., Price, S.D., Leone, S.R.
Charge transfer and collision-induced dissociation reactions of CO²⁺ with the rare gases at E=49 eV
J. Chem. Phys. 98 280 - 289 1993 E
CO²⁺ + B → CO⁺ (B = He, Ne, Ar, Kr, Xe)
TOF method
1.75x10² keV/amu
collisional-dissociation also

- 93E60 Roller-Lutz,Z, Wang, Y, Finck,K, Lutz,H.O.
Left-right asymmetry in H(2p) charge capture from laser-oriented Na(3p)
Phys. Rev. A 47 R13 - 15 1993 E
H⁺ + Na(3p) → H(2p) + Na⁺
laser-polarized target technique
1 keV/amu
- 93E61 Roller-Lutz,Z, Wang, Y, Finck,K, Lutz,H.O.
A quantum mechanically complete study of H⁺ + Na(3s) → H(2p) + Na⁺ charge
exchange excitation
J. Phys. B 26 2697 - 2707 1993 E
H⁺ + Na(3s) → H(2p) + Na³⁺
particle-photon coincidence technique
1 - 5 keV/amu
Angular distribution
- 93E62 Said,R, Kamber,E.Y, Yalckaya,S, Gopinathan,M, Ferguson,S.M.
Translational energy spectroscopy and differential cross sections for low-energy
Ar²⁺-Ar and Ne⁶⁺-Ne collisions
Nucl. Instr. Meth. B 79 40 - 43 1993 E
Ne⁶⁺ + Ne → Ne⁶⁺(nl,theta) ; Ar²⁺ + Ar → Ar²⁺(nl,theta)
translational energy spectroscopy
3x10⁻³ - 2.5x10⁻² keV/amu
- 93E63 Salgado,J, Doweck,D, Houver,J.C, Richter,C, Saubamea,B, Thomsen,J.W.
Collisional spectroscopy with aligned and oriented atoms VII. initial orbital
alignment effects in H₂⁺ - Na(3p) resonant charge transfer
J. Phys. B 26 L353 - 358 1993 E
H₂⁺ + Na(3p), Na(3s) → H₂³⁺ + Na⁺
0.25 - 0.1 keV/amu
- 93E64 Schlatmann,A.R, Hoekstra,R, Morgenstern,R, Olson,R.E, Pascale,J.
Strong velocity dependence of electron capture in collisions between aligned Na⁺
(3p) and He²⁺
Phys. Rev. Letters 71 513 - 516 1994 E
He²⁺ + Na⁺(3p) → He⁺(n=4->3)
polarized target technique
3 - 13 keV/amu
- 93E65 Sen,A, Li,X.
Measurements of electron capture and loss cross sections in collisions of Ar⁺
and Ar²⁺ with He in the energy range of 50 - 300 keV
Nucl. Instr. Meth. B 79 44 - 49 1993 E
Ar⁺ + He → Ar⁰, Ar²⁺, Ar³⁺ ; Ar²⁺ + He → Ar⁺, Ar⁰, Ar³⁺
growth method
1.25 - 7.5 keV/amu
- 93E66 Toshi,R,E, Johnsen,R.
Single and double charge transfer of He²⁺ ions with molecules at near-thermal
energies
Int. J. Mass Spectro. and Ion Processes 123 193 - 203 1993 E
He²⁺ + B → He⁺, He⁰ (B = H₂, N₂, O₂, CO, CO₂, H₂O)
ion-drift tube mass spectrometer
thermal energies
rate coefficients
- 93E67 Tribedi,L,C, Prasad,K,G, Tandon,P,N.
K-K electron transfer and K-shell-vacancy production cross sections for Ti
bombarded by Si and S beam at 1.25-4.70 MeV/amu
Phys. Rev. A 47 3739 - 3747 1993 E
Si¹⁴⁺, S¹⁶⁺ + Ti → Si¹³⁺(1s), S¹⁵⁺(1s) + Ti⁺(K⁻)
X-ray spectroscopy
(1.25 - 4.70) MeV/amu
- 93E69 van der Kamp, A.B, Hiemstra, R.S, van der Zande, W.J, Fink, R, Jungen, M.
The spectroscopy and dynamics of the n=3, 4 Rydberg states in O₂
J. Chem. Phys. 99 7487 - 7498 1993 E
O₂²⁺ + Cs, K, Na → O₂⁺(n)
TOF + translational energy spectroscopy
12.6 eV
- 93E68 Vancura,J, Marchetti,V,J, Perotti,J,J, Kostroun,V,O.
Absolute total and one- and two-electron transfer cross sections for Ar^{q+}(q=8-16)
on He and H₂ at 2.3xq keV
Phys. Rev. A 47 3758 - 3768 1993 E
Ar^{q+}(q=8-16) + H₂, He → Ar^{(q-1)+}, Ar<sup>(q-2)+
retarding grid method
- 0.5 keV/amu</sup>

- 93E73 Wöbermann, Th., Roller-Lutz, Z., Lutz, H.O.
Electron capture in Ar⁺ collisions with laser-aligned Rydberg atoms
Phys. Rev. A 47 R1594 - 1596 1993 E
Ar⁺ + Na(nlm) -> Ar^{*}
laser-aligned target method
0.01 - 0.1 keV/amu
- 93E70 Walch, B.P., Maleki, S., Ali, R., Stockli, M.P., Raphaelian, M.L.A., Cocke, C.L., Depaulis, B.D.
Enhancement of charge capture by a laser-excited target by highly charged ions
Phys. Rev. A 47 R3499 - 3501 1993 E
Ar⁷⁺ + Na(3s, 3p) ->
laser-excited target method
1.6 keV/amu
- 93E71 Wang, Y., Fink, K., Roller-Lutz, Z., Lutz, H.O.
Angle-differential H(2p) alignment in 1 keV H⁺ - Na charge exchange collisions
J. Phys. B 26 L61 - 63 1993 E
H⁺ + Na(3s) -> H(2p) + Na⁺
photon spectroscopy
1 keV/amu
- 93E72 Westphal, A., He, Y.D.
Measurement of cross sections for electron capture and stripping by highly relativistic ions
Phys. Rev. Letters 71 1160 - 63 1993 E
Au⁷⁹⁺ + glass -> Au⁷⁸⁺; Au⁷⁸⁺ + glass -> Au⁷⁹⁺
glass detector method
1.08x10⁹ keV/amu
Barium-phosphate glass track detector used for charge-separation
- 93E74 Wu, W., Griese, J.P., Ben-Itzhak, I., Cocke, C.L., Richard, P., Stockli, M., Ali, R., Schöne, H., Olson, R.E.
Velocity dependence of one- and two-electron processes in intermediate-velocity Ar¹⁶⁺ + He collisions
Phys. Rev. A 48 3617 - 3625 1993 E
Ar¹⁶⁺ + He -> Ar¹⁵⁺ + He⁺; Ar¹⁴⁺ + He²⁺; Ar¹³⁺ + He²⁺ + e
TOF coincidence technique
0.9 - 60 keV/amu
- 93E75 Yaitkaya, S., Kamber, E. Y., Ferguson, S.M.
Differential cross sections for state-selective electron capture by low-energy Arⁿ⁺ ions from He and Ar
Phys. Rev. A 48 382 - 391 1993 E
Arⁿ⁺ (q=4,5) + He, Ar -> Arⁿ⁺¹⁺(nl, theta)
translational energy spectroscopy
2.5x10⁻³ - 1.3x10⁻² keV/amu
differential angle scattering
- 93T 9 Borve, K.J., Hansen, J.P.
Electron capture from the light noble gases
J. Phys. B 26 L677 - 683 1993 multi-
Arⁿ⁺ + He, Ne, Ar -> Arⁿ⁺(nl)
multi-electron time-dependent model
2.5x10⁻³ - 25 keV/amu
- 93T 1 Baccus-Montabone, M.C., Ameziau, K.
Charge transfer in S²⁺ + H collisions at intermediate energy
Z. Phys. D 25 323 - 326 1993 T
S²⁺(3s²3p² 3P) + H -> S⁺(3s²3p³ 2P, 2D)
semiclassical MO basis
1.5x10⁻³ - 0.25 keV/amu
- 93T 4 Belkic, D.
Symmetric double charge exchange in fast collisions of bare nuclei with helium-like atomic systems
Phys. Rev. A 47 189 - 200 1993 T
He²⁺ + He(1s²) -> He(1s²) + He²⁺
correct first Born approx
25 - 500 keV/amu
- 93T 5 Belkic, D.
Intermediate ionization continua for double charge exchange at high impact energies
Phys. Rev. A 47 3824 - 3844 1993 T
He²⁺ + He(1s²) -> He(1s²) + He²⁺
boundary-corrected continuum-intermediate state approx
250 - 1750 keV/amu
angular distributions also

- 93T 2 Belkic,D
Two-electron capture from helium-like atomic systems by completely stripped particles
J. Phys. B 26 497-508 1993 T
 $Li^{3+} + He \rightarrow Li^{2+} + He^{2+}$
boundary-corrected first Born approx
1.5 - 1500 keV/amu
- 93T 3 Belkic,D, Mancev,I.
Four-body CDW approximation : dependence of prior and post total cross sections for double charge exchange upon bound-state wave functions
Phys. Scripta 47 18 - 23 1993 T
 $H^+ + He(1s^2) \rightarrow H(1s^2) + He^{2+}$
CDW approx.
10 - 1000 keV/amu
- 93T 6 Belyaev,A.K.
Charge exchange with ion excitation in collisions of helium ions with mercury atoms
J. Phys. B 26 3877 - 3890 1993 T
 $He^+(S_{1/2}) + Hg(^1S_0) \rightarrow He(^1S_0) + Hg^+(7p^2P_{3/2})$
non-adiabatic quasi molecule model
thermal velocities
rate coefficients
- 93T 7 Belyaev,A.K.
Theoretical investigation of charge exchange with ion excitation in atomic collisions at thermal energies
Phys. Rev. A 48 4299 - 4306 1993 T
 $He^+ + Hg \rightarrow He + Hg^{*+}(7p^2P_{3/2})$
MC
thermal energies
also rate coefficients given
- 93T 8 Ben-Itzhak,I, Jain,A, Weaver,O.L.
Impact parameter dependence of classical capture probability from any initial state by fast bare projectiles
J. Phys. B 26 1711 - 1726 1993 T
 $F^{9+} + H(nl), He(nl) \rightarrow F^{8+}, Ne^{10+} + H(1s,2s,2p) \rightarrow Ne^{9+}; O^{8+} + He \rightarrow O^{7+}, O^{6+}$
modified Bohr-Lindhard model
(1.4-2.5)x10³ keV/amu
- 93T10 Borve,K.,J. Hansen,J.P.
On the cluster-size dependence of electron capture cross sections in ion-cluster collisions
Z. Phys. D 25 247-251 1993 T
 $H^+ + (Na)_n \rightarrow H(n=1-75)$
extended Bohr-Lind hard model/quantal model
1 - 16 keV/amu
- 93T11 Bugacov,A, Maidagan,J.M, Rivarola,R.D, Shingai,R.
Distortion effects for electron excitation in ion-atom collisions
Phys. Rev. A 47 1052 - 1058 1993 T
 $H^+ + H(1s) \rightarrow H^+ + H(2s,2p); H^+ + Li^{2+}(1s) \rightarrow H^+ + Li^{2+}(2s,2p); A^{Z+} + H(1s), Ne^{9+}(1s) \rightarrow A^{Z+} + H(n=2), Ne^{9+}(n=2) (A=H,He,Li,Be,B)$
DW symmetric eikonal approx.
 $10 - 10^3$ keV/amu (H) ; $10^2 - 10^4$ keV/amu (A)
scaling for projectile Z
- 93T12 Casaubon,J.I.
Charge exchange between bare beryllium and boron with metastable hydrogen atoms at low energies
Phys. Rev. A 48 3680 - 3683 1993 T
 $Be^{4+} + H(2s) \rightarrow Be^{3+}(nl); B^{3+} + H(2s) \rightarrow B^{2+}(nl)$
Landau-Zener + OEDM
0.018 - 2.5 keV/amu
- 93T14 Chen,Z, Lin,C.D.
Double electron capture and the angular distribution of ejected electrons in Ne^{8+} -He collisions
Phys. Rev. A 48 1298 - 1307 1993 T
 $Ne^{8+} - He \rightarrow Ne^{6+}(3nl')$
Independent-electron model
20 - 80 keV/amu
- 93T13 Chen,Z, Reading,J.F.
One-and-a-half-centered expansion method in charge-transfer calculations of proton-hydrogen scattering
Phys. Rev. A 48 352 - 356 1993 T
 $H^+ + H(1s) \rightarrow H(1s,2s,2p)$
OHCE method
10 - 300 keV/amu

- 93T15 Corches,S.E. Rivalova,R.D. McGuire,J.H. Wang,Y.D.
Distorted-wave models for single-electron capture from molecular targets by the impact of bare ions
Phys. Rev. A 47 201 - 207 1993 T
 $H^+ + H_2^+ \rightarrow H + H^{2+}$, $H^+ + H_2 \rightarrow H + H_2^+$
DW model (BIB,Ba1)
 $10^2 - 5 \times 10^3$ keV/amu
- 93T16 Corches,S.E. Rivarola,R.D. McGuire,J.H.
Impact-parameter formulation for electron capture from molecular targets
Phys. Rev. A 47 3937 - 3944 1993 T
 $H^+ + H_2^+ \rightarrow H(1s) + 2H^+$
Impact parameter formulation
100 - 1000 keV/amu
- 93T17 Datta,S.K. Scheid,W. Grin,N.
Electron capture by a fully stripped ion from two electron atomic and ionic targets in the Coulomb-Born approximation
J. Phys. B 26 2127 - 2136 1993 T
 $H + H \rightarrow H^+ + H$
Coulomb-Born approx.
25 - 100 keV/amu
- 93T18 Decker,F. Eichler,J.
Comment on "fine structure constant expansions for electron capture
J. Phys. B 26 2081 - 2083 1993 T
comments
- 93T19 Deco,G. Fojon,O. Maitagan,J. Rivarola,R.
Matrix continuum distorted-wave approximation for electron capture
Phys. Rev. A 47 3769 - 3774 1993 T
 $H^+ + H(1s) \rightarrow H(1s) + H^+ U^{92+} + U^{91+} \rightarrow U^{91+} + U^{92+}$
relativistic matrix CDW approx.
50 - 10000 keV/amu (H) ; 5×10^2 keV/amu (U)
- 93T20 Drakes,J.A. McGregorand,W.K. Muson,A.A.
Two-electron exchange in collisions of neutral molecules
J. Chem. Phys. 99 7813 - 7818 1993 T
general theory
molecular quantum electrodynamics
metastable molecule + ground state molecule collision
- 93T21 Dreizler, R.M. Errea, L.F. Henne, A. Lıdde, H.J. Riera, A. Sanchez, P.
Regularization of Coulomb potential in the treatment of non-resonant transitions to an ionizing continuum
Phys. Rev. A 47 3852 - 3860 1993 T
 $He^+ + H^+ \rightarrow He^{2+} + He^+(2s,2p)$
close-coupling method
20 - 500 keV/amu
- 93T22 Dubois,A. Nilsen,S.E. Hansen,J.P.
State-selectivity in $H^+Na(3s/3p)$ collisions : differential cross sections, alignment and orientation effects for electron capture
J. Phys. B 26 705 - 721 1993 T
 $H^+ + Na(3s/3p) \rightarrow H(2s,2p)$
semiclassical IP treatment with eikonal method
0.75 - 5.0 keV/amu
- 93T23 Errea,L.F. Harel,C. Jimeno,P. Jouin,H. Mendez,L. Riera,A.
Molecular data for the hydrogen quasimolecule using a one-electron model
J. Phys. B 26 3573 - 3578 1993 T
 $H^+ + H \rightarrow H + H$
MO model
- 93T24 Esry,B.D. Chen,Z. Lin,C.D. Piancastini,R.D.
Close-coupling calculations of electron capture cross sections from the $n=2$ states of H by protons and alpha-particles
J. Phys. B 26 1579 - 1586 1993 T
 $H^+, He^{2+} + H^+(2s;2p) \rightarrow H(nl;n=2-3), He^+(nl;n=3,4)$
semiclassical close-coupling method + travelling AO
0.25 - 16 keV/amu
- 93T25 Fabrikant,I
Electron transfer in $Ca^+(4snl) - Ca(4s^2)$ collisions
Phys. Rev. A 48 R3411 - 3414 1993 T
 $Ca^+(4snl) + Ca(4s^2) \rightarrow Ca^+(4s) + Ca(4s^2 4p)$
three-body Faddeev approx.
thermal velocities

- 93T61 Florescu, A., Sizun, M., Grimbert, D., Sidis, V.
Multi-trajectory semi-classical method for the treatment of non-adiabatic atom-molecular collisions
Phys. Rev. A 47 2943 - 2950 1993 T
 $H^+ + O_2(v=0) \rightarrow H + O_2^+(v)$
IOS approx.
23 eV
- 93T25 Florescu, A., Sizun, M., Sidis, V.
Theoretical investigation of differential cross sections for vibrational excitation and vibronic charge transfer in $H^+ + H_2$ collisions
J. Chem. Phys. 99 7277 - 7278 1993 T
 $H^+ + H_2(v=0, X^1\Sigma_g^+) \rightarrow H + H_2^+(v=1-3, X^1\Sigma_g^+)$
quantal infinite order sudden approx.
0.03 eV/amu
also $H^+ + H_2(v=0, X^1\Sigma_g^+) \rightarrow H^+ + H_2^+(v=0-3, X^1\Sigma_g^+)$
- 93T26 Fritsch, W.
On the Coulomb explosion in slow ion-molecule collisions
Phys. Letters A 177 428 - 432 1993 T
 $H^+ + H_2 \rightarrow H + H_2^+; H + H_2^+ + e$
Close-coupling calculation
4 - 10 keV/amu
double ionization $\rightarrow H_2^{2+} \rightarrow H^+ + H^+$; polar angle dependence
- 93T27 Gargand, M., O'Rourke, S.F.C., McCarroll, R., Anderson, L.R.
Electron capture in slow collisions of N^{3+} ions with atomic hydrogen
Phys. Scripta 48 436 - 439 1993 T
 $N^{3+} + H \rightarrow N^{2+}(nl)$
MO
 $10 \times 10^{-3} - 1$ keV/amu
angular distributions; 3s-capture dominant
- 93T29 Hansen, J.P., Nilsen, S.E., Schweinzer, J.
Electron capture cross sections from initially aligned p-state atoms
J. Phys. B 26 L471 - 475 1993 T
 $H^+, He^{2+} + B^+ \rightarrow H(n=2,3), He^+(3,4,5) (B = H^+(2p_{n\sigma}, 2p_{\pi}, 2p_x))$
time-dependent close-coupling method
1-56 keV/amu
- 93T28 Hansen, J.P., Taulberg, K.
Partial cross sections for single- and double-electron capture by multiply charged ions colliding with He
Phys. Rev. A 47 2987 - 2994 1993 T
 $C^{3+} + He \rightarrow C^{4+}, C^{3+}(nl); B^{3+} + He \rightarrow B^{4+}, B^{3+}(nl); B^{4+} + He \rightarrow B^{3+}, B^{2+}(nl);$
 $Be^{4+} + He \rightarrow Be^{3+}, Be^{2+}(nl)$
two-electron/two-center AO model
0.25 - 225 keV/amu
- 93T30 Henne, A., Lüdde, H.J., Toepfer, A., Gluth, T., Dreizler, R.M.
Doorway approximation of the optical potential: application to one-electron ion-atom scattering systems
J. Phys. B 26 3815 - 3833 1993 T
 $H^+ + H(1s) \rightarrow H^+ + He^+(1s) \rightarrow$
doorway approx.
 $10-10^3$ keV/amu (He^+); $2 \cdot 10^3$ keV/amu (H)
excitation, ionization, electron loss
- 93T31 Ichihara, A., Shirai, T., Eichler, J.
Cross sections for electron capture in relativistic atomic collisions
At. Data and Nucl. Data Tables 55 63 - 79 1993 T
 $Au^{79+} + B \rightarrow Au^{78+}(nl) (B=C^{3+}, Al^{12+}, Cu^{28+}, Ag^{46+}, Au^{76+}); U^{92+} + B \rightarrow B^{3+}(nl)$
 $(B=C^{3+}, Al^{12+}, Cu^{28+}, Ag^{46+}, Au^{76+}, U^{91+})$
relativistic eikonal approx.
 $2 \times 10^5 - 1 \times 10^{10}$ keV/amu
- 93T33 Kazansky, A.K.
Trajectory study of post-collisional mixing of Rydberg states after double charge exchange
J. Phys. B 26 3863 - 3869 1993 T
classical trajectory calculation
- 93T32 Keller, S., Ast, H., Dreizler, R.M.
Quantum effects in CTMC models
J. Phys. B 26 L737 - 742 1993 T
 $H^+ + H \rightarrow H + H^+$
CTMC
10 - 200 keV/amu
also ionization $H^+ + H \rightarrow H^+ + H^+ + e$

- 93T34 Krishnamurthi, U.
On the application of the Landau-Zener curve crossing model to double charge transfer reactions
Int. J. Mass Spectro. Ion Processes 125 155 - 163 1993 T
Landau-Zener model
cross section as a function of energy defects
- 93T35 Krstic, P.S., Janev, R.K.
Excitation, ionization and electron-capture in slow $\text{He}^{2+} + \text{H}$ and $\text{H}^+ + \text{He}^+$ collisions
Phys. Rev. A 47 3894 - 3912 1993 T
 $\text{He}^{2+} + \text{H}(1s, 2s, 2p) \rightarrow \text{He}^+(n=1-4) + \text{H}^+$; $\text{H}^+ + \text{He}^+(1s) \rightarrow \text{H}(n) + \text{He}^{2+}$
hidden crossing model
0.1 - 30 keV/amu
excitation and ionization cross sections given
- 93T36 Kuang, Y.R.
Charge transfer in p-H and -H₂ collisions at low and high energies
Z. Phys. D 26 253 - 257 1993 T
 $\text{H}^+ + \text{H}_2 \rightarrow \text{H} + \text{H}^+, \text{H}_2^+$
MO with the initial united atom effect
0.1 - 200 keV/amu
- 93T62 Lafyatis, G.P., Kirby, K., Dalgarno, A.
Molecular cation NHe^{2+}
Phys. Rev. A 48 321 - 325 1993 T
 $\text{N}^{2+} + \text{He} \rightarrow \text{N}^+(\text{P}, \text{D}) + \text{He}^+$
MO-Landau-Zener
0.03 - 10³ eV
- 93T37 Lewartowski, E., Courbin, C.
A comparative study of classical and semiclassical models of the $\text{H}^+ - \text{Na}^+(3p)$ charge exchange process
J. Phys. B 26 3403 - 3413 1993 T
 $\text{H}^+ + \text{Na}^+(3p) \rightarrow \text{H}(n=2) + \text{Na}^+$
CTMC + semiclassical IP method
1 - 10 keV/amu
- 93T38 Moisewitsch, B.L.
Relativistic third-order Oppenheimer-Brinkman-Kramers cross sections for electron capture
J. Phys. B 26 2019 - 2028 1993 T
 $\text{C}^{6+} + \text{Al}, \text{Cu}, \text{Ag}, \text{Ta}, \text{Au} \rightarrow \text{C}^{5+}$; $\text{Ne}^{10+} + \text{Cu}, \text{Ag}, \text{Ta}, \text{Au} \rightarrow \text{Ne}^{9+}$;
 $\text{Ar}^{18+} + \text{Cu}, \text{Ag}, \text{Ta}, \text{Au} \rightarrow \text{Ar}^{17+}$; $\text{Xe}^{54+} + \text{Al}, \text{Cu}, \text{Ag}, \text{Ta}, \text{Au} \rightarrow \text{Xe}^{53+}$
OBK3
 $1.4 \times 10^4 - 1.0 \times 10^6$ keV/amu
- 93T39 Moribayashi, K., Hira, K., Matsuzawa, M., Kimura, M.
Hyperspherical approach to double-electron excitation of He by fast-ion impact IV. excitation to the (2l, 3l') and (3l, 3l') manifolds by multiply-charged ion impact
Phys. Rev. A 47 4874 - 4876 1993 T
 $\text{A}^{2+} + \text{He}(1s^2) \rightarrow \text{He}^{**}(2l, 2l', 2l3l', 3l3l')$ (A=1-10)
OBK3
 $(1-10) \times 10^3$ keV/amu
- 93T40 Mukherjee, M.
Relativistic electron capture including inter-nuclear interaction
Z. Phys. D 27 249 - 252 1993 T
 $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}^+$
1st Born approx. with inter-nuclear interaction
 $10 \times 10^3 - 5 \times 10^7$ keV/amu
- 93T41 Oliveira, G.H., Ramirez, C.A., Rivarola, R.D.
Electronic excitation of dielectronic targets by ion impact
Phys. Rev. A 47 1000 - 1005 1993 T
 $\text{H}^+ + \text{He}(1s^2) \rightarrow \text{H}^+ + \text{He}(1s2s; 2p)$; $\text{Kr}^{34+}(1s^2) + \text{B}(\text{B}=\text{B}-40) \rightarrow \text{Kr}^{34+}(1s2l)$;
 $\text{Fe}^{24+}(1s^2) + \text{B} \rightarrow \text{Fe}^{24+}(1s2p; 3p)(\text{B}=2-20)$
Impact parameter method + symmetric eikonal approx.
 $15 - 10^3$ keV/amu (H^+);
- 93T63 Padmavathi, D.A., Mishra, M.K., Rabitz, H.
Role of potential structure in non-adiabatic collisions with applications to $\text{He}^+ + \text{Ne}(2p^6) \rightarrow \text{He}^+ + \text{Ne}(2p^3s)$ and $\text{Na} + \text{I} \rightarrow \text{Na}^+ + \text{I}^-$
Phys. Rev. A 48 279 - 285 1993 T
 $\text{He}^+ + \text{Ne}(2p^6) \rightarrow \text{He}^+ + \text{Ne}(2p^3s)$; $\text{Na} + \text{I} \rightarrow \text{Na}^+ + \text{I}^-$
close-coupling calculations
27 - 71 eV

- 93T42 Ramillon, M., McCarroll, R.
Electron capture to excited states in H^+ collisions with H and He
Phys. Scripta 48 573 - 579 1993 T
 $H^+ + H, He \rightarrow H(2s, 2p, 3s, 3p, 3d, 4s; \text{total})$
DWA
20 - 200 keV/amu
angular distributions also given
- 93T43 Richter, K., Solovév, E.A.
Application of the advanced adiabatic approach to charge exchange in slow collisions between H and O^{2+}
Phys. Rev. A 48 432 - 441 1993 T
 $O^{2+} + H \rightarrow O^{2+}(nl; n=5-8)$
advanced adiabatic approx.
0.1 - 20 keV/amu
- 93T44 Roncin, P., Gaboriaud, M.N., Barat, M., Bordenau-Montesquieu, A., Moretto-Capelle, P., Benhenni, M., Bauchau, H., Haral, C.
Auto transfer to Rydberg states and indirect stabilization following double capture
J. Phys. B 26 4181 - 4199 1993 T
advanced adiabatic approx.
- 93T45 Schippers, S., Schlachtmann, A.R., Morgenstern, R.
Dependence of electron capture from $Na^*(3p)$ on orbital alignment : a kinematic effect ?
Phys. Letters A 181 80 - 84 1993 T
 $He^{2+} + Na^*(3P) \rightarrow He^+(n=4 \rightarrow 3)$
overlap integral in momentum space
- 93T46 Shimakura, N., Kimura, M., Lane, N.F.
Double- and single-electron capture in $He^{2+} + H_2$ collisions in the energy range from 50eV to 2keV
Phys. Rev. A 47 709 - 710 1993 T
 $He^{2+} + H_2 \rightarrow He^+ + H_2^+; He + H^+ + H^+$
MO expansion model
 $12.5 \times 10^{-3} - 0.50$ keV/amu
- 93T47 Shimakura, N., Kimura, M.
Molecular treatment of electron capture in collisions of O^{2+} ions with H atoms at energies from 6eV/amu to 10keV/amu : transfer ionization
Phys. Rev. A 48 3652 - 3662 1993 T
 $O^{2+} + H \rightarrow O^+(2lm^1)$
MO
 $6 \times 10^{-3} - 10$ keV/amu
angular distributions
- 93T48 Shimakura, N., Suzuki, S., Kimura, M.
Molecular treatment of electron capture at low to intermediate collision energies : collisions of B^{2+} ions with H atoms
Phys. Rev. A 47 3930 - 3936 1993 T
 $B^{2+}(1s^2) + H \rightarrow B^+(1s^2nl) + H^+$
MO with EITF.
 $10^{-2} - 10$ keV/amu
- 93T49 Slim, H.A.
Balmer-alpha emission in H^+-H collisions at intermediate energies
J. Phys. B 26 L743 - 746 1993 T
 $H^+ + H \rightarrow H(n=3 \rightarrow 2) + hv$
coupled channel calculation
15 - 100 keV/amu
- 93T50 Stolterfoht, N.
Evidence for auto-excitation producing inner-shell vacancies in slow ion-atom collisions
Phys. Rev. A 47 R763 - 766 1993 T
 $Ar^+ + Si \rightarrow Ar^+ Si^+(L^1)$
auto-excitation model
- 93T51 Toshima, N.
Convergence of the perturbation series for high energy electron capture
J. Phys. B 26 L281 - 286 1993 T
 $H^+ + H \rightarrow H$
AO close-coupling method
 5×10^3 keV/amu
angular distributions

- 93T52 Toshima, N., Lin, C.D.
Propensity rule for magnetic-substate distributions for electron capture from excited states of atoms by multiply charged ions
Phys. Rev. A 47 4831 - 4836 1993 T
 $\text{He}^{2+} + \text{H}(2s;2p) \rightarrow \text{He}^+(\text{n}l\text{m}); \text{Li}^{3+} + \text{H}(2s;2p) \rightarrow \text{Li}^{2+}(\text{n}l\text{m})$
close-coupling two center AO model
0.25 - 16 keV/amu
- 93T53 Vaeck, N., Hancenc, J.E.
Comment on stabilization of autoionizing states during ion-atom collisions
J. Phys. B 26 2977 - 2980 1993 T
post-collision interaction in autoionizing state
- 93T54 van der Hart, H.W., Hansen, J.E.
Competition between radiative and non-radiative decay for doubly excited $2nl'$ and $3nl'$ states in C^{6+}
J. Phys. B 26 641 - 662 1993 T
 $\text{C}^{6+} + \text{He} \rightarrow \text{C}^{4+}(2nl'; 3nl')$
truncated diagonalization method with B-spline
- 93T55 van der Hart, H.W., Hansen, J.E.
Competition between radiative and non-radiative decay for the doubly-excited $1s^2 3nl'$ states in O^{8+}
J. Phys. B 26 3297 - 3312 1993 T
 $\text{O}^{8+} + \text{B} \rightarrow \text{O}^{6+}(1s^2 3nl')$
truncated diagonalization method + B-spline
radiative/non-radiative decay rates for $1s^2 3nl'$
- 93T56 Wang, J., Olson, R.E., Tökési, K.
quantal and classical correspondence of double scattering
J. Phys. B 26 L613 - 618 1993 T
 $\text{H}^0 + \text{H} \rightarrow \text{H}^+ + \text{H}^+$
quantal/classical calculation
75 - 400 keV/amu
e-e interaction included ejected electron
- 93T57 Wang, Y.D., McGuire, J.H., Weaver, O.L., Corchis, S.E., Riverola, R.D.
Molecular-alignment dependence in the transfer excitation of H_2
Phys. Rev. A 47 3966 - 3975 1993 T
 $\text{H}^+ + \text{H}_2 \rightarrow \text{H} + \text{H}^+$
Independent-electron model/SCA/PWBA
500 - 5000 keV/amu
- 93T58 Winter, T.G.
Coupled-Sturmian treatment of electron transfer and ionization in proton-carbon collisions
Phys. Rev. A 47 264 - 272 1993 T
 $\text{H}^+ + \text{C} \rightarrow \text{H} + \text{C}^+(\text{K}^{-1})$
coupled-Sturmian-pseudostate approx.
75 - 600 keV/amu
also $\text{H}^+ + \text{C} \rightarrow \text{H}^+ + \text{C}^+(\text{K}^{-13}) + e$
- 93T59 Winter, T.G.
Coupled-Sturmian treatment of electron transfer and ionization in proton-neon collisions
Phys. Rev. A 48 3706 - 3713 1993 T
 $\text{H}^+ + \text{Ne} \rightarrow \text{H}^0 + \text{Ne}^+(\text{K}^{-1})$
Coupled-Sturmian-pseudostate approx.
250 - 1500 keV/amu
Also ionization cross sections

- 94E 1 Ali,R. Cooke,C.L., Raphaelian,M.L.A., Stockli,M.
Multielectron processes in 10 keV/u Arⁿ⁺ (5 ≤ q ≤ 17) on Ar collisions.
Phys. Rev. A 49 3586 - 3596 1994 E
Arⁿ⁺ (q=5-17) + Ar → Arⁿ⁺ + Arⁿ⁺
projectile-recoil ion coincidence technique
10 keV/amu
- 94E 2 Andriamonje,S.
Electronic capture and excitation of highly charged channeled ions.
Nucl. Instr. Meth. B 87 116 - 123 1994 E
- 94E 4 Beijers,J.P.M., Hoestra,R., Morgenstern,R.
State-selective charge transfer between He-like ions and He.
Phys. Rev. A 49 363 - 373 1994 E
A^{(z-2)+} + He → A^{(z-3)(nl)} (A = N,O,F,Ne)
VUV photon spectroscopy
0,05 - 2 keV/amu
- 94E 3 Belkacem,A., Gould,H., Fainberg,B., Bossingham,R., Meyerhof,W.E.
Projectile energy and atomic number dependence of electron capture from pair
production in relativistic heavy ion collisions.
Phys. Rev. Letters 73 2432 - 2435 1994 E
La⁵⁷⁺ + Cu,Ag,Au → La⁵⁶⁺
positron-projectile coincidence
0,41, 0,96, 1,3 GeV/amu
- 94E 5 Benhenni,M., Shafroth,S.M., Swenson,J.K.
Alignment effects in fast ion-atom collisions.
Nucl. Instr. Meth. B 86 28-37 1994 E
a review
- 94E 6 Bliman,S., Cornille,M.
Spectroscopic studies of metastable ion-atom collisions : an overview of doubly
excited systems.
Nucl. Instr. Meth. B 87 51-57 1994 E
a review
- 94E 7 Bliman,S., Cornille,M., Katsonis,K.
Dielectronic recombination versus charge exchange : electron capture by metastable
ions.
Phys. Rev. A 50 3134-3141 1994 E
A^{(z-2)+} (1s2s) + H₂ → A^{(z-3)+} (1s2lnl⁺) (A = C,N,O)
photon spectrometer
10xq keV
- 94E 9 Bordenave-Montesquieu,A., Moretto-Capolle,P.
Investigation by high resolution electron spectroscopy of the helium-like 3l3l'
Rydberg series in double capture processes at low collision velocity : auto transfer
to Rydberg states and electron stabilization.
J. Phys. B 27 4243 - 4261 1994 E
N⁷⁺ + He → N⁶⁺ (3l,nl⁺) ; Ne¹⁰⁺ + He → Ne⁹⁺ (3l,nl⁺)
electron spectroscopy
70 keV (N), 100 keV (Ne)
- 94E 8 Bordenave-Montesquieu,D., Dagnac,R.
Single-electron capture in He²⁺ - D₂ collisions.
J. Phys. B 20 543 - 553 1994 E
He²⁺ + D₂ → He⁺ + D₂⁺
translational energy spectroscopy
1.5 - 2 keV/amu
angular distribution (10° - 2°30')
- 94E10 Bross,S.W., Bonham,S.M., Gans,A.D., Peacher,J.L., Vajnai,T., Schultz,M.
Differential transfer ionization cross sections for 50 - 175 keV proton-helium
collisions.
Phys. Rev. A 50 337 - 342 1994 E
H⁺ + He → H + He²⁺ + e
E : projectile-recoil ion coincidence technique ; T : CIMC
50 - 175 keV
- 94E11 Chabot,M., Wohrer,K., Chetoui,A., Rojet,J.P., Toufi,A., Verhiet,D., Politis,M.F.,
Stephan,C., Grandin,J.P., Macias,A., Martin,F., Riera,A., Sanz,J.L., Gayet,R.
New investigation of saturation effect in ion-atom excitation.
J. Phys. B 27 111 - 125 1994 E
Kr³⁴⁺ + B → Kr (B = C,Si,Ar,Cu,Zr)
E : photon spectroscopy
33,9 X 10³ keV/amu
Lyman-X-rays observed due to excitation

- 94E12 Cline, R. van der Burg, P.T.M. Westerveld, W.B. Riskey, J.S.
Measurement of the $H(n=2)$ density matrix for 20 - 100 keV collisions of H^+ on He.
Phys. Rev. A 49 2613 - 2629 1994 E
 $H^+ + He \rightarrow H(2s, 2p) + He^+$
Lyman-alpha spectroscopy
20 - 100 keV/amu
- 94E13 de Nijs, G. Hoekstra, R. Morgenstern, R.
A coincidence study of multiple-electron capture in $^{15}N^{7+}$ -Ar collisions.
J. Phys. B 27 2557 - 2567 1994 E
 $N^{7+} + Ar \rightarrow N^{6+}, N^{5+}, N^{4+}, N^{3+}$
projectile-electron coincidence method
1 - 10 keV/amu
- 94E14 Denis, A. Martin, S. Chen, L. Desesquelles, J.
Velocity dependence of captured electron l-distributions low-energy collisions of Ar^{8+} with atomic Cs
Phys. Rev. A 50 2263 - 2268 1994 E
 $Ar^{8+} + Cs \rightarrow Ar^{7+}$
photon spectroscopy
- 94E15 Dennis, K. Akimune, H. Berg, G.P.A. Chang, S. Davis, B. Fujiwara, M. Harakeh, M.N. Jäneske, J. Liu, J. Pharr, K. Roberts, D.A. Stephenson, E.J.
Atomic charge exchange between helium ions and targets from carbon to bismuth at $\beta=0.36$.
Phys. Rev. A 50 3992 - 3999 1994 E
 $^3He^{2+} + B \rightarrow He^+$ ($B = 6-83$)
charge equilibration method
200 MeV
- 94E16 Ehrenreich, T. Day, J.C. Hansen, S.B. Hosdal, Pedersen, E. MacAdam, K.B. Mogenssen, K.S.
Electron capture from oriented elliptic Rydberg atoms.
J. Phys. B 27 L383 - 389 1994 E
 $Ng^+ + Li^*(n) \rightarrow Na$
laser-excited target
2.5 keV
- 94E17 Fedchack, J.A. Champion, R.L. Doverspike, L.D. Wang, Y.
Slow collisions of Na⁺ and K⁺ with atomic hydrogen.
J. Phys. B 27 3045 - 3054 1994 E
 $A^+ + H \rightarrow A + H$
growth-method
3 - 20 eV
- 94E18 Folkerts, H.O. Bliet, F.W. Meng, L. Olson, R.E. Morgenstern, R. von Hellermann, M. Summers, H.P.S. Hoekstra, R.
 He^{2+} -He collisions: one-electron capture and target ion excitation.
J. Phys. B 27 3475 - 3488 1994 E
 $He^{2+} + He \rightarrow He^+(nl) + He^+(1s)$
E: photon spectroscopy; T: CTMC
1 - 75 keV/amu
also $He^{2+} + He \rightarrow He^{2+} + He^+(nl) + e$
- 94E19 Fremont, F. Merabet, H. Chesnel, J.Y. Husson, X. Lepoutre, A. Lecler, D. Rieger, G. Stollerfoht, N.
Auger electron emission following double electron capture in 150 keV $Ne^{10+} + He$ collisions.
Phys. Rev. A 50 3117 - 3123 1994 E
 $Ne^{10+} + He \rightarrow Ne^{8+}(nln'l')$
electron spectroscopy
150 keV
- 94E20 Gaboriaud, M.N. Barat, M. Roncin, P. Sidis, V.
Transfer excitation in F^{8+} and Ne^{7+} ions colliding with He and Ne targets.
J. Phys. B 27 4595 - 4609 1994 E
 $F^{8+}(1s^2s) + B \rightarrow F^{8+}(1s^2snl)$ ($B=He, Ne$); $Ne^{7+}(1s^2s) + B \rightarrow Ne^{6+}(1s^2snl)$ ($B=He, Ne$)
E: coincidence-energy-gain spectroscopy; T: quasi-molecular model
3 - 10 keV
- 94E21 Graham, W.G.
Charge-changing and excitation in high energy, multicharged ion collisions.
Nucl. Instr. Meth. B 87 58 - 63 1994 E
a review

- 94E22 Graul, S.T. Williams, S. Dressler, R.A. Salter, H. Murad, E.
Guided-ion beam measurements of $X^+ + NO(X=Ar, N_2)$ reactions.
J. Chem. Phys. 100 7348 - 7359 1994 E
 $Ar^+ + NO \rightarrow Ar + NO^+$; $Ar + O^+ + N$; $Ar + O + N^+$; $N_2^+ + NO \rightarrow N_2 + NO^+$; $N_2 + O^+ + N$; $N_2 + N^+ + O$
guided-ion beam technique
0.1 - 10 eV
- 94E23 Guenckunst, A. Zuccati, S. Mehlhorn, W.
 L_{γ} -subshell alignment of magnesium after electron capture by protons.
J. Phys. B 27 533 - 542 1994 E
 $H^+ + Mg \rightarrow H + Mg^+(2p^1, ^2P_{3/2,1/2})$
Auger electron spectroscopy
40 - 240 keV/amu
alignment parameter
- 94E24 Hashida, M. Sakabe, S. Izawa, Y. Nakai, S.
Modified crossed-beam apparatus for charge transfer cross section measurement
Rev. Sci. Instr. 65 877 - 881 1994 E
 $Gd^+ + Gd \rightarrow Gd + G_d^+$
crossed-beam technique
10 - 10^4
- 94E25 Herman, Z. Birkinshaw, K. Pacak, U.
A beam scattering study of non-dissociative charge transfer between Kr^+ and CH_4 at collision energies below 1 eV
Int. J. Mass Spectro. Ion Proc. 135 47 - 53 1994 E
 $Kr^+ + CH_4 \rightarrow Kr + CH_4$
crossed beam technique
0.45 - 1.11 eV
- 94E26 Hoekstra, R. Folkerts, H.O. Beijers, J.P.M. Morgenstern, R. de Heer, F.J.
 $He^{2+} + H_2$ collisions : non-dissociative and dissociative one-electron capture.
J. Phys. B 27 2021 - 2031 1994 E
 $He^{2+} + H_2 \rightarrow He^+(nl : n=2,3,4)$; $He^0(nl : n=2,3)$
photon spectroscopy
1 - 13 keV/amu
- 94E27 Huelis, M.A. Fedchak, J.A. Champion, R.L. Doverspike, L.D. Gauyacq, J.P. Tillet-Billy, D.
Electron detachment in low-energy collisions of halogen anions with atomic hydrogen.
Phys. Rev. A 49 255 - 264 1994 E
crossed-beam technique
0.1 - 20 eV
- 94E28 Hvelplund, P. Andersen, L.H. Brink, C. Yu, D.H. Lorentz, D.C. Ruoff, R.
Charge transfer in collisions involving multiply charged C_{60} molecules.
Z. Phys. D 30 323 - 326 1994 E
 $C_{60}^{2+}, C_{60}^{3+} + B \rightarrow C_{60}^+, C_{60}^{2+}$ (B=H₂, He, Ar, Kr, Xe, NO)
Growth method
(40 - 120) keV
- 94E29 Irby, V.D. Gay, T.J. Park, J.T. Bross, S.W. Gans, A.D.
Superelectronic and inelastic $He^{2+} + He$ state-selective electron capture
Phys. Rev. A 50 2292 - 2297 1994 E
 $^3He^{2+} + He \rightarrow He^+(n) + He^+(n')$
Translational energy spectrometer
15, 30, 45 keV/amu
- 94E30 Itoh, Y.
Differential cross section measurements for one-electron capture processes in Ar^{2+} -Ne system at $E_{lab}=40, 60$ and 80 eV
J. Phys. Soc. J. 63 941 - 947 1994 E
 $Ar^{2+} + Ne \rightarrow Ar^+ + Ne^+$
crossed-gas target method
40, 60, 80 eV
theta = 0 - 20
- 94E31 Jacquet, E. Boduch, P. Chantepie Druetta, M. Hennecart, D.
Visible and near-UV photon spectroscopy of charge-exchange collisions between Ar^{2+} and Li at 105 keV
Phys. Scripta 49 417 - 423 1994 E
 $Ar^{2+} + Li \rightarrow Ar^{3+}$ (3sml, 3pnl, 3dnl)
photon spectroscopy (2000 - 6000 Å)
2.6 keV/amu

- 94E32 Keller, N. Miller, R.D. Westerlind, M. Elston, S.B. Sellin, I.A. Andersson, L.R. Biedermann, C. Cederquist, H.
Angular distributions for single- and double-electron electron capture in slow C^{4+} -Ne collisions.
Phys. Rev. A 50 462 - 467 1994 E
 $C^{4+} + Ne \rightarrow C^{3+}, C^{2+}$
recoil ion source
400 eV
- 94E33 Lee, A.R. Wilkins, A.C.R. Enos, C.S. Brenton, A.G.
Single electron capture by C^{3+} ions in He, Ne and Ar
Int. J. Mass Spectro. and Ion Proc. 130 83 - 88 1994 E
 $C^{3+} + He, Ne, Ar \rightarrow C^{2+}$
translational energy spectroscopy
6 keV
- 94E34 Lee, A.R. Wilkins, A.C.R. Enos, C.S. Brenton, A.G.
Translational energy spectroscopy of single electron capture by C^{2+} ions in He, Ne and Ar
Int. J. Mass Spectro. Ion Proc. 134 213 - 220 1994 E
 $C^{2+} + B \rightarrow C^{+} + B^{+}$
translational spectroscopy
4 keV
- 94E35 Lee, A.R. Wilkins, A.C.R. Leather, C. Brenton, A.G.
Translational energy spectra for single electron capture by O^{2+} in He, Ne and Ar
Phys. Rev. A 50 1149 - 1154 1994 E
 $O^{2+}(1s^2 2s^2 2p) + He, Ne, Ar \rightarrow O^{+}$
translational energy spectroscopy
4 keV
- 94E36 Levin, J.C. Short, R.T. Biedermann, C. Cederquist, H. Elston, S.B. Sellin, I.A.
Determination of mean energies and impact parameters characteristic of charge-charging reactions.
Phys. Rev. A 49 228 - 235 1994 E
 $Cl^{3+} + Ar \rightarrow Cl^{4+}; Cl^{3+} + Ar \rightarrow Cl^{7+}; Cl^{10+} + Ar \rightarrow Cl^{9+}, Cl^{8+}; P^{3+} + Ar \rightarrow P^{8+}, P^{7+}$
projectile-recoil ion coincidence technique
 10^3 keV/amu (F); 6300 keV/amu (Cl)
coincidence with loss
- 94E37 Liesen, D. Beyer, H.P. Fillayson, K.D. Bosch, F. Jung, M. Klepper, O. Moshhammer, R. Beckert, K. Eickhoff, H. Franke, B. Nolden, F. Spadike, F. Sieck, M. Menzel, G. Deslattes, R.D.
X-rays from radiative electron capture of highly-charged heavy ions in an electron cooler.
Z. Phys. D 30 307 - 313 1994 E
 $Au^{78+}, Au^{79+}, U^{91+} + e \rightarrow Au^{77+}, Au^{78+}, U^{90+} + hv$
x-ray-projectile coincidence technique
200 - 300 MeV/amu
- 94E38 Lork, R. Tybislowski, M. Bends, M. Berger, R.J. Neuwirth, W.
Formation of O_2 in charge transfer collisions of fast molecular hydrogen ions with O_2 molecules
Z. Phys. D 29 213 - 221 1994 E
 $H_2^+, D_2^+, H_3^+, D_3^+ + O_2 \rightarrow O_2^+$
TOF
4 - 64 keV/amu
- 94E39 Martin, S. Bernard, J. Denis, A. Desesquelles, J. Chen, L. Ouerdiance, Y.
The double capture incollisions of bare and hydrogen-like ions with rare gas atoms ($Z=7-13$)
Phys. Rev. A 50 2322 - 2326 1994 E
 $A^{2+} + B \rightarrow A^{(Z-2)+} + B^{2+}$ ($A=N, O, F, Ne$; $B=He, Ne, Ar, Kr, Xe$; $A=Na, Al$; $B=Ne, Ar, Kr, Xe$)
projectile-recoil ion coincidence technique
2xq keV
- 94E40 Matsuo, T. Tonuma, T. Kumagai, H. Tawara, H.
Cross sections of Ne^{10+} recoil ion production through pure ionization, electron loss and electron capture of projectiles in 1.05 MeV/amu $Ar^{6+} + Ne$ collisions.
Phys. Rev. A 40 1178 - 1183 1994 E
 $Ar^{6+} + Ne \rightarrow Ar^{7+} + Ne^{+}$ ($q=4, 6, 8, 10, 12, 14$)
projectile-recoil ion coincidence technique
1.05 MeV/amu
- 94E41 Meyerhof, W.E. Montenegro, E.C.
Two-center electron-electron interaction in projectile electron excitation and loss
Nucl. Instr. Meth. B 86 45 - 51 1994 E
a review

- 94E42 Moretto-Capelle, P., Bordanave-Montesquieu, A., Gonzalez, A., Benhenni, M.
Auger doorway of the $Ne^{2+}(1s2nl^2)$ Rydberg series around $Ne^{8+}(1s2s^2S)$
threshold
J. Phys. B 27 L317 - 323 1994 E
 $Ne^{8+}(1s) + Ne \rightarrow Ne^{7+}(1s2nl^2)$
electron spectroscopy
90 keV
- 94E43 Moudry, B.W., Yenen, O., Jaeks, D.H.
Alignment and orientation of Ar^m in $He^+ - Ar$ collisions
Z. Phys. D 40 199 - 204 1994 E
 $He^+ + Ar \rightarrow He + Ar^m(3p^4p')$
photon spectroscopy
0.25 keV/amu
- 94E44 Murphy, J.G., Dunn, K.F., Gilbody, H.B.
 He^{2+} formation in collisions between fast He^+ ions.
J. Phys. B 27 3687 - 3694 1994 E
 $He^+ + He^+ \rightarrow He^{2+} + He$; $He^+ + He^{2+} + e$
crossed-beam technique
108 - 460 keV
- 94E45 Nakamura, N., Nabeshima, T., Curmel, F.J., Kanai, Y., Kitazawa, S., Koide, M., Sakata, H.A., Iida, H., Matsui, Y.,
Wakita, K., Takayanagi, T., Kambara, T., Aways, Y., Suzuki, H., Ohnami, S., Satorova, U.I.
Ejected-electron spectra from the triplet states of $O^{4+}(1s^23l^3)$ produced by $O^{6+} + O_2$
collisions
J. Phys. B 27 L785 - L793 1994 E
 $O^{6+}(1s^2) + O_2 \rightarrow O^{4+}(1s^2nl^3)$
E.; Electron spectroscopy; T; Z-expansion method
60 keV
- 94E46 Ogawa, H., Katayama, I., Sugai, I., Haruyama, Y., Saito, M., Yoshida, K., Tosaki, M.,
Ikegami, H.
Electron loss cross sections of 10.6 MeV/amu light ions.
Nucl. Instr. Meth. B 88 350 - 354 1994 E
 $A^{q,-j} + C(\text{foil}) \rightarrow A^{z,-}(A = He, C, O)$
attenuation method
 10.6×10^3 keV/amu
- 94E47 Okasaka, R., Kawabe, K., Kawamoto, S., Tani, M., Kuma, H., Iwai, T., Mitu, K.,
Iwamae, A.
Excitation function of $He(n=3)$ levels in the intermediate-velocity regime of $He^+ - He$
collisions
Phys. Rev. A 49 246 - 254 1994 E
 $He^+ + He \rightarrow He^*(nl; n=3)$
photon spectroscopy
20 - 300 keV
also $He^+ + He \rightarrow He^+ + He^*(n=3)$; polarization
- 94E48 Oswald, W., Schramm, R., Jakubassa-Amundsen, D.H., Betz, H.D.,
Electron capture to the continuum in collisions of projectiles with Ne targets
J. Phys. B 27 513 - 532 1994 E
 $H^+, O^{8+} + Ne \rightarrow H^+, O^{7+} \rightarrow H^+, O^{8+}$
E.; Zero-degree electron spectroscopy; T; Second Born approx.; impulse
approximation
 $(1.25 - 5.0) \times 10^3$ keV/amu
- 94E49 Patton, C.J., Bolorizadeh, M.A., Shah, M.B., Gafdes, J., Gilbody, H.B.
Electron capture and transfer ionization in collisions of H^+ and He^{2+} ions with Fe
atoms
J. Phys. B 27 3695 - 3706 1994 E
 $H^+, He^{2+} + Fe \rightarrow H, He^+, He^0$
coincidence-technique
70 - 500 keV/amu
multiple ionization of Fe^r ($r = 1 - 4$)
- 94E50 Peart, B., Hayton, D.
Merged beam measurements of the mutual neutralization of He/H^+ and Li^+/D^- ions
J. Phys. B 27 2551 - 2556 1994 E
 $He^+ + H^- \rightarrow He + H$; $Li^+ + D^- \rightarrow Li + D$
Merged beam technique
0.6 - 300 keV (cm)
- 94E51 Radchenko, V.I.
Scattering fast hydrogen particles in gaseous media
JETP 78 445 - 455 1994 E
 $H^0 + B \rightarrow H^+$; $H^+ + B \rightarrow H^0, H^+$ ($B = He, Ar, Kr, Xe, H_2, O_2, CO_2, C_2H_2, K$)
growth method
 $1.67 \times 10^3, 5.0 \times 10^3$ keV/amu
scattering cross sections of H^+, H^0 and H^+ without charge change

- 94E52 Richter, C., Andersen, N., Doweck, D., Houver, J.C., Saigado, J., Thomsen, J.W.
Polarization effects in electron transfer reactions with laser excited Na(3p) at medium energies
Z. Phys. D 30 211 - 215 1994 E
 $H^+, H_2^+, He^+ + Na(3p) \rightarrow H^+, H_2^+, He^+; Li^+ + Na(3s, 3p) \rightarrow Li$
translational energy spectroscopy
1 keV
- 94E53 Rieger, G., Boudch, P., Chantepie, M., Cremer, G., Jacquet, E., Lecler, D., Wilson, M.
Study of photon spectra emitted during $N^{3+} + Li$ collisions
Phys. Scripta 50 493 - 500 1994 E
 $N^{3+}(1s^2) + Li \rightarrow N^{4+}(1s^2n) + Li^+$
photon spectroscopy (200 - 600 nm)
75 keV
- 94E54 Roncin, P., Adfouri, C., Andersen, N., Barat, M., Dubois, A., Gaboriaud, M.N., Hansen, J.P.H., Nielsen, S.E., Szilagyi, S.Z.
Differential cross sections and orientation propensities for electron capture in 0.75 - 12 keV $B^{3+} - He$ collisions : experiment and atomic basis theory
J. Phys. B 27 3079 - 3091 1994 E
 $B^{3+}(1s) + He \rightarrow B^{2+}(1s2s, 2p)$
E : projectile-recoil ion-photon spectroscopy ; T : AO
0.175 - 12 keV
angular differential
- 94E55 Said, R., Kamber, E.Y., Yaitkaya, S., Ferguson, S.M.
Experimental study of single-electron capture by low-energy Ne^{6+} recoil ions ($q = 3 - 6$) from He, Ne and Ar using translational energy spectroscopy
J. Phys. B 27 3993 - 4008 1994 E
 $Ne^{6+}(q = 3 - 6) + B \rightarrow Ne^{6-q+}$
translational energy spectroscopy
0.1 - 0.6 keV
angular distribution
- 94E56 Schippers, S., Schlatmann, A.R., Wiersma, W.P., Hoekstra, R., Morgenstern, R., Olson, R.E., Pascale, J.
Anisotropy effects in electron capture by O^{6+} from aligned $Na^+(3p)$
Phys. Rev. Letters 27 1628 - 1631 1994 E
 $O^{6+} + Na^+(3p) \rightarrow O^{5+}(n=5-15)$
E : photon spectroscopy ; T : CTMC
2 - 8 keV/amu
photons ($n=10 \rightarrow n=8$) ; anisotropy
- 94E57 Söhlker, Th., Giesel, H., Imrich, G., Kandler, T., Kozhuharov, C., Möller, P.H., Munzenberg, G., Nickel, F., Scheidenberger, C.S., Suzuki, T., Kucharski, M., Wazsak, A., Rymuza, F., Stachura, Z., Kriesbach, A., Dauvergne, D., Dunford, B., Eichler, J., Ichihara, A., Shirai, T.
L-subshell resolved photon angular distribution of radiative electron capture into He-like uranium
Phys. Rev. Letters 73 3520 - 3523 1994 E
 $U^{90+} + C \rightarrow U^{89+}(1s^2s, 2p) + REC$
E : photon spectroscopy ; T : relativistic calculation
 89×10^9 keV/amu
deviation of $\sin^2(\theta)$ for L-REC
- 94E58 Tanaka, M., Shimakura, N., Ohshima, T., Katori, K., Fujiwara, M., Ogata, H., Kondo, M.
Spin-polarized electron capture for the $Na + {}^3He^{2+}$ system at a ${}^3He^{2+}$ impact energy of 5.33 - 9.33 keV/amu
Phys. Rev. A 50 1184 - 1196 1994 E
 ${}^3He^{2+} + Na(3s) \rightarrow He^+(n=3,4)$
photon spectroscopy
5.33 - 9.33 keV/amu
polarized ion beam source
- 94E59 Tribedi, L.C., Nanaï, V., Press, M.R., Kurup, M.B., Prasad, K.G., Tandon, P.N.
Radiative electron capture by fully stripped channelled light ions
Phys. Rev. A 49 374 - 378 1994 E
 $A^{Z+} + Si < 100 > \rightarrow A^{(Z-1)+} + hv$
photon-spectroscopy
 $(3-7.5) \times 10^3$ keV/amu
- 94E60 Tribedi, L.C., Prasad, K.G., Tandon, P.N., Chen, Z., Lin, C.D.
Single- and double-K-shell ionization and electron-transfer cross sections for Fe and Ni bombarded by S ions and Fe by Si ions at 1.25 - 4.70 MeV/amu
Phys. Rev. A 49 1015 - 1020 1994 E
 $Si^{14+} + Fe \rightarrow Si^{13+}(1s) + Fe^+(K^{-1})$; $Si^{12+}(1s^2) + Fe^+(K^{-2})$; $Si^{16+} + Fe, Ni \rightarrow Si^{15+}, S^{14+}$
X-ray spectroscopy
 $(1.25 - 4.70) \times 10^3$ keV/amu
- 94E61 Ulrich, A., Gerth-Uaser, R., Krötz, W., Wieser, J., Murnick, D.E.
Ion-atom charge transfer system in a heavy ion atom pumped laser
Phys. Rev. A 50 1931 - 1934 1994 E
 $Ar^{2+} + Cs \rightarrow Ar^+$
photon spectroscopy
 10^5 keV
recoil ion produced by 100 MeV S

- 94E62 van der Kamp, A.B., Beijerbergen, J.H.M., Cosby, P.C., van der Zande, W.J.
 $N_2^+(A^1\Pi_u \leftarrow X^2\Sigma_g^+)$ excitation in the charge exchange collision with C_2 : two electron effects at keV energies
J. Phys. B 27 5037 - 5053 1994 E
 $N_2^+ + C_2 \rightarrow N_2^+$
 translational energy spectroscopy
 5 keV
- 94E63 van der Kamp, A.B., Cosby, P.C., van der Zande, W.J.
 Charge-transfer production of predissociated N_2 states I. the $n=3$ Rydberg state region (12.8 - 14 eV)
Chem. Phys. 184 319 - 333 1994 E
 $N_2^+ + Cs \rightarrow N_2^+$
 T-O-F + position sensitive detector technique
 4.8 - 7 keV
- 94E64 Vancura, J., Kostroun, V.O.
 Ionization and dissociation of N_2 and CO in collisions with 2.3xq keV Ar^{q+} ($8 \leq q \leq 14$)
Phys. Rev. A 49 321 - 328 1994 E
 $Ar^{q+}(q=8-14) + N_2, CO$
 TOF method
 dissociation and ionization
- 94E65 Vancura, J., Perotti, J.J., Flihr, J., Kostroun, V.O.
 Absolute total, one-, two- and three-electron transfer cross sections for $Ar^{q+}(q=8-16)$ on Ar at 2.3xq keV
Phys. Rev. A 49 2515 - 2523 1994 E
 $Ar^{q+}(q=8-16) + Ar \rightarrow Ar^{(q-1)+}, Ar^{(q-2)+}, Ar^{(q-3)+}$
 growth method
 2.3 X q keV
- 94E66 Vane, C.R., Datz, S., Dittner, P.F., Giese, J., Jones, N.L., Krause, H.F., Rossel, T.M.
 Radiative electron capture by high energy oxygen ions in hydrogen and helium.
Phys. Rev. A 49 1847 - 1853 1994 E
 $O^{8+} + H_2, He \rightarrow O^{7+} + hv$
 X-ray spectroscopy
 $5.9 \times 10^3 - 13.9 \times 10^3$ keV/amu
- 94E67 Vane, C.R., Datz, S., Dittner, P.F., Kraus, H.F., Schuch, R., Gao, H., Hutton, R.
 Electron-positron pair production in Coulomb collisions by 6.4 TeV sulfur ions
Phys. Rev. A 50 2313 - 2321 1994 E
 e^-e^+ pair spectrometer method
 6.4×10^{12} eV
 e^-e^+ pair production
- 94E68 Watch, B., Cocke, C.L., Voelpel, R., Salzborn, E.
 Electron capture from C_{60} by slow multiply charged ions
Phys. Rev. Letters 72 1439 - 1442 1994 E
 $Ar^{i+} + C_{60} \rightarrow Ar^{(i-7-1)+} + C_{60}^{i-}(i=1-6)$
 projectile-recoil ion coincidence technique
 2 keV/amu
- 94E69 Wang, Y., Westphal, J., Roller-Lutz, Z., Lutz, H.O.
 The role of an initial $Na(3p)$ state alignment in 1 keV $H^+ + Na(3p) \rightarrow H(2p) + Na^+$ collisions
Z. Phys. D 30 217 - 222 1994 E
 $H^+ + Na(3p) \rightarrow H(2p) + Na^+$
 photon-projectile coincidence technique
 1 keV
- 94E70 Wu, W., Giese, J.P., Chen, Z., Ali, R., Cooke, C.L., Pichard, P., Stockli, M.
 Evidence for population of highly asymmetric states in double-electron capture by $O^{7+,8+}$ and N^{7+} colliding with He at low to intermediate velocities
Phys. Rev. A 50 502 - 510 1994 E
 $O^{7+}, O^{8+} + He \rightarrow O^{6+}, O^{6+}; N^{7+} + He \rightarrow N^{6+}$
 coincidence-recoil momentum spectroscopy
 1 - 72 keV
- 94T 1 Adjouri, C., Roncin, P., Gaboriad, M.N., Barat, M., Andersen, N.
 Quasi molecular analysis of orientation and alignment in B^{3+} - rare gas electron capture processes.
J. Phys. B 27 3093 - 3113 1994 T
 $B^{3+}(1s) + He, Ne \rightarrow B^{2+}(1s2s, 2p)$
 quasi-molecular model
 0.75 - 6 keV

- 94T 3 Alston,S.
Innershell capture using atomic potentials : a distorted strong-potential Born treatment.
Phys. Rev. A 49 310 - 320 1994 T
H⁺ + C, Ne, Ar -> H + C⁺, Ne⁺, Ar⁺(1s⁻¹)
distorted strong-potential Born approx.
150 - 2000 keV/amu (C) ; 1500 - 15000 keV/amu (Ar)
- 94T 2 Alt,E.O. Avakov,G.V. Blukhntsev,L.D. Kodyrov,A.S. Mukhamedzhanov,A.M.
Charge exchange reactions in a three-body eikonal approach
J. Phys. B 27 4653 - 4674 1994 T
H⁺ + H(1s,2s,2p) -> H(n=1-5) ; He²⁺ + H(1s) -> He⁺(1s,2s) ; Li³⁺ + H(1s) -> Li²⁺
three-body eikonal approx.
0.1 - 10³ keV/amu (H) ; 0.5 - 10³keV/amu (He) ; 1 - 500 keV/amu (Li)
- 94T 4 Astie,A. Hencken,K. Trautmann,D. Baur,G.
Electromagnetic pair production with capture.
Phys. Rev. A 50 3980 - 3983 1994 T
analytical expression for any ion target.
- 94T 5 Avakov,G.V. Blukhntsev,L.D. Dias,O. Mukhamedzhanov,A.M.
Off-shell effects in three-body equations for the atomic reactions of electron transfer.
J. Phys. B 27 3067 - 3078 1994 T
H⁺ + H -> H + H⁺ ; He²⁺ + H -> He⁺ + H⁺
Impact parameter method with Alt-Grassberger-Sandhas equation.
0.2 - 500 keV/amu
- 94T 6 Bacchus-Montabonel,M.C. Frajja,F.
Electron capture processes in the collision of metastable B³⁺(1s2s) on atomic hydrogen.
Phys. Rev. A 49 5108 - 5111 1994 T
B³⁺(1s2s) + H -> B²⁺(1s2ln^l)
MO
- 94T 7 Belkic,D.
Double charge exchange at high impact energies.
Nucl. Instr. Meth. B 86 62 - 81 1994 T
- 94T 8 Belkic,D. Mancev,I. Mudrnic,M.
Two-electron capture from helium by fast alpha particles.
Phys. Rev. A 49 3646 - 3658 1994 T
He²⁺ + He -> He + He²⁺
second Born-DWA
25 - 1750 keV/amu
- 94T 9 Brandenbrink,S. Reihl,H. Wörmann,Th. Röllner-Lutz,Z. Lutz,H.O.
CTMC calculations of electron capture from oriented elliptical Rydberg atoms.
J. Phys. B 27 L391 - 394 1994 T
Na⁺ + Li⁺(nl) -> Na
CTMC
3.12 keV
- 94T10 Brown,G.J.N. Crothers,D.S.F.
The role symmetry in variational continuum distorted-wave models of electron capture by protons from hydrogen.
J. Phys. B 27 5309 - 5320 1994 T
H⁺ + H -> H + H⁺
variational CDW method
10 - 10³ keV
- 94T11 Castillo,J.F. Cooper,I.L. Errea,L.F. Mendez,L. Riera,A.
Molecular treatment of charge transfer in C²⁺ + H collisions : I. Ab initio evaluation of electronic energies and dynamic couplings.
J. Phys. B 27 5011 - 5026 1994 T
C²⁺ + He -> C⁺ + He⁺
MO
- 94T12 Castillo,J.F. Cooper,I.L. Errea,L.F. Mendez,L. Riera,A.
Molecular treatment of charge transfer in C²⁺ + He collisions : II. Dynamical treatment.
J. Phys. B 27 5027 - 5035 1994 T
C²⁺-(1s²2s²1S ; 1s²2s2p³P) + He -> C⁺
MO
1 - 50 keV
- 94T13 Chen,Z. Lin,C.D. Toshima,N.
Calculation of Q- values in single- and double-charge transfer collisions of highly charged ions with atoms.
Phys. Rev. A 50 511 - 517 1994 T
A^{Z+} + H -> A^{(Z-1)+} ; A^{Z+} + He -> A^{(Z-1)+}(n) , A^{(Z-2)+}(n,n⁺) (A = He,B,N,O)
close-coupling method
5 - 80 keV/amu

- 94T14 Corchs,S.E. Rivarola,R.D. McGuire,J.H. Wang, Y.D.
Electron capture from H₂ targets by H⁻ and He²⁺ ions. Dependence of the cross sections on the orientation of the molecular axis.
Phys. Scripta 50 469 - 472 1994 T
H⁻,He²⁺ + H₂(theta) -> H,He⁺
B1B molecular model
10² - 5x10³ keV/amu
- 94T15 Courbin,C. Machhain,M. Lewartowski,E.
Orientation and alignment in charge exchange processes involving sodium atoms studied by semi-classical molecular theory.
Z. Phys. D 30 205 - 210 1994 T
H⁺ + Na(3p) -> H; Li⁺+Na(3p) -> Li
semi-classical MO model
1, 2 keV/amu
- 94T16 Dutta,C.M. Lane,N.F. Kimura,M.
Electron capture in collisions of excited Na*(3p) atoms with He⁻ ions at 0.1 - 7 keV/u; effects of alignment of the initial Na*(3p) orbital.
Phys. Rev. A 49 1806 - 1815 1994 T
He⁺ + Na*(P_{3,2,1}) -> He(2s,2p_{3,2,1}); He⁺ + Na(3s) -> He
MO
0.1 - 7 keV/amu
alignment factor
- 94T17 Ermolaev,A.M.
Neutralization of protons in energetic collisions with hydrogen-like beryllium ions.
J. Phys. B 27 L671 - 675 1994 T
H⁺ + Be³⁺(1s) -> H(m) + Be⁴⁺
AO
100 - 3000 keV
also ionization to B⁴⁺ (100 - 1000 keV/amu)
- 94T18 Ermolaev,A.M. Jackson,D. Shimakura,N. Watanabe,T.
Study of He⁻ - H collisions at intermediate keV energies using pseudo-one- and two-electron atomic orbital expansions.
J. Phys. B 27 4991 - 5009 1994 T
He⁺ + H -> He + H⁺
AO
2.5 - 100 keV/amu
also ionization, excitation, Balmer-Alpha-line emission
- 94T20 Errea,L.F. Herrevo,B. Mendez,L. Rabadan,I. Sanchez,P.
Molecular treatment of excitation and charge transfer in Be⁺ - He collisions.
J. Phy. B 27 L753 - 761 1994 T
Be⁺(2s) + H(1s) -> Be(2s²,2s2p) + H⁺
MO model (28 states)
also excitation to Be⁺(2p), H(2l)
- 94T19 Errea,L.F. Meudez,L. Riera,A. Harel,C. Jouin,H. Pons,B.
Common-translational factor method with an atomic basis.
Phys. Rev. A 50 418 - 422 1994 T
He²⁺ + H -> He⁺(n=2) + H⁺
Close-coupling AO with common translational factor
0.25 - 156 keV/amu
also He²⁺ + H⁺; He²⁺ + H(n=2)
- 94T21 Errea,L.F. Sanchez,P.
Application of regularized probability absorber states to He⁺ + H⁺ collisions.
J. Phys. B 27 3677 - 3686 1994 T
He⁺ + H⁺ -> He²⁺ + H; He²⁺ + e + H⁺
close-coupling + probability absorber method
10 - 500 keV
also excitation to He⁺(n=2,3)
- 94T22 Fraija,F. Allouche,A.R. Bacchus-Montabonel,M.C.
Ab initio treatment of electron capture by B⁴⁺ ions from atomic hydrogen.
Phys. Rev. A 49 272 - 276 1994 T
B⁴⁺(1s) + H -> B³⁺(total,1s3l)
AO with ETF
2x10⁻³ - 10 keV
- 94T23 Fraija,F. Bacchus-Montabonel,M.C. Gargaud,M.
Ab initio molecular treatment of electron capture processes in the B³⁺ + He collision.
Z. Phys. D 29 179 - 182 1994 T
B³⁺(1s²) + He(1s²) -> B³⁺(1s²2s;1s²2p) + He⁺
MO
0.2 - 6.25 keV/amu

- 94T24 Fritsch, W.
On transfer excitation in slow ion-helium collisions.
Phys. Letters A 192 369 - 373 1994 T
 $C^{3+} + He \rightarrow C^{2+}(n=2-5) + He^+$; $C^{3+}(n=2-3) + He^+(n=2)$
AO
8 keV/amu
also target excitation to $He(n=2)$ and scaling for other ions/charges.
- 94T25 Fritsch, W.
Theoretical study of electron processes in slow $He^{2+} - He$ collisions.
J. Phys. B 27 3461 - 3474 1994 T
 $He^{2+} + He \rightarrow He^+(nl) + He^+(1s)$; $He^+(nl) + He^+(nl; n=2-4)$
closed-coupling two-electron model
4 - 65 keV/amu
also target excitation to $He(1snl) n=2-3$
- 94T27 Gargaud, M. Bacchus-Montabone, M.C. McCarroll, R. Grozdanov, T.
Orientation propensity for states populated by electron capture in B^{3+}/He collisions.
J. Phys. B 27 4675 - 4680 1994 T
 $B^+ + He \rightarrow B^{2+}(1s^2 2p^2 p)$
guasi-molecular representation
0.3 - 1.5 keV
- 94T26 Gargaud, M. Fraija, F. Bacchus-Montabone, M.C. McCarroll, R.
Total and differential electron capture cross sections in B^{3+}/He collisions.
J. Phys. B 27 3985 - 3992 1994 T
 $B^{3+} + He \rightarrow B^{2+}(1s^2 2s; 2p) + He^+$
model potential
1 eV - 10 keV
- 94T28 Gayet, R. Hansen, J.
Resonant and non-resonant modes of transfer and excitation processes in ion-atom collisions.
Nucl. Instr. Meth. B 86 52 - 61 1994 T
a review
- 94T29 Glass, J.T. McCann, J.F. Crothers, D.S.F.
Asymmetric theories of relativistic electron capture.
J. Phys. B 27 3975 - 3984 1994 T
 $H^+ + H \rightarrow H + H^+$; $A^{Z+} + B \rightarrow A^{(Z-1)+}$ ($A = C, Ne, Ar$; $B=10-92$)
relativistic CDW + EI model
140 - 400 MeV/amu
- 94T30 Glass, J.T. McCann, J.F. Crothers, D.S.F.
Relativistic continuum distorted wave theory for electron capture
J. Phys. B 27 3445 - 3460 1994 T
 $H^+ + H \rightarrow H + H^+$; $H^+ + Zn^{29+}(1s) \rightarrow H(1s) + Zn^{30+}$; $A^{Z+} + B \rightarrow A^{(Z-1)+}$ ($A = C, Ne, Ar$; $B=10-92$)
relativistic CDW
10 - 10^6 MeV/amu (H); 140 - 1050 MeV/amu (Ar)
- 94T31 Gulyas, L. Szabo, Gy.
Resonant double electron capture by fast He^{2+} from He : the first-order Born approximation with correct boundary condition
Z. Phys. 29 115 - 119 1994 T
 $He^{2+} + He(1s^2) \rightarrow He(1s^2) + He^{2+}$
first-order Born approx. with correct boundary condition
- 94T32 Homan, D.M. Cavagnero, M.J. Harmin, D.A.
Charge transfer in ion collisions with circular Rydberg atoms.
Phys. Rev. A 50 R1965 - 1994 T
 $Na^+ + Li(n=25) \rightarrow Na$
classical electron + elementary model
2.5 keV
- 94T33 Honvault, P. Bacchus-Montabone, M.C. McCarroll, R.
Electron capture by state-selected O^{2+} ions from atomic hydrogen.
J. Phys. B 27 3115 - 3127 1994 T
MO
20 eV - 30 keV
cross sections (P) - 3 x cross sections (D, S)
- 94T34 Ichihara, A. Shirai, T. Eichler, J.
Radiative electron capture in relativistic atomic collisions.
Phys. Rev. A 49 1875 - 1884 1994 T
 $A^{Z+} + e \rightarrow A^{(Z-1)+}(K, L)$ ($A=20-100$)
Impulse approx.
 $10^2 - 2 \times 10^3$ MeV/amu
- 94T35 Kabachnik, N.M.
New trends in the study of alignment and orientation in ion-atom collisions.
Nucl. Instr. Meth. B 86 20 - 27 1994 T
a review

- 94T37 Kazansky,A.K., Ostrovsky,V.N.
Orientation effects in charge exchange : probing short-range repulsion by interference patterns.
Phys. Rev. A 50 2273 - 2278 1994 T
 $B^{3+} + He \rightarrow B^{2+}(2p) + He^+$
three-state model
- 94T38 Kazansky,A.K., Rorcin,P.
Stabilization of multiple electron capture by the post-collisional increase of angular momentum of Rydberg electrons.
J. Phys. B 27 5537 - 5550 1994 T
 $N^{7+} \rightarrow N^{5+}(nl'n'l')$; $Ne^{10+} \rightarrow Ne^{8+}(nl'n'l')$
model calculation
- 94T39 Kimura,M., Dalgarno,A., ChanCranupony,L., Li,Y., Hirsch,G., Buenker,R.J.
Non-radiative and radiative electron capture in collisions of He^+ ions with C atoms below 1000 eV.
Phys. Rev. A 49 2541 - 2544 1994 T
 $He^+ + C \rightarrow He + C^*(^2D,^2P)$
MO
 $10^{-5} - 10^3$ eV
- 94T40 Kimura,M., Gu,J.P., Li,Y., Hirsch,G., Buenker,R.J.
Comment on "Suppressed electron capture in slow $O^+(^4S^0,^4D^0,^4P^0) - He$ collisions".
Phys. Rev. A 49 3131 - 3133 1994 T
 $O^+(^4S,^4D,^4P) + He \rightarrow O(^3P) + He^+$
MO
0.6 - 10 keV
- 94T41 Kuang,J., Chen,Z., Lin,C.D.
A perturbation/close-coupling method for inelastic processes in ion-atom collisions.
J. Phys. B 27 5731 - 5740 1994 T
 $H^+ + H \rightarrow H + H^+$; $H^+ + H^+(n)$
perturbation/close-coupling method
20 - 200 keV
also excitation to $H(n=2,3,4)$
- 94T42 Lin,C.D., Tushima,N.
Selectivity of electron capture probabilities on the initial state magnetic quantum numbers in ion-atom collisions.
Z. Phys. D 30 189 - 192 1994 T
 $H^+ + H(4f) \rightarrow H(4f) + H^+$
two-center AO
1, 4 keV/amu
- 94T43 Lin,C.D., Tushima,N., Fritsch,W.
Alignment and orientation in atomic collisions.
Nucl. Instr. Meth. B 86 12 - 19 1994 T
a review
- 94T44 Lundgaard,M.F.V., Tushima,N., Chen,Z., Lin,C.D.
Electron capture from elliptic Rydberg states.
J. Phys. B 27 L611 - 617 1994 T
 $H^+ + H(n=3,4,5) \rightarrow H + H^+$; $Ne^+ + Li(n=25) \rightarrow Na$
Close-coupling method
- 94T45 Lundy,C.J., Olson,R.E., Schultz,D.R., Pascale,J.P.
Coherence parameters for electron capture in $H^+ + He$ collisions.
J. Phys. B 27 935 - 942 1994 T
 $h^+ + He \rightarrow H(n=2,3,4) + He^+$
CTMC
30 - 250 keV/amu
- 94T46 Macchalin,M., Courbin,C.
Alignment and orientation for charge exchange in $Li^+ - Na(3s,3p)$ collisions : II. time-dependent outer electron density and current.
J. Phys. B 27 4703 - 4714 1994 T
 $Li^+ + Na(3p) \rightarrow Li$
semiclassical close-coupling mode
1 - 2 keV
- 94T47 Kazansky,A.K., Ostrovsky,V.N.
Orientation effects in charge exchange : probing short-range repulsion by interference patterns.
Phys. Rev. A 50 2273 - 2278 1994 T
 $B^{3+} + He \rightarrow B^{2+}(2p) + He^+$
three-state model
- 94T48 Kimura,M., Dalgarno,A., ChanCranupony,L., Li,Y., Hirsch,G., Buenker,R.J.
Non-radiative and radiative electron capture in collisions of He^+ ions with C atoms below 1000 eV.
Phys. Rev. A 49 2541 - 2544 1994 T
 $He^+ + C \rightarrow He + C^*(^2D,^2P)$
MO
 $10^{-5} - 10^3$ eV
- 94T49 Kimura,M., Gu,J.P., Li,Y., Hirsch,G., Buenker,R.J.
Comment on "Suppressed electron capture in slow $O^+(^4S^0,^4D^0,^4P^0) - He$ collisions".
Phys. Rev. A 49 3131 - 3133 1994 T
 $O^+(^4S,^4D,^4P) + He \rightarrow O(^3P) + He^+$
MO
0.6 - 10 keV
- 94T50 Kimura,M., Gu,J.P., Liebermann,H.P., Li,Y., Hirsch,G.H., Buenker,R.J., Dalgarno,A.
Electron capture and excitation in collisions of $O^+(^4S,^4D,^4P)$ ions with He atoms and He^+ ions with O atoms at energies below 10 keV.
Phys. Rev. A 50 4854 - 4858 1994 T
 $O^+(^4S,^4P,^4D) + He \rightarrow O + He^+$; $He^+ + O(^3P) \rightarrow He + O^+(^3P)$
semiclassical/full quantum mechanical MO
0.16 - 9.0 keV

- 94T46 Machtholm, M. Lewartowski, E. Courbin, C.
Alignment and orientation for charge transfer in $\text{Li}^+ - \text{Na}(3s, 3p)$ collisions :
I. differential and total cross sections.
J. Phys. B 27 4681 - 4702 1994 T
 $\text{Li}^+ + \text{Na}(3s, 3p) \rightarrow \text{Li}(2s, 2p)$
semiclassical close-coupling method
1 - 1.5 keV
- 94T48 Martinez, A.E. Geyet, R. Hanssen, J. Rivarola, R.D.
Thomas two-step mechanisms for double electron transfer
J. Phys. B 27 L375 - 382 1994 T
 $\text{He}^{2+} + \text{He} \rightarrow \text{He}^0 + \text{He}^{2+}$
CDW-EIS approx.
1 - 5 MeV (total) ; 1.5 - 400 MeV (angular distribution)
- 94T49 McCartney, M. Crothers, D.S.F.
Capture via ionization
J. Phys. B 27 L485 - 488 1994 T
 $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}^+$
CDW-EIS method
10 - 500 keV
- 94T50 Meng, L. Olson, R.E. Folkerts, H.O. Hoekstra, R.
State-selective electron capture in $\text{He}^{2+} - \text{H}_2$ collisions.
J. Phys. B 27 2269 - 2276 1994 T
 $\text{He}^{2+} + \text{H}_2 \rightarrow \text{He}^+(n\ell) + \text{H}_2^+ ; \text{He}^+(n\ell) + \text{H}_2^{2+} + e$ ($n=1-6$)
T : CTMC ; E : photon spectroscopy
30 - 200 keV/amu
- 94T51 Micha, D.A. Runge, K.
Time-dependent many-electron approach to slow ion-atom collisions : the coupling
of electronic and nuclear motions.
Phys. Rev. A 50 322 - 336 1994 T
 $\text{H}^+ + \text{H} \rightarrow \text{H}^0 + \text{H}^+ ; \text{He}^{2+} + \text{H} \rightarrow \text{He}^+$
eikonal + time-dependent TDHF
2 - 10^5 eV (H)
- 94T52 Nitikin, E.E. Taulbjerg, K.
Effect of rotational coupling on charge transfer into Coulomb channels.
J.P hys. B 27 2259 - 2268 1994 T
 $\text{Ar}^{18+} + \text{Ne} \rightarrow \text{Ar}^{17+}$
perturbation theory
1 keV
- 94T53 Ostrovsky, V.N.
Asymptotic theory of $s \rightarrow p$ charge exchange : Extended Demkov model.
Phys. Rev. A 49 3740 - 3751 1994 T
 $\text{H}^+ + \text{Na}(3p) \rightarrow \text{H}(n=2) + \text{Na}^+$
extended Demkov model
1 keV/amu
- 94T54 Pradhan, A. Dalgarno, A.
Charge transfer of H^+ with Cl and Cl^+ with H.
Phys. Rev. A 49 960 - 964 1994 T
 $\text{H}^+ + \text{Cl} \rightarrow \text{H} + \text{Cl}^+$
MO
50 - 10^3 K
rate coefficients
- 94T55 Reading, J.F. Ford, A.L. Hall, K.A. Lindroth, E.
A review of some selected two electron processes in ion-atom collisions.
Nucl. Instr. Meth. B 86 38 - 44 1994 T
a review
- 94T56 Roller-Lutz, Z. Höelmann, R. Blum, K. Lutz, H.O.
Angular correlation analysis of non-isotropic atomic collision ensembles.
J. Phys. B 27 2009 - 2019 1994 T
 $\text{H}^+ + \text{Na}(3p) \rightarrow \text{H}(2p) + \text{Na}^+$
- 94T57 Sain, A.
New light on old problems
Nucl. Instr. Meth. B 86 1 - 11 1994 T
a review
- 94T58 Schweinzer, J. Wutte, D. Winter, H.P.
A study of electron capture and excitation processes in collisions of multiply
charged ions with lithium atoms.
J. Phys. B 27 137 - 153 1994 T
 $\text{H}^+, \text{He}^{2+}, \text{Li}^{3+}, \text{Be}^{4+}, \text{C}^{5+} + \text{Li}(2s, 2p, 3p) \rightarrow \text{H}, \text{He}^+, \text{Li}^{2+}, \text{Be}^{3+}, \text{C}^{4+}$
AO-close-coupling method
1-10 keV/amu
scaling

- 95E1 Allen, J.S., X. D. Fang, A. Sen, R. Matulioniene and T. J. Kvale
Double electron detachment cross sections in intermediate-energy H⁺ plus noble - gas collisions
Phys. Rev. A 52 357 - 63 1995
H⁺ + B → H⁺ (B=He, Ne, Ar)
E: growth method
3 - 50 keV
- 95E2 Bordenave-Montesquieu, D. and R. Dagnac
Differential cross sections for single-electron capture in He²⁺ - D collisions
J. Phys. B 28 2181 - 92 1995
He²⁺ + D → He⁺ (n=2, 3)
E: translational energy spectroscopy
4, 6, 8 keV/amu
- 95E3 Brandau, C. F. Melcher, S. Krüdener, S. Meuser, A. Pfeiffer, K. V. Diemar, T. Bartisch, E. Salzborn, D. B. Uskov, A. D. Ulanisev and L. P. Presnyakov
Quasi-resonant charge exchange between carbon and boron ions
J. Phys. B 28 1579 - 84 1995
C²⁺ + B⁺ → C⁺ + B²⁺
B²⁺ + C⁺ → B⁺ + C²⁺
E: crossed beam technique
1.3 - 160 keV (c.m.)
- 94E4 Bruckmeier, R., Ch. Wunderlich and H. Figger
Enhanced charge transfer to molecular ions by electronic excitation of the target
Phys. Rev. A 52 334 - 41 1995
A⁺ + Cs(6²P_{3/2}) → A (A=Ar, Kr, Xe)
E: laser-excited target method
15 keV
- 95E5 Cederquist, H. C. Biedermann, N. Selberg and P. Hvelplund
Measurements of translational energy gain for one- and two-electron transfer in slow Ar^{q+} (q=15-18) collisions
Phys. Rev. A 51 2169 - 78 1995
Ar^{q+} (q=15,16,17,18) + He → Ar^{q-1+} (n), Ar^{q-2+} (n, n')E: translational energy gain spectroscopy
3.35 keV × q
- 95E6 Cederquist, H. C. Biedermann, N. Selberg and P. Hvelplund
Oscillations in mean capture Q - values as functions of the projectile charge in slow Xe^{q+} - He (q=25-44) collisions
Phys. Rev. A 51 2191 - 98 1995
Xe^{q+} + He → Xe^{q-1+} (q=25-44)
E: translational energy spectroscopy
3.4 keV × q
q=25-31, 33, 35-37, 39-44
- 95E64 Cisneros, C. de Uguijo, J. Alvarez, J. Aguilar, A. Juarez, A. M. Martinez, H.
Electron capture collision processes involving multiply-charged Si, Ni, Ti, Mo and W ions with H, He and He targets
Suppl. Nucl. Fusion 6 247-261 1995
Si^{q+} (q=2,14) + H → Si^{q-1+}; Si^{q+} (q=2,9) + H₂ → Si^{q-1+}; Si^{q+} (q=4,8,11,13,14) + He → Si^{q-1+}; Ti^{q+}; Ti^{q+} (q=2,22) + H → Ti^{q-1+}; Ti^{q+} (q=2,4) + H₂ → Ti^{q-1+}; Ti^{q+} (q=4) + He → Ti^{q-1+}; Ni^{q+} (q=4,13,15-28) + H → Ni^{q-1+}; Mo^{q+} (q=3-30,42) + H → Mo^{q-1+}; Mo^{q+} (q=4-18) + H₂ → Mo^{q-1+}; W^{q+} (q=3-30,74) + H → W^{q-1+}; W^{q+} (q=4-15) + H₂ → W^{q-1+}
- 95E7 DePaola, B.D., M. T. Huang, S. Winecki, M. P. Stockli, Y. Kanai, S. R. Lundeen, C. W. Fehrenbach and S. A. Arko
Absolute cross sections for charge capture from Rydberg targets by slow highly charged ions
Phys. Rev. A 52 2136 - 140 1995
Xe^{q+} (q=8, 16, 32, 40) + Rb^{*} (10f) → Xe^{q-1+}
E: laser-excited target technique
0.25 - 9 keV/amu
- 95E8 Dmitriev, I.S., Ya. A. Toplova and Yu. A. Fainberg
An experimental study of single electron loss cross sections for hydrogen atoms and negative hydrogen ions in various media
JETP 80 28 - 31 (1995)
H + B → H⁺; H⁺ + B → H⁰ (B=H₂, He, N₂, Ne, Ar, Xe)
E: growth method
0.3, 0.7 MeV
- 95E9 Dressler, R.A., S. T. Arnold and E. Murad
Charge transfer dynamics in ion-poly atomic molecule collisions: X⁺ + H₂O (X = N, Kr)
J. Chem. Phys. 103 9989 - 10000 1995
Kr) luminescence study
A⁺ + H₂O (v₁ = 0) → A + H₂O⁺ (A: v₁ = 7-13) (A = N, Kr)
E: photon spectroscopy
0.4-130 eV
- 95E65 Druetta, M. Hitz, D. Jettikant, B.
Charge exchange collisions of multi-charged Ar^{q+}, Kr^{q+}, Fe^{q+} and Ni^{q+} ions with He and H₂
Suppl. Nucl. Fusion 6 225-246 1995
Ar^{q+} + H₂, He → Ar^{q-1+}; Kr^{q+} + H₂, He; Kr^{q+} + Fe⁺ + He → Fe^{q+}; Fe^{q+} + H₂, He → Fe^{q+}; Ni^{q+} + H₂ → Ni^{q+}
photon spectroscopy
50-60 keV (Ar); 90-100 keV (Kr); 105-120 keV (Fe); 340 keV (Ni)

- 95E10 Fang, Z. and V. H. S. Kwong
Charge transfer between the $2p^2\ ^3P$ ground state O^{2+} ion and He, H₂, N₂ and CO at electron-volt energies
Phys. Rev. A 51 1321 - 26 1995
 $O^{2+} + B \rightarrow O^+(B=He, H_2, N_2, CO)$
E : ion-trap technique
2.5 eV
- 95E11 Folkerts, L. M. A. Haque, C. C. Harvener, N. Shimakura and M. Kimura
Low-energy electron capture by N^{4+} ions from H atoms : experimental study using merged beam and theoretical analysis by molecular representation
Phys. Rev. A 51 3685 - 92 1995
 $N^{4+} + D(1s) \rightarrow N^{3+}$
E : merged beam technique
1-300 eV/amu
- 95E12 Forest, J.L., J. A. Tanis, S. M. Fergusson, R. R. Haer, K. Liffrieri and V. L. Plano
Single and double ionization of helium by intermediate-to-high velocity He^+ projectiles
Phys. Rev. A 52 350 - 56 1995
 $He^+ + He \rightarrow He + He^+, He + He^{2+} + e$
E : projectile-recoil ion coincidence technique
0.125 - 3.0 MeV/amu
also $He^+ + He \rightarrow He^{2+}$
- 95E67 Gilbody, H.B.
Charge transfer and ionization studies involving metallic species
Suppl. Nucl. Fusion 6 197-212 1995
 $Al^+ + H \rightarrow Al^0 ; Fe^{3+} + H, He \rightarrow Fe^{2+} ; H^+ + Fe, Cu \rightarrow H^0 ; He^+ + Fe, Cu \rightarrow He^+$
data compilation and ionization
- 95E13 Glosser, J., A. Hagedorn, U. Herne, M. Izziok and T. Simonides
Partial differential cross sections for inelastic $He^+ + Ne$ collisions at low energy
Z. Phys. D 35 93 - 100 1995
 $He^+(1s) + Ne \rightarrow He(1s2s)$
E : energy-loss spectroscopy
100 - 200 eV
- 95E14 Gosselin, A., D. Hennecart, X. Husson, H. Kucal, D. Lecler, A. Lepoutre, A. Cassimi, J. P. Grandin, P. Jardin and C. Adjouri
Partial and total cross sections for single electron capture by Ar^{2+} from He in the 400 - 2400 eV energy range
J. Phys. B 28 445-56 1995
 $Ar^{2+} + He \rightarrow Ar^{2+}$ (total, 4d, 4f, 5s, 5p)
E : translational energy spectroscopy + retardation technique
400 - 2400 eV
- 95E15 Havener, C. C. A. Muller, P. A. Zeijlman van Emmichoven and R. A. Phaneuf
Low-energy electron capture by C^{3+} from hydrogen using merged beams
Phys. Rev. A 51 2982 - 88 1995
 $C^{3+} + D \rightarrow C^{2+}$ (total)
E : merged beam technique
0.26 - 2700 eV/amu
- 95E16 Hayton, D.A. and B. Peart
Merged beam measurements of the mutual neutralization of He^+O^+ and Na^+O^+ ions
J. Phys. B 28 L279 - 83 1995
 $He^+ + O^+ \rightarrow He + O$
 $Na^+ + O^+ \rightarrow Na + O$
E : merged beam technique
1.2 - 500 eV (He^+) ; 0.6 - 30 eV (Na^+)
- 95E17 Heber, O., G. Sampoll, B. B. Bandoo, R. J. Maurer, R. L. Watson, I. Ben - Izhak, J. M. Sanders, J. L. Shimpugh and P. Richard
Multiple-electron ionization, capture and loss by 19 MeV F^{9+} ($q = 2 - 9$) in collisions with Ne and Ar.
Phys. Rev. A 52 4578 - 85 1995
 $F^{9+}(q=4-9) + Ne, Ar \rightarrow F^{q+1+} ; F^{9+}(q=6-9) + Ne, Ar \rightarrow F^{q+2+} ; F^{9+}(q=2-8) + Ne, Ar \rightarrow F^{q+1+} ; F^{9+}(q=2-6) + Ne, Ar \rightarrow F^{q+2+}$
E : projectile-recoil ion coincidence technique
19 MeV
- 95E18 Hodgkinson, J.M., T. K. McLaughlin, R. W. McCullough, J. Geddes and H. B. Gilbody
Importance of dissociative excitation by slow He^{2+} ions in one-electron capture collisions with H_2
J. Phys. B 28 L393 - 97 1995
 $He^{2+} + H_2 \rightarrow He^+(1s) + H^+ + H(2l) ; He^+(2l) + H_2^+$
E : translational energy spectroscopy
0.5 - 2.0 keV/amu
- 95E19 Hoekstra, R.
Lime emission from collisions of multiply charged ions on He and Li for charge exchange spectroscopy diagnostics at tokamaks
Comm. At. Mol. Phys. 30 361 - 79 1995
 $He^{2+} + B \rightarrow He^+(4l)$ ($B = H, H_2, He, Li, Na$)
 $A^{2+} + Li \rightarrow A^+(7l)$ ($A = B, N, C$)
evaluated cross sections
 $1 - 10^3$ keV/amu
- 95E66 Hoekstra, R., Beijers, J.M.P., Blicek, F.W., Schippers, S., Morgenstern, R.
Fusion-related experiments with medium-z multiply charged ions
Suppl. Nucl. Fusion 6 213-223 1995
 $He^{2+} + Na \rightarrow He^+ ; B^+, C^+ + Li \rightarrow B^+, C^+ ; N^+, He, Li \rightarrow N^+ ; N^+ + Li \rightarrow N^+ ; O^+ + He \rightarrow O^+ ; O^+ + Li \rightarrow O^+$
1-25 keV/amu (He) ; 1-10 keV/amu (B, C) ; 0.05-10 keV/amu (N) ; 0.1-10 keV/amu (O)

- 95E20 Itoh, A. N., Inanishi, F., Fukuzawa, N., Hamamoto, S., Hanawa, T., Tanaka, T., Ohdaira, M., Saito, Y., Haruyama and T. Shirai
Single-, double- and triple-electron capture cross sections for multicharged slow carbon ions in H₂, CH₄, C₂H₆, C₃H₈ and CO₂ molecules
J. Phys. Soc. Japan 64 3255-64 1995
C³⁺ + B → C⁰; C³⁺ + B → C⁺, C⁰; C³⁺ + B → C²⁺, C⁺, C⁰ (B=H₂, CH₄, C₂H₆, C₃H₈, CO₂); C⁴⁺ + H² → C³⁺, C²⁺
E: recoil ion beam
6.3 - 16.3 keV
- 95E21 Jaquet, E., J. Pascale, P. Boduch, M. Chantepie and D. Lecler
Velocity and core-electron effects in state-selective electron capture following Ar⁸⁺ + Li collisions
J. Phys. B 28 2221 - 31 1995
Ar⁸⁺ + Li → Ar⁷⁺(nl; n = 8-11)
E: photon spectroscopy
1.5 - 4.5 keV/amu
- 95E22 Jaquet, E., P. Boduch, M. Chantepie, M. Druetta, D. Lecler and M. Wilson
New investigations of near UV and visible photon emission resulting from 60 keV C⁴⁺-Li collisions
Phys. Scripta 51 64-68 1995
C⁴⁺(1s², 1s2s) + Li → C³⁺(1s² nl; n = 5-9)
E: photon spectroscopy
60 keV
transition energies determined
- 95E23 Kimbara, T., J. Z. Tang, Y. Aways, B. D. DePaola, O. Jazutski, Y. Kanai, M. Kimura, T. M. Kojima, V. Mergel, Y. Nakai, H. W. Schmidt-Böcking and I. Shimamura
Three-dimensional recoil ion momentum analyses in 8.17 MeV O⁷⁺-H₂ collisions
J. Phys. B 28 4593-606 1995
O⁷⁺ + He → O⁶⁺ + He⁺; O⁶⁺ + He²⁺
E: recoil momentum spectroscopy
8.17 MeV
- 95E24 Kandler, T., Th. Stöhlker, P. H. Mokler, C. Kozhuharov, H. Geisel, C. Scheidenberger, P. Rymuza, Z. Stachura, A. Warczak, R. W. Dunford, J. Eichler, A. Ichihara and T. Shirai
Photon angular distribution of radiative electron capture into the M shell of He-like uranium ions at 110-140 MeV/u
Z. Phys. D 35 15-18 1995
U⁹⁰⁺ + C (foil) → U⁸⁹⁺(1s²nl; n = 2,3)
E: photon spectroscopy
110 - 140 MeV/amu
- 95E26 Khemliche, H., M. H. Prior and D. Schneider
Complex sulfate anions formed in double electron capture
Phys. Rev. Letters 74 5013 - 5016 1995
C³⁺ + He → C²⁺[1s(2s2p¹P)P; 1s2p²D]
E: Auger electron spectroscopy
25 keV
- 95E27 Kimura, M., N. Nakamura, H. Watanabe, I. Yamada, A. Darjo, K. Hosaka, A. Matsumoto, S. Ohtani, H. Sakaue, M. Sakurai, H. Tawara and M. Yoshino
A scaling law of cross sections for multiple electron transfer in slow collisions between highly charged ions and atoms
J. Phys. B 28 L643 - 47 1995
- 95E28 Kravis, K., H. Saitoh, K. Okuno, K. Saejima, M. Kimura, I. Shimamura, Y. Aways, Y. Kaneko, M. Oura and N. Shimamura
Single and double charge exchange cross sections for Ar¹⁷⁺ + H₂ (q=6,7,8,9,11) collisions from 6 eV to 11 keV
Phys. Rev. A 52 1206 - 12 1995
Ar^{q+}(q = 6-9,11) + H₂ → Ar^{q+1+}, Ar^{q-2+}
E: OPIG technique
6 eV - 11 keV
- 95E30 Kvale, T. J., J. S. Allen, A. Sen, X. D. Fang and R. Matulioniene
Curvature in the scattered-beam growth curves in H⁺ + (He, Ne, Ar) collisions
Phys. Rev. A 51 1360 - 66 1995
H⁺ + He, Ne, Ar → H⁰, H⁺
E: growth method
3 - 50 keV
- 95E29 Kvale, T. J., J. S. Allen, X. D. Fang, A. Sen and R. Matulioniene
Single-electron detachment cross sections for 5-50 keV H⁺ ions incident on He, Ne and Ar atoms
Phys. Rev. A 51 1351 - 59 1995
H⁺ + He, Ne, Ar → H⁰
E: growth method
3 - 50 keV
- 95E25 Kandler, T., P. H. Mokler, Th. Stöhlker, H. Geisel, H. Irnich, Ch. Kozhuharov, A. Kriesbach, M. Kucharski, G. Munzenberg, F. Nickel, P. Rymuza, C. Scheidenberger, Z. Stachura, T. Suzuki, A. Warczak, D. Dauvergne and R. W. Dunford
Transition selective investigation of the resonant transfer and excitation in U⁹⁰⁺ → C collisions
Phys. Letters A 204 274 - 80 1995
U⁹⁰⁺ + C → U⁸⁹⁺(1s²nlⁿ)
E: X-ray-projectile coincidence technique
105 - 140 MeV/amu

- 95E31
Larsson, M.O. A., M. Gonzalez, R. Hallin, F. Heijkenkjold, R. Hutton, A. Langerais, B. Nystrom, G. O'Sullivan and A. Wannstrom
Wave lengths and energy levels of Xe VII and Xe VIII obtained by collision-based spectroscopy
Phys. Scripta 51 69 - 75 1995
Xe⁸⁺ + He, Ar → Xe^{(q=1)+}
E : photon spectroscopy
10 keV X q
- 95E32
Laulhe, C. E., Jacquet, G., Cremer, J., Pascale, P., Boduch, G., Rieger, D., Lecler, M., Chantepie and J. L. Cojan
Polarization of lines emitted after electron capture into Ar⁷⁺ (nlm) sub levels during 80 keV Ar⁷⁺ - Li collisions
Phys. Rev. A 52 3803 - 808 1995
Ar⁷⁺ + Li → Ar⁷⁺(nlm; n=8, 9)
E : photon spectroscopy
80 keV
- 95E34
MacAdam, K.B., J. C. Day, J. C. Aquilar, D. M. Homan, A. D. MacKellar and N. J. Cavagnero
Transient molecular-ion formation in Rydberg electron capture
Phys. Rev. Letters 75 1723 - 26 1995
K⁺ + Na(24d, 25s) → K
E : laser-excited target
- 95E33
Martin, S. J., Bernard, L., Chen, A., Denis and J. Desessuelles
Stabilized double electron capture in Ne¹⁰⁺ - He collisions : velocity dependence of Rydberg-electron (n, l) distributions
Phys. Rev. A 52 1218 - 23 1995
Ne¹⁰⁺ + He → Ne⁸⁺, Ne⁸⁺
E : photon spectroscopy + recoil ion coincidence
0.9 - 9 keV/amu
- 95E68
Martinez, H., Fuentes, B.E., Alvarez, J., Cisneros, C. de Urquijo, J.
Single and double electron capture in H⁺ on Kr collisions at low-keV energies
Chem. Phys. 190 139 - 143 1995
H⁺ + Kr → H^p, H⁺
differential and total cross sections
1 - 5 keV
- 95E37
Melchert, F., M. Benner, S. Kridener, R. Schulze, S. Meuser, K. Huber, E. Salzborn, D. R. Uskov and L. P. Presnyakov
Neutralization of H in energetic collisions with multiply charged ions
Phys. Rev. Letters 74 888 - 91 1995
H⁺ + Ne⁶⁺ (q=1-4), Ar¹¹⁺ (q=1-8), Xe⁶⁺ (q=1-8) → H⁰
E : crossed beam technique
20 - 200 keV (c.m.)
- 95E36
Melchert, F., R. Schulze, S. Kridener, S. Meuser, E. Salzborn, D. B. Uskov, A. D. Ulanisov and L. P. Presnyakov
Single- and double-electron detachment in collisions of two negative hydrogen ions
J. Phys. B 28 3299 - 308 1995
H⁻ + H⁻ → H⁰, H⁺
E : crossed beam technique
0.15 - 300 keV
- 95E35
Melchert, F., S. Kridener, R. Schulze, S. Petri, S. Pfaff and E. Salzborn
Measurements of resonant charge transfer in He²⁺ - He⁺ collisions
J. Phys. B 28 L355 - 59 1995
He²⁺ + He⁺ → He⁺ + He²⁺
E : crossed beam technique
4 - 200 keV
- 95E38
Mergel, V., R. Dörner, J. Ullrich, O. Jaguzki, S. Lencinas, S. Nüttgens, L. Spielberger, M. Unverzagt, C. L. Cocke, R. E. Olson, M. Schulz, U. Buck, E. Zanger, W. Theisinger, M. Isser, S. Geis and H. Schmidt-Böcking
State-selective scattering angle dependent capture cross sections measured by cold target recoil ion momentum spectroscopy
Phys. Rev. Letters 74 2200 - 03 1995
He²⁺ + He → He⁺⁽ⁿ⁾ + He⁺⁽ⁿ⁾
E : recoil ion momentum spectroscopy
0.25 - 1.0 MeV
- 95E39
Mokler, P.H., Th. Stöhlker, C. Kozhutharov, R. Moshhammer, P. Rymuza, Z. Stachura and A. Warczak
Doppler-shift assisted fast-ion spectroscopy : a case study for X-ray emissions from 277 MeV/u Pb⁸¹⁺ ions
J. Phys. B 28 617 - 29 1995
Pb⁸¹⁺ + N₂ → Pb³⁰⁺ + REC
E : Doppler-shift spectrometer
277 MeV/u
- 95E40
Mokler, P.H., Th. Stöhlker, R. W. Dunford, A. Gallus, T. Kandler, G. Menzel, H. T. Prinz, P. Rymuza, Z. Stachura, P. Swiat and A. Warczak
The X-ray spectrum of H-like uranium
Z. Phys. D 35 77 - 80 1995
U⁹²⁺ + N₂ → U⁹¹⁺(n ; n=1 - 6)
E : photon spectroscopy
49 MeV/amu

- 95E41 Muller, U. H. A. J. Meijer, N. C. R. Halme, M. Kmit, J. H. V. Lauritsen, J. O. P. Pedersen, C. Richter, J. W. Thomsen, N. Andersen and S. E. Nielsen
Orbital alignment dependence of electron capture cross sections I: $H^+ + Na(3p)$ near the matching velocity
Z. Phys. D 33 187 - 96 1995
 $H^+ + Na(3p) \rightarrow H(n=1-4)$
E: laser-excited target technique
0.5 - 15 keV/amu
- 95E42 Nakamura, N. F. J. Currell, A. Danjo, M. Kimura, A. Matsumoto, S. Ohtani, H. Sakaue, M. Sakurai, H. Tawara, H. Watanabe, I. Yamada and M. Yoshino
Target dependence of multi-electron processes in $F^+(q=10, 15)$ + rare gas (Ne, Ar, Kr, Xe) collisions
J. Phys. B 28 2959 - 72 1995
 $F^+(q=10, 15) + B \rightarrow F^{(q-1)+} + B^+(j=1-5)$ (B=Ne, Ar, Kr, Xe)
E: projectile-recoil ion coincidence technique
1.5 keV \times q
- 95E43 Nakamura, N. H. Ida, Y. Matsui, K. Wakiya, T. Takayanagi, M. Koide, F. J. Currell, S. Kitazawa, H. Suzuki, S. Ohtani, U. I. Safronova and M. Sekiguchi
Electron spectra from singlet and triplet states of $O^+(1s^2 313^1; 1s^2 314^1)$ produced by 60 and 120 keV $O^{6+} + He, Ne, Ar$ collisions
J. Phys. B 28 4743 - 58 1995
 $O^{6+} + He, Ne, Ar \rightarrow O^{+}(1s^2 n1^1)$
E: electron spectroscopy
60, 120 keV
- 95E44 Pesnelle, A. R. Trainham, J. Pascale, E. Mormand and H. J. Andr a
Very high Kr^{24+} Rydberg states after electron capture from laser-excited $Rb^*(17p)$ atoms into Kr^{26+}
Phys. Rev. Letters 74 4169 - 72 1995
 $Kr^{26+} + Rb^*(17p) \rightarrow Kr^{27+}(n = 70 - 110)$
E: laser-excited target technique
18, 40 keV
- 95E45 Radchenko, V. I. and G. D. Vedmanov
Scattering of hydrogen ions and atoms in gases
JETP 80 1 - 9 1995
 $H^0 + B \rightarrow H^+; H^+ + B \rightarrow H^0, H^+ (B = He, Ar, Kr, Xe, H_2, O_2, CO_2, C_2H_2)$
E: scattering technique
1.67 - 14.9 MeV
- 95E46 Raphaelian, M. L. A. M. P. Stokki, W. Wu and C. L. Cooke
Energy-transfer processes during $Xe^{30+} - Ar$ collisions for projectile velocities between 0.3 and 1.0 a.u.
Phys. Rev. A 51 1304 - 10 1995
 $Xe^{30+} + Ar \rightarrow Xe^{(30-q)+} + Ar^{q+} + ne$
E: projectile-recoil ion coincidence technique
2.5 - 25 keV/amu
- 95E47 Rieger, G. P. Boduch, M. Chantepie, E. Jacquet, D. Lecler and J. Pascale
Electron capture into $N^{4+}(1s^2 nl)$ subshells during $N^{3+} + Li$ collisions at 40 - 120 keV
J. Phys. B 28 2689 - 70 1995
 $N^{3+}(1s^2) + Li \rightarrow N^{4+}(1s^2 nl)$
E: photon spectroscopy
40 - 120 keV
- 95E48 Saito, M. Y. Haruyama, N. Hamamoto, K. Yoshida, A. Itoh and N. Imanishi
Production cross sections of recoil ions in coincidence with final charge states of 2 MeV C^{6+} projectiles
J. Phys. B 28 5117 - 26 1995
 $C^{6+} + Ar \rightarrow C^{2+}, C^+$
E: projectile-recoil ion coincidence
3 MeV
- 95E49 Schippers, S. P. Boduch, J. van Buchem, F. W. Bielek, R. Holkstra, R. Morgenstern and R. E. Olson
Polarized light emission in keV $He^{26+} + Na(3s)$ collisions
J. Phys. B 28 3271 - 82 1995
 $He^{26+} + Na(3s) \rightarrow He^+(n=4) + Na^+$
E: photon spectroscopy
2 - 13.3 keV/amu
 $n = 4 \rightarrow 3$ transition
- 95E50 Schwarz, U. F. Linder and K. Rohr
Cross sections for the interaction of multiply charged Ta and Tl ions with H_2 and He at low energies
J. Phys. B 28 839 - 44 1995
 $Ta^{80+}(q = 3, 4, 5) + H_2 \rightarrow Ta^{(q-1)+}$
 $Tl^{80+}(q = 3, 4) + H_2 \rightarrow Tl^{(q-1)+}; Tl^{80+}(q = 2, 3) + He \rightarrow Tl^{(q-1)+}$
E: laser-plasma source + retarding method
1-30 eV/amu
- 95E52 Seifert, N. N. D. Gibson and J. S. Risley
Experimental determination of the real elements of the density matrix of $H(n=3)$ atoms produced in 20 - 100 keV collisions of H^+ on Kr
Phys. Rev. A 52 3816 - 23 1995
 $H^+ + Kr \rightarrow H(n=3)$
E: photon spectroscopy
20 - 100 keV
- 95E51 Seifert, N. N. D. Gibson, S. P. Renwick and J. S. Risley
On the formation of $H(n=3)$ dipole moments in collisions of protons on rare gas atoms
Z. Phys. D 35 231 - 33 1995
 $H^+ + He, Ar, Kr \rightarrow H(n=3)$
E: optical spectroscopy
20 - 100 keV

- 95E53 Shah, M. B., C. J. Patton, M. A. Bolorizadeh, J. Geddes and H. B. Gilbody
Electron capture and transfer ionization in collisions of fast H⁺ and He²⁺ ions with Cu atoms
J. Phys. B 28 1821 - 33 1995
H⁺ + Cu → H + Cu^{q+} (q=1-5); He²⁺ + Cu → He⁺ + Cu^{q+}, He + Cu^{q+} (q=1-7)
E: crossed beam technique + coincidence
70 - 720 keV/amu (H⁺); 35 - 360 keV/amu (He²⁺)
- 95E54 Shen, H. P., Hvelplund, D., Mathur, A., Barany, H., Cederquist, N., Selberg and D. C. Lorents
Fullerene-fullerene collisions: fragmentation and electron capture
Phys. Rev. A 52 3847 - 51 1995
C₆₀⁺, C₇₀⁺ + C₆₀, Xe → C₆₀, C₇₀; C₆₀²⁺, C₇₀²⁺ + C₆₀, Xe → C₆₀⁺, C₇₀⁺; C₇₀³⁺ + C₆₀, Xe → C₇₀²⁺, C₇₀⁺
100 keV
- 95E55 Ströhker, Th. C., Kozuharov, P. H., Mokler, A., Warczak, F., Bosch, H., Geissel, R., Moshammer, C., Scheidemberger, J., Eichler, A., Ichihara, T., Shitai, Z., Stachura and P. Rymuza
Radiative electron capture studied in relativistic heavy ion-atom collisions
Phys. Rev. A 51 2098 - 111 1995
Au⁷⁸⁺, Au⁷⁹⁺ + B → Au⁷⁷⁺, Au⁷⁸⁺; (B = C, N₂, Al); Pb⁸¹⁺, Pb⁸²⁺ + N₂ → Pb⁸⁰⁺, Pb⁸¹⁺; Bi⁸²⁺, Bi⁸³⁺ + C → Bi⁸¹⁺, Bi⁸²⁺; U⁹¹⁺, U⁹²⁺ + Be, C, N₂, Ar → U⁹⁰⁺, U⁹¹⁺
E: photon spectroscopy + coincidence technique
100 - 1000 MeV/amu
- 95E56 Thomsen, J. W., N. Andersen, D. Döwck, J. C. Houver, M. O. Larsson, J. H. V. Lauritsen, U. Müller, J. O. P. Pedersen, J. Salgado and A. Svensson
Orbital alignment dependence of electron transfer cross sections II. 1 - 15 keV He⁺ - Na (3p) collisions
J. Phys. B 28 L93 - 99 1995
He⁺ + Na(3s, 3p) → He⁰(2l)
E: TOF
1 - 15 keV
- 95E57 Tribedi, L. C., V. Nanal, M. B. Kurup, K. G. Prasad and P. N. Tandon
Radiative electron capture by bare and H-like Si and Cl ions using the channeling technique and the associated solid-state effect
Phys. Rev. A 51 1312 - 20 1995
Si¹³⁺, Si¹⁴⁺ + Si → Si¹²⁺, Si¹³⁺, Cl¹⁶⁺, Cl¹⁷⁺ + Si → Cl¹⁵⁺, Cl¹⁶⁺
E: photon spectroscopy
2 - 5 MeV/amu
- 95E58 Uiterwaal, C. J. G. J., J. van Eck and A. Niehaus
State-selected ion-molecule reactions: charge transfer and atomic rearrangement processes in thermal energy collisions of H₂⁺(X;v) + N₂ and of N₂⁺(X,A;v) + H₂
J. Chem. Phys. 102 744 - 53 1995
H₂⁺(X;v) + N₂ → H₂ + N₂⁺
N₂⁺(X,A;v) + H₂ → N₂ + H₂⁺
E: PEPICO
thermal energies
- 95E59 Wilkins, A. C. R., A. R. Lee and A. G. Brenton
State-selective double-electron capture processes by Xe²⁺ and Kr²⁺
Phys. Rev. B 28 1015 - 21 1995
Kr²⁺ + Ar → Kr⁺; Xe²⁺ + Ar, Kr → Xe⁺ + Ar²⁺, Kr²⁺
E: translational energy spectroscopy
6 keV
- 95E60 Wu, W., K. L. Wong, C. L. Cocke, J. P. Giese and E. C. Montenegro
Recoil longitudinal momentum and Q-value measurements in electron-capture processes of fast multiply charged ions colliding with He
Phys. Rev. A 51 3718 - 25 1995
O²⁺, F⁸⁺ + He → O³⁺(1snl), F⁷⁺(1snl) (n=1, 2)
E: projectile-recoil ion coincidence spectroscopy
0.6 - 3.7 MeV/amu
- 95E61 Yamada, I., F. J. Currel, A. Danjo, M. Kimura, A. Matsumoto, N. Nakamura, S. Ohnami, H. Sakaue, M. Sakurai, H. Tawara, H. Watanabe and M. Yoshino
Decay of multiply excited Rydberg ions produced in I¹⁰⁺ - rare gas collisions
J. Phys. B 28 L9 - 13 1995
I¹⁰⁺ + B → I⁹⁺ (q=9-5) (B=Ne, Ar, Kr, Xe)
E: projectile-recoil ion coincidence technique
15 keV
- 95E62 Yu, Y. C., H. L. Sun, J. L. Duggan, F. D. McDaniel, J. Y. Yin and G. Lapicki
Charge-state dependence of M-shell X-ray production in Ho by 2 - 12 MeV carbon ions
Phys. Rev. A 52 3836 - 46 1995
C³⁺ (q=5,6) + Ho → C^{(q-1)+} (n=3)
E: X-ray spectroscopy
4 - 12 MeV
- 95E63 Zaharakis, K. E., R. R. Haer, O. Woitke, M. Zhu and J. A. Janis
Recombination in Kr³⁴⁺ + H₂ collisions
Phys. Rev. A 52 2910 - 14 1995
Kr³⁴⁺ + H₂ → Kr³³⁺
E: X-ray-projectile coincidence method
37.2 - 47.5 MeV/amu
REC cross sections at 90

95T1	Alston,S. Comparison of eikonal and multiple-scattering representations of internuclear scattering in charge transfer at forward angles Phys. Rev. A 52 3860 - 67 1995 $H^+ + H \rightarrow H$ $H^+ + He \rightarrow H$ T : 2nd order Faddeev representation 0.6 - 2.5 MeV (H) ; 1.8 - 7.1 MeV (He) scattering distributions	95T7	Chaudhuri, C. S. Sanyal and T. K. Rai - Dastidar Theoretical study of single and double charge transfer in $He^{2+} - He$ collisions at kilo-electron-volt energies in a diabatic molecular representation Phys. Rev. A 52 1137 - 42 1995 $He^{2+} + He \rightarrow He^+$ (total, 2s, 2p), He^0 T : diabatic MO 1.0 - 25 keV/amu target excitation to $He^+(2p)$
95T3	Alston,S. K-shell electron capture from negative ions J. Phys. B 28 5127 - 35 1995 $H^+ + B^+(l = -1, 0, 1) \rightarrow H(1s)$ (B=C, O, F, Si, S, Cl) T : Distorted strong potential Born approx. 0.1 - 20 MeV	95T8	Das,M, N. C. Deb, N. C. Sil and S. C. Mukherjee Electron capture by fully stripped high-Z projectiles from the hydrogen atom Phys. Rev. A 52 4616 - 21 1995 $A^{Z+} + H \rightarrow A^{(Z-1)+}(nlm)$ (A = Ti ²⁺ , V ²⁺ , Fe ²⁶⁺) T : CDW 400 - 900 keV/amu
95T2	Alston,S, T. Brennan and F. Bannion III Thomas double scattering in electron capture from oriented molecular hydrogen Phys. Rev. A 52 3899 - 909 1995 $H^+ + H_2 \rightarrow 11^0$ T : 2nd-order Born approx. 2.5 - 10 MeV	95T9	Eerden,M,J.J. M. C. M. van der Sanden, D. K. Otorbaev and D. C. Schram Cross section for the mutual neutralization reaction $H_2^+ + H^+$, calculated in a multi-crossing Landau-Zener approximation Phys. Rev. A 51 3362 - 65 1995 $H^+ + H^+ \rightarrow H + H$ $H_2^+(v) + H^+ \rightarrow H_2(v^+) + H$ T : Landau-Zener model 0.02-10 eV
95T4	Bradenbrink,S. H. Reihl, Z. Roller-Lutz and H. O. Lutz Classical trajectory studies of charge changing collisions involving Rydberg target atoms J. Phys. B 28 L133 - 38 1995 T : classical trajectory method	95T10	Eichler,J. Charge transfer from the negative-energy continuum Phys. Rev. Letters 75 3653 - 56 1995 $S^{16+} + Cu \rightarrow S^{15+}(1s_{1/2}) ; La^{37+} + B \rightarrow La^{36+}$ (B = Cu, Ag, Au) T : OBK 0.4 - 1.3 GeV/amu
95T5	Busnengo,H.F. A. E. Martinez and R. D. Rivarola Distorted wave models for electron capture in asymmetric collisions Phys. Scripta 51 190 - 95 1995 $H^+ + H(1s) \rightarrow H(nl) ; He^{2+} + H(1s) \rightarrow He^+(2s, \text{total}) ; Li^{3+} + H(1s) \rightarrow Li^{2+}$ T : CDW-EIS approx. 50 - 1000 keV/amu	95T11	Eichler,J. A. Itohara and T. Shirai Photon angular distributions from radiative electron capture in relativistic atomic collisions Phys. Rev. A 51 3027-35 1995 $A^{Z+} + \rightarrow A^{(Z-1)+} + hv(REC)$ (A = Sn, Yb, Th)
95T6	Busnengo,H.F. A. E. Martinez, R. D. Rivarola and L. J. Dube Distorted wave models for electron capture in asymmetric collisions III. Differential cross sections and the double scattering region J. Phys. B 28 3283 - 98 1995 $H^+ + H \rightarrow H(nlm) + H^+$ T : CDW, CDW-eikonal, eikonal final-state approx. 0.125 - 2.8, 5 MeV/amu		T : relativistic calculation with spin-flip 20, 100, 300 MeV/amu Angular distributions of K-, L- and M-REC

- 95T12 Errea, L.F., B. Herrero, L. Mendez and A. Riera
Molecular calculation of total and differential charge transfer cross sections in $C^{4+} + He$ collisions
J. Phys. B 28 693 - 709 1995
 $C^{4+} + He \rightarrow C^{3+}(2l, 3l), C^{3+}(2s^2, 2s2p, 2p^2)$
T: MO
0.04 - 6 keV/amu
- 95T13 Errea, L.F., C. Harel, H. Jouin, L. Mendez, B. Pons and A. Riera
Molecular treatment of $H^+ + He^+(1s)$ collisions including pseudostates
Phys. Rev. A 52 R2505 - 507 1995
 $H^+ + He^+(1s) \rightarrow H(1s) + He^2+; H^+ + He^3+ + e$
T: MO with common translational factor + pseudostates
9 - 300 keV/amu
- 95T14 Fritsch, W.
Theoretical studies on slow collisions between medium-z metallic ions and neutral H, H₂ or He
Suppl. Nucl. Fusion 6 131-145 1995
 $Si^{4+} + H, He \rightarrow Si^3+; Ti^{4+} + H, He \rightarrow Ti^3+; Fe^{6+} + H_2 \rightarrow Fe^5+; Ni^{10+} + H \rightarrow Ni^9+;$
AO
0.2-100 keV/amu (Si); 2-120 keV/amu (Ti); 2-80 keV/amu (Fe); 1.5-80 keV/amu
- 95T15 Gargaud, M., MacCarroll, R.
Electron capture from H and He by $Al^{13+}, Si^{14+}, Ar^{18+}$ and Ti^{22+} in the eV to keV energy range
Suppl. Nucl. Fusion 6 163-171 1995
 $Al^{13+} + H \rightarrow Al^{12+}; Si^{14+} + H \rightarrow Si^{13+}; Si^{14+} + H \rightarrow Si^{12+}; Ar^{18+} + H, He \rightarrow Ar^{17+}; Ti^{22+} + H \rightarrow Ti^{21+};$
MO
0.8-1130 eV
- 95T16 Gayet, R., J. Hansen and L. Jacqui
Transfer and excitation in ion-atom collisions at high impact velocities III. Application of the CDW-4B theory to an almost symmetrical system: $He^+ - He$
J. Phys. B 28 2193 - 208 1995
 $He^+ + He \rightarrow He(2p^2, 2s2p, 2s^2)$
T: CDW
30 - 200 keV/amu
- 95T17 Gravielle, M.S. and J.E. Miraglia
State-selective scaling in electron capture by multicharged ions on light atoms
Phys. Rev. A 51 2131 - 39 1995
 $A^{Z+} + H \rightarrow A^{(Z-1)+}(nl) (A = Li, B, C, F)$
 $A^{Z+} + He \rightarrow A^{(Z-1)+}(nl) (A = He, Li, C, N, O, F)$
T: eikonal impulse approx.
20 - 300 keV $\times q$
scaling for nl-distribution
- 95T18 Grosser, J. and H. Sturk
Numerical treatment of inelastic $He^+ + Ne$ collisions at low energy
Z. Phys. D 35 81 - 91 1995
 $He^+(1s) + Ne \rightarrow He(1s, 2s)$
T: coupled-channel calculation
100 - 200 eV
- 95T19 Herrero, B., I. L. Cooper, A. S. Dickinson and D. R. Flower
Charge transfer in slow $N^{2+} + H$ collisions
J. Phys. B 28 711 - 24 1995
 $N^{2+}(1s^2 2s^2 2p^2 P^0) + H \rightarrow N^+(1s^2 2s 2p^3 ^3P^0, ^3D^0; 1s^2 2s^2 2p^2 ^3P) + H^+$
T: MO with common translational factor
0.1 - 100 eV/amu
rate coefficient given also
- 95T20 Gargaud, M., R. MacCarroll and L. Benmearajem
Model potential methods for the description of electron capture by multiply charged ions from single- and multi-electron targets: application to $Ar^{16+} - H$ and $Ar^{16+} - He$ systems
Phys. Scripta 51 752 - 58 1995
 $Ar^{16+} + H \rightarrow Ar^{15+}(4l, 5l); Ar^{16+} + He \rightarrow Ar^{15+}(3l, 4l)$
T: model potential method
4 - 350 keV/amu
- 95T21 Gavres, P. M. S. Pinzola, D. R. Schultz and J. C. Wells
Schrödinger equation for proton-hydrogen collisions in two dimensional Cartesian space
Phys. Rev. A 52 3808 - 76 1995
 $H^+ + H \rightarrow H$
T: 3D time-dependent Schrödinger equation
10 - 100 keV
- 95T22 Hildenbrand, R., N. Grün and W. Scheid
Coupled channel calculations with Cartesian Gaussian basis functions for $H + He$ and $He^+ + He$ collisions
J. Phys. B 28 4781 - 98 1995
 $He^+ + He \rightarrow He(2^1S)$
T: CC with Cartesian-Gaussian basis
10 - 600 keV
 $He^+ + He \rightarrow He^+ + He(2^1S; 2^3S; 2^1P; 2^3P; 3^1S; 3^3P; 3^3P)$

- 95T22 Homan, D.M., M. J. Cavagnero, D. A. Hurnin
Classical charge-transfer and ionization channels for ion collisions with circular Rydberg atoms
Phys. Rev. A 51 2075 - 84 1995
T : classical phase-space method
- 95T24 Hose, G.
Charge exchange and excitation in $H + He^{2+}$ and $He^+ + H^+$ collisions using single- and multi-channel perturbed-stationary-state propagators
Phys. Rev. A 51 2222 - 46 1995
 $He^{2+} + H \rightarrow He^+(nl; n=1-4) + H^+$
 $H^+ + He^+ \rightarrow H(n=1-3) + He^{2+}$
T : pss
0.5 - 22.5 keV/amu (He^{2+}) ; 5 - 228 keV/amu (H^+)
also excitation to $H(n=1-3)$
- 95T23 Hose, G.
Semiclassical multi-channel perturbed-stationary state model for rearrangement atomic collisions
Phys. Rev. A 51 2199 - 221 1995
T : multi-channel PSS
- 95T25 Jain, A. and T. G. Winter
Electron transfer, target excitation and ionization in $H^+ + Na(3s)$ and $H^+ + Na(3p)$ collisions in the coupled-Sturmian-pseudostate approach
Phys. Rev. A 51 2963 - 73 1995
 $H^+ + Na(3s, 3p) \rightarrow H + Na^+$
T : two-center coupled-Sturmian-pseudostate approx.
1 - 100 keV
- 95T26 Kimura, M. J. P. Gu, G. Hirsch and R. J. Buenker
Electron capture in collisions of $N^+(^2S, ^3P)$ with He : the effect of metastable ions
Phys. Rev. A 51 2063 - 66 1995
 $N^+(^2S, ^3P) + He \rightarrow N(^4S) + He^+$
T : MO
1.5 - 100 keV
- 95T27 Kimura, M. Y. Li, G. Hirsch and R. J. Buenker
Elastic and inelastic processes in $H^+ + CH_4$ collisions in the low-keV-electron-volt regime
Phys. Rev. A 52 1196 - 205 1995
 $H^+ + CH_4(C_3v, C_2v) \rightarrow H$
T : MO with full quantum-mechanical representation
50 - 2000 eV
- 95T28 Kuang, J. Z. Chen and C. D. Lin
Excitation and charge transfer in $He^+ + H$ collisions
J. Phys. B 28 2173 - 79 1995
 $He^+ + H \rightarrow He + H^+$
T : AO
2.5 - 25 keV/amu
also excitation cross sections $He^+ + H(2l)$ Balmer emission
- 95T29 Lopez-Castillo, A. and F. R. Ornellas
Theoretical charge-exchange Gallilean invariant cross sections for $B^{3+} + He$ collisions
Phys. Rev. A 51 381 - 90 1995
 $B^{3+}(1s^2) + He \rightarrow B^{2+}(1s^2nl)$
T : pss
0.1 - 10 keV/amu
- 95T31 Lundsgaard, M.F.V. and S. E. Nielsen
Coherence parameters for $He^+(2p)$ capture and $H(2p)$ excitation in $He^{2+} - H(1s)$ collisions
Z. Phys. D 34 97 - 105 1995
 $He^{2+} + H(1s) \rightarrow He^+(2p)$
T : AO
0.5 - 225 keV/amu
- 95T30 Lundsgaard, M.F.V. Z. Chen, C. D. Lin and N. Toshima
Electron capture from circular Rydberg atoms
Phys. Rev. A 51 1347 - 50 1995
 $H^+ + H(3d, 4f, 5g), Na(3p) \rightarrow H$
T : close-coupling calculation
- 95T32 Mancev, J.
Four-body corrected first Born approximation for single charge exchange at high impact energies
Phys. Scripta 51 762 - 68 1995
 $H + H \rightarrow H^+ + H^+$; $He^+ + H \rightarrow He(1s^2) + H^+$; $He^+ + He \rightarrow He(1s^2) + He^{2+}$
T : CB1-4B approx.
20 - 2000 keV
- 95T33 Mitroy, J.
Formation of antihydrogen by charge-transfer reaction
Phys. Rev. A 52 2859 - 64 1995
 $anti-p + Ps(nl) \rightarrow anti-H(nl^+) + e^-$
T : unitarized Born approx.
< 4 eV

- 95T34 Morales, J. A. Diz, E. Deumens and Y. Öhrn
Electron nuclear dynamics of $H^+ + H_2$ collisions at $E_{\text{en}} = 30$ eV
J. Chem. Phys. 103 9968 - 80 1995
 $H^+ + H_2 \rightarrow H(\theta) + H_2^+(\nu_e)$ ($\nu_e = 0$)
T : Electron nuclear dynamics theory
30 eV
inelastic scattering, rearrangement, dissociation
- 95T35 Nielson, S.E. J. P. Hansen and A. Dubois
Electron transfer in keV $Li^+ - Na(3s, 3p)$ collisions : I. atomic basis coupled-channel calculations
J. Phys. B 28 5295-307 1995
 $Li^+ + Na(3s, 3p) \rightarrow Li(nlm)$
T : AO
1 - 50 keV
- 95T36 Ostrovsky, V.N.
Rydberg atom-ion collisions : classical overbarrier model for charge exchange
J. Phys. B 28 3901 - 14 1995
 $N^{2+} + Cs \rightarrow N^{3+} ; Ar^{2+} + Cs \rightarrow Ar^{3+} ; Na^+ + Na(nl) \rightarrow Na$
T : classical over-barrier model
0.25 - 25 keV/amu
n-scaling
- 95T37 Rod, T.H. and S. E. Nielsen
Orbital alignment dependence of electron transfer cross sections III : coupled channel results for $He^+ - Na(3s, 3p)$ collisions
J. Phys. B 28 L607 - 14 1995
 $He^+ + Na(3s, 3p) \rightarrow He$
T : classical coupled-channel calculation
0.25 - 9.0 keV/amu
- 95T38 Saha, B. C.
Molecular-state treatment of electron capture in slow collisions of C^{4+} with H : alignment and orientation effects
Phys. Rev. A 51 5021- 1995
 $C^{4+}(1s^2) + H \rightarrow C^{3+}(1s^2 3l) + H^+$
T : close-coupling + MO
0.02 - 1.0 keV/amu
- 95T39 Salasnich, L. and F. Sattin
Charge-exchange processes between excited helium and fully stripped ions
Phys. Rev. A 51 4281 - 83 1995
 $A^{Z+} + He^*(2s) \rightarrow A^{(Z-1)+}(n)$ ($A = Li, Be, B, C, O$)
T : CTMC
10, 20 , 30 keV/amu
Scaling in n-distribution
- 95T40 Sanchez, I. and H. Bachau
Properties of $Ne^{8+}(4,4)$ and $Ne^{8+}(3,n)$ states populated during ion - atom collisions
J. Phys. B 28 795 - 806 1995
 $Ne^{10+} + He \rightarrow Ne^{8+}(4,4) (3,n) + He^{2+}$
T : close-coupling method
1.0, 4.6 keV/amu
- 95T48 Schulz, D.R., Krstic, P.S.
Inelastic processes in 0.1-1000 keV/amu collisions of $Ne^q(q=7010)$ ions with atomic hydrogen
Suppl. Nucl. Fusion 6 173-196 1995
 $Ne^q(q=7-10) + H \rightarrow Ne^{q-1}(nl)$
CTMC, hidden crossing method
0.1-200 keV/amu
- 95T41 Shitaba, T. and K. Ogura
Symmetric charge transfer of gadolinium and neodymium
J. Phys. Soc. Japan 64 3136 - 40 1995
 $A^+ + A \rightarrow A + A^+$ ($A=Gd, Nd$)
T : asymptotic (Sirmov) theory
2 eV - 5 keV
- 95T42 Shimakura, N., S. Yamada, S. Suzuki and M. Kimura
Low-energy collisions of O^{3+} ions with He atoms : single-electron capture, projectile excitation and transfer excitation and ionization
Phys. Rev. A 51 2989 - 96 1995
 $O^{3+}(1s^2 2s) + He \rightarrow O^{2+}(1s^2 2snl) ; O^{4+}(1s^2 n'l^2)$
T : MO with ETF
0.060 - 15 keV/amu
- 95T43 Stancil, P. C. and B. Zygelman
Kinematic isotope effects in low energy electron capture
Phys. Rev. Letters 75 1495 - 98 1995
 $N^{4+}(2s) + H, D \rightarrow N^{3+}(3l) + H^+, D^+$
T : full quantum calculation
0.1 - 30 eV
- 95T44 Thumm, U.
Electron transfer and emission in slow collisions of N^{4+} with C_{60}
J. Phys. B 28 91 - 101 1995
 $N^{3+} + C_{60} \rightarrow N^{4+}, N^{3+}$
T : COB model
50 keV

95T45

Wang, Y.D., C. D. Lin, N. Toshima and Z. Chen
Ionization and charge transfer in collisions of highly charged ions with helium at low
velocities
Phys. Rev. A 52 2852 - 58 1995
 $A^{Z+} + He \rightarrow A^{(Z-1)+} + He^+$ (A=C, N, O)
T : two-center AO model
42 - 72 keV/amu

- 96E1 Andriamonje, S., Chevallier, M., Cohen, C., Cue, N., Dauvergne, D., Dura, I. J., Fujimoto, F., Kirsch, R., L'Hoir, A., Poizat, J. C., Quere, Y., Ramillieux, J., Rohl, C., Tothard, H., Rozet, J. P., Schmaus, D., Toutenmonde, M., Vernhet, D.
K-shell radiative electron capture with bare 60 MeV/u Kr ions channelled in a Si crystal; experiments and simulations
Phys. Rev. A 54 1404 - 1416 1996 E
Kr³⁶⁺ + Si <110> -> REC
REC+projectile coincidence
60 MeV/amu
- 96E2 Aumay, F., Gieler, M., Winter, H. P., Schweinzer, J.
Electron capture by doubly charged ions from laser excited alkali atoms : III Ne²⁺, Ar²⁺ - Na(3p) collisions
J. Phys. B 29 1515 - 1523 1996 E
Ne²⁺, Ar²⁺ + Na(3s, 3p) -> Ne⁺(nl), Ar⁺(nl)
laser-excited target + translational energy spectroscopy
10 keV
- 96E3 Beck, B. R., Steiger, J., Weinberg, G., Church, D. A., MacDonald, J., Schneider, D.
Measurement of charge exchange between H₂ and low-energy ions with charge states q=35 - 80
Phys. Rev. Letters 77 1735 - 1738 1996 E
Xe^{q+}(q=35, 43, 44, 45, 46), Th^{q+}(q=73-80) + H₂ ->
Penning ion trap
6 eV
- 96E4 Beijers, J. P., Hoekstra, R., Morgenstern, R.
State-selective charge transfer in slow collisions of O³⁺ with H and H₂
J. Phys. B 29 1397 - 1408 1996 E
O³⁺(1s²2s²2p²) + H, H₂ -> O²⁺(1s²2s²2pnl)
vuv spectroscopy
45 - 752 eV/amu
- 96E5 Bliman, S., Bruch, R., Alifick, P. L., Schneider, D., Prior, M. H.
Double electron capture in low energy Fe¹⁷⁺ + He collisions
Phys. Rev. A 53 4176 - 4182 1996 E
Fe¹⁷⁺ + He -> Fe¹⁵⁺(2p²nl¹) + He²⁺
zero-degree electron spectroscopy
170 keV
- 96E6 Briand, J. P., de Billy, L., Jin, J., Khemaliche, H., Prior, M., Xie, Z., Nectoux, M., Schneider, D. H.
Interaction of slow Ar^{17+,18+} ions with C₆₀ : an insight into ion-surface interactions
Phys. Rev. A 53 R2925 - 2929 1996 E
Ar¹⁷⁺, Ar¹⁸⁺ + C₆₀ ->
X-ray-recoil ion coincidence
10xq keV
- 96E7 Cassimi, A., Duponchel, S., Flechard, X., Jardin, P., Sortais, P., Hennecart, D., Olson, R. E.
State-selective electron capture in low velocity multiply charged ions, helium collisions
Phys. Rev. Letters 76 3679 - 3682 1996 E
Ne¹⁰⁺, Ar¹⁸⁺ + He -> Ne⁹⁺, Ar¹⁷⁺(n)
recoil momentum spectroscopy
6.8 keV/amu
- 96E8 Chen, L., Bernard, J., Martin, S., Denis, A., Desesquelles, J.
Two-electron capture and stabilization in collisions of C⁶⁺ with rare-gas targets at low energy
Phys. Rev. A 54 3049 - 3054 1996 E
C⁶⁺ + He, Ne, Ar, Kr, Xe -> C⁴⁺
projectile-recoil-ion TOF
12, 60, 114 keV
- 96E9 Chesnet, J. Y., Merabet, H., Fremont, F., Cremer, G., Husson, X., Lecler, D., Rieger, G., Spieler, S., Grether, M., Stolterfoht, N.
Dielectronic processes producing radiative stabilization in slow Ne¹⁰⁺ + He collisions
Phys. Rev. A 53 4198 - 4204 1996 E
Ne¹⁰⁺ + He -> Ne⁸⁺(3nl;4ml)
Auger electron spectroscopy
10, 150 keV
- 96E10 Chesnet, J. Y., Merabet, H., Husson, X., Fremont, F., Lecler, D., Jouin, H., Harel, C., Stolterfoht, N.
Energy dependence of cross sections for double-electron capture in 48-132 keV C⁶⁺ + He collisions
Phys. Rev. A 53 2337 - 2344 1996 E
C⁶⁺ + He -> C⁴⁺(2l, nl)
electron spectroscopy
48-132 keV

96E11	Cisneros, C. Martinez, H. Fuentes, B.E. Alvarez, I. de Urquijo, J. Dominguez, I. Single electron capture of H ⁺ in Mg in the energy range 0.5 to 5.0 keV Nucl. Instr. Meth. B 117 1-4 1996 H ⁺ + Mg → H ⁰ angular distributions 0.5-5 keV	E	96E16	Edens, J. Kamber, E. Y. Akgüngör, K. Ferguson, S.M. Differential single-electron capture cross sections in low-energy Ar ^{q+} (q=4-8) ions-He and Ar collisions Nucl. Instr. Meth. B 111 27-30 1996 Ar ^{q+} (q=4-8) + He, Ar → Ar ^{q+1+} recoil ion source 0.6-2.5 keV	E
96E12	de Nijs, G. Folkerts, H.O. Hoekstra, R. Morgenstern, R. Multiple target ionization in collisions between highly charged ions and Ar J. Phys. B 29 85 - 95 1996 C ⁶⁺ , N ⁶⁺ , O ⁶⁺ , Ne ⁶⁺ , Ar ⁶⁺ , Kr ⁶⁺ + Ar → Ar ^{r+} (r < 9) TOF 2 keV/amu innershell electron transfer	E	96E17	Folkerts, H.O. Hoekstra, R. Morgenstern, R. Velocity and charge state dependence of molecular dissociation induced by slow multicharged ions Phys. Rev. Letters 77 3339 - 3342 1996 He ²⁺ , O ⁷⁺ + CO → C ⁺ + O ⁺ kinetic energy measurement 2 - 11 keV/amu	E
96E13	de Nijs, G. Hoekstra, R. Morgenstern, R. Charge equilibrium pathways following C ⁶⁺ - Ar collisions J. Phys. B 29 6143-6153 1996 C ⁶⁺ + Ar → Ar ²⁺ , Ar ³⁺ , Ar ⁴⁺ , Ar ⁵⁺ + electron electron-recoil ion coincidence technique 4.67 keV	E	96E18	Frenont, F. Bedouet, C. Chesnel, J. Y. Merabet, H. Husso, X. Grether, M. Spielter, A. Stolterfoht, N. Experimental evidence for dielectronic excitation producing Ne-K vacancies in 35 keV N ⁷⁺ + Ne collisions Phys. Rev. A 54 R4509-4612 1996 N ⁷⁺ , N ⁶⁺ + Ne → Auger electron spectroscopy 35 keV	E
96E14	Dominguez, I. de Urquijo, J. Cisneros, C. Martinez, H. Alvarez, I. Single- and double-electron loss of H in collisions with SF ₆ , CH ₄ and CO Phys. Rev. A 54 506 - 509 1996 H ⁺ + SF ₆ , CH ₄ , CO → H ⁰ , H ⁺ growth rate method 1 - 5 keV	E	96E19	Frohne, V. Cheng, S. Ali, R.M. Raphaelian, L.A. Cocke, C.L. Olson, R. Measurements of recoil and projectile momentum distributions for 19 MeV F ⁹⁺ + Ne collisions Phys. Rev. A 53 2407 - 2416 1996 F ⁹⁺ + Ne → recoil ion momentum spectroscopy : CTMC 19 MeV	E
96E15	Dovek, D. Houver, J.C. Reiser, I. Salgado, J. Svensson, A. Thomsen, J.W. Andersen, N. Nielsen, S.E. Dubois, A. Left-right scattering asymmetries for electron transfer from oriented and tilted aligned Na(3p) states to H(n=2,3) Phys. Rev. A 54 970 - 973 1996 H ⁺ + Na(3p) → H(n=2,3) laser-excited target : angular distributions : also AO calculation 2 keV/amu	E	96E20	Greenwood, J.B. Burns, D. McCullough, R.W. Geddes, J. Gilbody, H.B. The first use of state-prepared beams of C ²⁺ in studies of state-selective electron capture collisions J. Phys. B 29 L599 - 603 1996 C ²⁺ (¹ S ; ³ P) + Ar → C ⁺ translational energy spectroscopy 4 keV/amu	E

- 96E2 Greenwood, J.B., Burns, D., McCullough, R.W., Geddes, J., Gilbody, H.B.
State-selective one-electron capture from He, Ne and Ar by 4 keV state-prepared C^{3+} ions
J. Phys. B 29 5867-5880 1996 E
 $C^{3+}(1s^2 2s^2 1S; 1s^2 2s^2 p^3 P) + He, Ne, Ar \rightarrow C^+$
translational energy spectroscopy
4 keV
- 96E22 Hashida, M., Sakabe, S., Izawa, Y.
Cross section of symmetric charge transfer between Gd^{2+} and Gd^+ in the energy range 30-1000 eV
Phys. Rev. A 53 1487 - 1491 1996 E
 $Gd^{2+} + Gd^+ \rightarrow Gd + Gd^+$
laser-ionization
30 - 1000 eV
- 96E23 Hashida, M., Sakabe, S., Izawa, Y.
Cross sections of charge transfer between a Gd atom and its singly charged positive ion in metastable states close to the ground state
Phys. Rev. A 54 4573 - 4576 1996 E
 $Gd^{2+} + Gd^{2+} \rightarrow Gd^{3+} + Gd^{1+}$
laser ionization method
30 - 1000 eV
- 96E24 Jin, J., Khemliche, H., Prior, M., Xie, Z.
New highly charged fullerene ions : production and fragmentation by slow ion impact
Phys. Rev. A 53 615 - 618 1996 E
 $Ar^{q+}(q=4,5,8,12,16,17), Kr^{2q+}, Xe^{2q+}, Bi^{q+}(q=20,38,44,46), U^{46+} + C_{60} \rightarrow C_{60}^{q+}(l=1-9)$
electron-recoil-ion TOF
10kVxq
- 96E25 Kamber, E.Y., Akgüngör, K., Leather, C., Brenton, A.G.
Transfer-excitation processes in collisions of N^{3+} ions with H_2, He, Ne and Ar targets
Phys. Rev. A 54 1452 - 1458 1996 E
 $N^{3+} + H_2, He, Ne, Ar \rightarrow N^{2+}$
translational energy spectroscopy
6-15 keV
- 96E26 Kamber, E.Y., Akgüngör, K., Safvan, C.P., Mathur, D.
State-selective single-electron capture in very slow collisions between metastable N_2^{2+} ions and neutral atoms and molecules
Chem. Phys. Letters 258 336-341 1996 E
 $N_2^{2+} + He, Ne, Ar, D_2, N_2, O_2 \rightarrow N_2^+$
translational energy spectroscopy
28 eV
- 96E27 Katayama, I., Ikegami, H., Ogawa, H., Haruyama, Y., Tozaki, M., Aoki, A., Fukuzawa, F., Yoshida, K.
High-resolution study of electron capture by 72- and 52-MeV He projectiles from target of high atomic number
Phys. Rev. A 53 242 - 249 1996 E
 $He^{2+} + B \rightarrow He^+ (B=V, Cr, Cu, Ge, Nb, Ag, Sn)$
energy-loss spectroscopy
52, 72 MeV
also electron loss cross sections
- 96E28 Kato, S., de Gouw, J.A., Lin, C.D., Bierbaum, V.M., Leone, S.R.
Vibrational enhancement of the charge transfer rate constant of N_2^+ ($v=0-4$) with Kr at thermal energies
J. Chem. Phys. 105 5455-5466 1996 E
 $N_2^+(v=0-4) + Kr \rightarrow N_2^0 + Kr^+$
selected-ion flow tube technique
thermal energies
- 96E29 Kravis, S.D., Abdallah, M., Cocke, C.L., Lin, C.D., Stockli, M., Walch, B., Wang, Y.D., Oisen, R.E., Rodriguez, V.D., Wu, W., Plekama, M., Watanabe, N.
Single ionization of He by low-velocity protons and C^{6+} ; ejected electron momentum distributions
Phys. Rev. A 54 1394 - 1403 1996 E
 $H^+, C^{6+} + He \rightarrow He^+$
electron momentum spectroscopy + recoil ion
0.63-2.39 au (H); 1.16-1.63 au (C)
- 96E30 Lauritsen, J.H., Thomsen, J.w., Andersen, N., Dowek, D., Houver, J.C., Pedersen, J.O., Salgado, J., Svensson, A.
Electron transfer in keV $Li^+ - Na(3p)$ collisions : III experiments on initial alignment dependence
J. Phys. B 29 1093 - 1100 1996 E
 $Li^+ - Na(3s, 3p) \rightarrow Li Li^+ - Na(3p)$
energy loss spectroscopy
1 - 45 keV

- 96E31 Lindsay,B.G. Sieglaff,D.R. Schafer,D.A. Haker,K.A. Smith,K.A. Stebbings,R.F.
Charge transfer of 0.5, 1.5 and 5 keV protons with atomic oxygen : absolute
differential and integrated cross sections
Phys. Rev. A 53 212 - 218 1996 E
 $H^+ + O \rightarrow H^+(\theta), H^0$
0.5, 1.5, 5.0 keV
- 96E32 Martin,S. Bernard,J. Chen,L. Denis,A. Desesquelles,J.
Double Rydberg states formed in stabilized triple electron capture
Phys.Rev. Letters 77 4306 - 4309 1996 E
 $C^{6+} + Ne, Ar, Kr, Xe : O^{8+} + Ar, Kr, Xe : Ne^{10+} + Ar, Kr, Xe \rightarrow$
photon spectroscopy : projectile-recoil coincidence
1 keV/amu
- 96E33 Merabet,H. Cremer,G. Fremont,F. Chesnel,J.Y. Stolterfoht,N.
Energies and radiative and nonradiative decay rates of doubly excited $3n1'$ and $4n1'$
($n \rightarrow 40$ states in Ne^{8+}
Phys. Rev. A 54 373 - 378 1996 E
 $Ne^{10+} + He \rightarrow Ne^{8+}(3n1', 4n1')$
n-dependence calculated by Cowan-code
- 96E34 Moudry,B.W. Yeren,O. Jaecks,D.H. Macek,J.H.
Experimental determination of orbital and spin orientation of $(Ar^+)^*$ formed in
collisions
Phys. Rev. A 54 4119 - 4126 1996 E
 $He^+ + Ar \rightarrow He + Ar^+(3p^1[D]p^2F_{7/2,5/2})$
photon-product TOF
0.67, 1, 2 keV
- 96E35 Nakamura,N. Aways,Y. Currell,F.J. Kambara,T. Kanai,Y. Kitazawa,S. Koide,M.
Ohtani,S. Satronova,U.I. Suzuki,H. Takayanagi,T. Wakiya,K.
Electron spectra from doublet and quartet states of $N^{4+}(1s3l3l')$ produced by 60 keV
 $N^{6+} + H_2, O_2$ collisions
J. Phys. B 29 1995 - 2006 1996 E
 $N^{6+} + H_2, O_2 \rightarrow N^{4+}(1s3l3l')$
electron spectroscopy
60 keV
- 96E36 Nanal,V. Tribedi,L.C. Kurup,M.B. Prasad,K.G. Tandon,P.N.
Novel features in projectile X-rays and radiative electron capture photons emission
from highly stripped channelled ions
J. Phys. B 29 5857 - 5866 1996 E
 $S^{8+}, S^{16+}, Si^{13+} + Si < 100 \text{ \AA} \rightarrow Si^{15+}, Si^{14+} + hv(REC)$
90-143 MeV
- 96E37 Olamba,K. Szucs,S. Chenu,J.P. El Arbi,N. Brouillard,F.
Improvement of the merged-beam method and its application to the study of the
reactions : $H^+ + He^+ \rightarrow H + He$
J. Phys. B 29 2837 - 2846 1996 E
 $H^+ + He^+ \rightarrow H + He$
merged beam method
5 - 4000 eV
- 96E38 Pesnelle,A. Pascale,J. Trainham,R. Andra,H.J.
State-selective electron capture by 18 keV kr^{2+} ions from laser-excited $Rb^+(15p-25p)$
Rydberg atoms
Phys. Rev. A 54 4051 - 4063 1996 E
 $Kr^{2+} + Rb(15p-25p) \rightarrow kr^{2+}(nl)$
laser-excited target
18 keV
- 96E39 Piekma,M. Gargaud,G. McCarrroll,R. Havener,C.C.
Electron capture cross section at near-thermal collision energies for $Si^{4+} + D$
Phys. Rev. A 54 R13 - 16 1996 E
 $Si^{4+} + D \rightarrow Si^{3+}$
merged beam technique
0.01 - 1000 eV/amu
MO calculation
- 96E40 Quintana,E.J. Pollack,E.
 $H^0 + N_2$ collisions at low-kilo-electron-volt energies
Phys. Rev. A 53 206 - 211 1996 E
 $H^0 + N_2 \rightarrow H^0, H^+, H$
energy-loss spectroscopy
1 - 3 keV
- 96E41 Quintana,E.J. Pollack,E.
 $H^0 + H_2$ and $H^0 + O_2$ collisions at low kilo-electron-volt energies
Phys. Rev. A 54 4015 - 4021 1996 E
 $H^0 + H_2 \rightarrow H^0(\text{elastic}), H^+, H^-$
 $H^0 + O_2 \rightarrow H^0(\text{elastic}), H^+, H^-$
TOF energy-loss spectroscopy
1,2,3 keV

- 96E42 Reid, C.J.
Electron-transfer ionization of CS₂ into hidden cationic states below 20 eV
J. Phys. B 29 71 - 83 1996 E
H⁺, O⁺, F⁺, P⁺, P₂⁺, S⁺, Ar⁺, CS⁺ + CS₂ →
translational energy spectroscopy
8 keV
- 96E43 Remscheid, A. Huber, B.A. Pykavy, M. Staemmler, V. Wiesemann, K.
Electron capture and dissociation of the N₂³⁺ molecule in slow Ar²⁺/N₂ collisions
J. Phys. B 29 515 - 529 1996 E
Ar²⁺ + N₂ → N₂³⁺ → N²⁺ + N⁺
retardation + TOF
8 - 16 keV
- 96E44 Schippers, S. Hoekstra, R. Morgenstern, R. Olson, R.E.
Anisotropy and polarization in charge changing collisions of C⁴⁺ with Na(3s) and laser
aligned Na(3p)
J. Phys. B 29 2819 - 2836 1996 E
C⁴⁺ + Na(3s), Na(3p) → C²⁺ (nl)
photon spectroscopy
3 - 7 keV/amu
- 96E45 Selberg, N. Barany, A. Biedermann, C. Setterlind, C.J. Cederquist, H. Langereis, A.
Larsson, M.O. Waennstroem, Hvelplund, P.
Slow collisions between highly charged ions and C₆₀: absolute delta-E values and
cross sections
Phys. Rev. A 53 874 - 879 1996 E
Ar¹⁶⁺ (q=8,13,14,15) + C₆₀ → Ar⁶⁻¹⁰⁺
energy-gain spectroscopy
3.3kV xq
- 96E46 Thompson, W.R. Shah, M.B. Gilbody, H.B.
One-electron capture in collisions of 6-100 keV protons with oxygen atoms
J. Phys. B 29 725 - 732 1996 E
H⁺ + O → H
TOF + Ir-furnace
6-600 keV
- 96E47 Thompson, W.R. Shah, M.B. Gilbody, H.B.
Electron capture in collisions of 5-67 keV/amu He²⁺ ions with oxygen atoms
J. Phys. B 29 2847 - 2853 1996 E
He²⁺ + O → He⁺ + O⁺; He⁺ + O²⁺; He + O²⁺
TOF + Ir-oven
5 - 67 keV/amu
- 96E48 Thomsen, J.W. Andersen, N. Dowek, D. Houver, J.C. Lauritsen, J.H.V. Muller, U.
Pedersen, J.O.P. Salgado, J. Svensson, S.
Orbital alignment dependence of electron transfer cross sections IV: 1-15 keV Ne⁺, Ar⁺
+ Na(3p) collisions
Z. Phys. D 37 133-139 1996 E
Ne⁺, Ar⁺ + Na(3s,3p) → Ne⁰, Ar⁰
energy-loss spectroscopy
1-15 keV
- 96E49 Thomsen, J.W. Reiser, I. Andersen, N. Houver, J.C. Salgado, J. Sidly, E. Svensson, A.
Dowek, D.
An experimental determination of the complete transition matrix for the electron
transfer process Li⁺ + Na(3s) → Li(2p) + Na⁺
J. Phys. B 29 5459-5473 1996 E
Li⁺ + Na(3s) → Li(2s,2p) + Na⁺
photon-neutral particle coincidence technique
1 keV
- 96E50 Vancuura, J. Mucha, P.J. Kostroun, V.O.
Spectroscopic study of electrons emitted in Ar¹⁶⁺ (q=8-16) on Ar at 2.3q keV collision
energy
Phys. Rev. A 53 2379 - 2390 1995 E
Ar¹⁶⁺ (q=8-16) + Ar →
electron spectroscopy
2.3q keV
- 96E51 Viktor, L. Sarkadi, L. Penent, F. Bader, A. Palinka, J.
Single- and double-electron detachment from H in collisions with He
Phys. Rev. A 54 2161 - 2168 1996 E
H⁺ + He → H + e; H⁺ + 2e
electron spectroscopy
85 keV

96E52	Watson,R.L, Sampoll,G, Hovart,V, Heber,O. Kinetic energy release in the dissociative capture-ionization of CO molecules by 97 MeV Ar^{14+} Phys. Rev. A 53 1187 - 1190 1996 $\text{Ar}^{14+} + \text{CO} \rightarrow \text{Ar}^{13+} + \text{C}^+ + \text{O}^+$ projectile-recoil-ion TOF 97 MeV E	96T4	Bachau,H. Investigation of the properties of (3,3,3) triply excited states of multicharged ions J. Phys. B 29 4365 - 4379 1996 $\text{N}^{7+} \rightarrow \text{N}^{4+}(3,3,3)^3\text{S}^{*o}$ T
96E53	Wu,W, Deveney,E.F, Datz,S, Desai,D.D, Krause,H.F, Sanders,J.M, Vane,C.R, Cocke,C.L, Giese,J.P Scaling rule for target ionization by highly charged ions at low-to-intermediate velocities Phys. Rev. A 53 2367 - 2370 1996 $\text{C}^{3+}, \text{Cu}^{8+}, \text{Fe}^{9+}(q=6-10) + \text{He} \rightarrow \text{He}^+$ recoil-ion-projectile TOF 1.6 - 3.1 au E	96T5	Belkic,Dz. Reformulated impulse approximation (RIA) for charge exchange in fast ion-atom collisions Phys. Scripta 53 414-430 1996 $\text{H}^+ + \text{H} \rightarrow \text{H} + \text{H}^+$ RIA 60 keV - 3 MeV T
96T1	Alston,S. Modified Faddeev treatment of electron capture Phys. Rev. A 54 2001 - 2021 1996 $\text{H}^+ + \text{He} \rightarrow \text{H}^0$ Faddeev multiple-scattering theory 293 keV/amu angular distributions Ashok,J, Winter,T,G. Single electron transfer and target excitation in $\text{He}^{2+} + \text{Na}(3s)$ collisions at 2-50 keV/amu in the coupled-Sturmian-pseudostate approach J. Phys. B 29 4675 - 4687 1996 $\text{He}^{2+} + \text{Na}(3s) \rightarrow \text{He}^+(2l,3l,4l)$ Sturmian 2 - 50 keV/amu also excitation to $\text{Na}(3p,3d,4l)$ Bacchus-Montabonel,M,C. Double-electron capture processes in $\text{B}^{4+} + \text{He}$ collisions Phys. Rev. A 53 3667 - 3670 1996 $\text{B}^{4+}(1s) + \text{He} \rightarrow \text{B}^{2+}(1s2l2l')$ MO 0.1 - 0.7 au T	96T6	Bhattacharjee,B, Das,M, Deb,N,C, Mukherjee,S,C. Two-electron capture by $\text{He}^{2+}, \text{Li}^{3+}$ and B^{3+} in the independent-event model Phys. Rev. A 54 2973 - 2976 1996 $\text{He}^{2+}, \text{Li}^{3+}, \text{B}^{3+} + \text{He} \rightarrow \text{He}^+, \text{Li}^{2+}, \text{B}^{4+}$ CDW with independent-event model 0.5-6 MeV (He) ; 1-4 MeV/amu (Li) ; 5-25 MeV (B) Brown,G,J, Crothers,D,S,F. Close-coupling symmetrized variational continuum distorted-wave theory : electron capture in alpha-particle collisions with hydrogen J. Phys. B 29 L705 - 711 1996 $\text{He}^{2+} + \text{H}(1s) \rightarrow \text{He}^+(1s,2s,2p)$ symmetrized variational CDW 7 - 1000 keV/amu T
96T2		96T7	Brown,G,J,N, Crothers,D,S,F. A theoretical description of electron capture by H^+ from He^+ ions using symmetrized variational continuum distorted waves J. Phys. B 29 6165-6174 1996 $\text{H}^+ + \text{He}^+ \rightarrow \text{H}^0 + \text{He}^{2+}$ symmetrized variational CDW 20-500 keV Brown,G,J,N, Crothers,D,S,F. Close-coupling symmetrized variational continuum distorted-wave theory : electron capture to excited states in p-H collisions Phys. Rev. Letters 76 392 - 395 1996 $\text{H}^+ + \text{H}(1s) \rightarrow \text{H}(2s,2p)$ symmetrized variational CDW 5 - 200 keV T
96T3		96T8	
		96T9	

- 96T10 Busnegro, H.F., Martinez, A.E., Rivarola, R.D.
Single electron capture from He target
J. Phys. B 29 4193 - 4205 1996 T
H⁺, He²⁺, Li³⁺, B⁵⁺, C⁶⁺, N⁷⁺, O⁸⁺, F⁹⁺, + He -> H(nl=2s, 2p, 3s, 3p, 3d, 4s), He⁺, Li²⁺, B⁴⁺, C⁵⁺, N⁶⁺, O⁷⁺, F⁸⁺
CDW-EIS, -EFS
20-3000 keV/amu
- 96T11 Cherkani, M.H., Fussen, D., Chibisov, M.I., Brouillard
Electron detachment of H in collisions with multiply charged ions
Phys. Rev. A 54 1445 - 1447 1996 T
H⁺ + A^{q+} -> H⁰ (A=Ne, Ar, Xe)
two-state model
10 - 200 keV
scaling law
Cohen, J.S.
Quasiclassical-trajectory Monte Carlo methods for collisions with two-electron atoms
Phys. Rev. A 54 573 - 586 1996 T
H⁺ + He -> H + He⁺; H + He²⁺ + e; He²⁺ + He -> He⁺ + He⁺; He²⁺ + e; Li²⁺ + He -> Li²⁺ + He⁺; Li²⁺ + He²⁺ + e; Li²⁺ + He²⁺
Quasi-CTMC
25-2000 keV/amu
also single/double ionization
Croft, H., Dickinson, A.S.
Charge transfer in slow collisions of Na with H⁺
J. Phys. B 29 57 - 70 1996 T
H⁺ + Na(3s, 3p) -> H(n=2) + Na⁺
MO
0.01 - 34 eV
- 96T12 Das, M., Deb, N.C., Mukherjee, S.C.
Calculation of cross sections for electron capture by fast fully stripped ions from atomic hydrogen
Phys. Scripta 54 44-49 1996 T
A^{q+} + H -> A^{(q-1)+}(nl) (A=Li, Be, B, C, N, O, Ne)
DW
200-700 keV/amu
- 96T15 Dubois, A., Hansen, J.P.
Comparison between quantum and classical scattering dynamics in singly charged ion-atom collisions
J. Phys. B 29 L225 - 230 1996 T
H⁺ + Na(3p) -> H
CTMC
1 keV
- 96T16 Ermolaev, A.M., Korotkov, A.A.
Close-coupling calculation of p + Be³⁺ collisions at intermediate and high energies and application to JET plasmas
J. Phys. B 29 2797 - 2818 1996 T
H⁺ + Be³⁺(1s) -> H(n=1,2)
AO
30 keV - 10 MeV
also excitation, ionization
- 96T17 Errea, I., F. Harel, C. Jimeno, P. Jouin, H. Mendez, L. Riera, A.
Molecular treatment of electron detachment in H⁺ + H⁺ collisions
Phys. Rev. A 54 967 - 969 1996 T
H⁺ + H⁺ -> H + H
MO with CTF
0.1 - 0.9 au
- 96T28 Fourre, I., Courbin, C.
Classical trajectory study of orientation and alignment effects for charge exchange processes in H⁺ - Na(3p_m) collisions
Z. Phys. D 38 103-111 1996 T
H⁺ + Na(3p_m) -> H
CTMC
1-8 keV
- 96T19 Fritsch, W., Lin, C.D.
One- and two-electron transitions in slow C³⁺ - He collisions: total and angle-differential cross sections and coherence parameters
Phys. Rev. A 54 4931-4942 1996 T
C³⁺(1s) + He -> C⁺(1snl; n=2,3), C³⁺(1s2l2l')
semiclassical close-coupling AO
1-35 keV/amu

- 96T20 Gargaud, M., McCarroll, R.
Orientation of the $(3p)^2P$ state resulting from electron capture in Al^{13+}/H collisions
J. Phys. B 29 3673 - 3682 1996 T
 $Al^{13+} + H/D \rightarrow Al^{2+}(2p^6 3p)^2P, Al^{2+}(2p^6 3s)^2S$
MO
0.5 - 10 keV/amu
angular differential cross sections
- 96T21 Gayet, R., Hansson, J., Jacqui, L., Martinez, a., Rivarola, R.
Double electron capture by fast bare ions in helium atoms : production of singly and doubly excited states
Phys. Scripta 53 549-556 1996 T
 $A^{*+} + He \rightarrow A^{(s,2p)(nl,n'l')}(A=He, Li, B,)$
four-body CDW
0.4-30 MeV
- 96T22 Glass, J.T., McCann, J.F., Crothers, D.S.F.
Second-order relativistic electron capture
Z. Phys. D 36 119-124 1996 T
relativistic CDW
- 96T23 Grande, P.L., Schriewitz, G., Sigaud, G.M., Montenegro, E.C.
Nonperturbative treatment of the screened-Coulomb contribution of projectile-electron loss
Phys. Rev. A 54 2983 -2990 1996 T
 $He^{*+} + B \rightarrow He^{2+}(B=He, Ne, Ar, Kr)$
couplet-channel calculation
250-1000 keV/amu
- 96T24 Herrero, B., Cooper, I.L., Dickinson, A.S.
Structure and coupling in the $(Si-H)^{3+}$ quasimolecule
J. Phys. B 29 5583-5595 1996 T
 $Si^{3+} + H \rightarrow Si^{2+}$
potential energy and wavefunctions
rate coefficients
- 96T25 Ichihara, A., Shirai, T., Eichler, J.
Radiative electron capture and the photoelectric effect at high energies
Phys. Rev. A 54 4954-4959 1996 T
 $Au^{79+} + Au \rightarrow Au^{78+} + hv(REC)$
photoionization for Au^{78+}, U^{91+} ; radiative recombination of free electron
10.8 GeV/amu
- 96T26 Ionescu, D.C., Eichler, J.
Bound-free electron-positron pair creation in relativistic heavy-ion collisions as a charge-transfer processes
Phys. Rev. A 54 4960-4967 1996 T
first-order distorted wave Born approx.
- 96T27 Jakimoski, d., Savichev, V.I., Solov'ev, E.A.
H-type of hidden crossings in atomic collisions involving highly charged ions
Phys. Rev. A 54 2962 - 2966 1996 T
 $H^+ + O^{7+}(1s) \rightarrow H(n) + O^{8+}$
hidden crossing method : also excitation
0.05 - 1.0 MeV/amu
- 96T28 Janev, R.K., Solov'ev, E.A., Wang, Y.
Electron capture, excitation and ionization in slow collisions of Li^{13+} ions with ground state and metastable hydrogen atoms
J. Phys. B 29 2497 - 2514 1996 T
 $Li^{13+} + H(1s), H(2s) \rightarrow Li^{12+}(nl)$
hidden crossing method
0.1 - 20 keV/amu
also ionization, excitation
- 96T29 Kazansky, A.K., Ostrovsky, V.N.
Rydberg-atom-ion collision : classical theory of intrashell transitions
J. Phys. B 29 3651 - 3672 1996 T
 $Na^+ + Na(28d, 26d) \rightarrow Na^+ + Na(28l, 26l)$
classical trajectory
- 96T30 Kimura, M., Gu, J.P., Hirsch, G., Buenker, R.J.
Electron capture in collisions of $O^{2+}(^3P)$ ions with He atoms at energies below 10 keV : the effect of metastable $O^{2+}(^1D)$ ions
Phys. Rev. A 53 4164 - 4168 1996 T
 $O^{2+}(^3P, ^1D) + He \rightarrow O^+$
MO
0.02 - 1000 eV/amu
- 96T31 Kimura, M., Li, Y., Hirsch, G., Buenker, R.J.
Elastic and inelastic processes in $H^+ + C_2H_2$ collisions below the 1.5 keV regime
Phys. Rev. A 54 5019-5026 1996 T
 $H^+ + C_2H_2 \rightarrow H^0$
MO
0.1-7 keV
angular distributions

- 96T32 Kimura, M. Suzuki, S. Shimakura, N. Gu, J. P. Hirsch, G. Buehner, R. J. Shimamura, I.
Charge transfer in collisions of $B^{2+}(^2S, ^2P)$ and $B^{3+}(^1S)$ ions with He atoms below 200 keV
Phys. Rev. A 54 3029 - 3035 1996 T
- $B^{2+}(^2S, ^2P) + He \rightarrow B^{3+}(^1S) + He \rightarrow$
MO
0.2-200 keV
also excitation cross sections
- 96T33 Kuang, J. Lin, C. D.
On the convergence of the two-centre AO close-coupling method in ion-atom collisions
J. Phys. B 29 1207 - 1218 1996 T
- $H^+ + H(1s) \rightarrow H(1s, 2s, 2p, 3l)$
two-centre AO
15 - 1000 keV
also ionization, excitation
- 96T34 Lundsgaard, M. F. V. Tushima, N. Lin, C. D.
Dependence of electron loss cross sections on the alignment and orientation of elliptic Rydberg states
J. Phys. B 29 1045 - 1062 1996 T
- $H^+ + H(n=4) \rightarrow H(n') + H^+ ; Na^+ + Li(n=25) \rightarrow Na + Li^+$
CC
1 - 3 au
also $H^+ + H(n=4) \rightarrow H^+ + H^+$
- 96T35 Machhol, M. Courbin, C.
Electron transfer in keV $Li^+ - Na(3p)$ collisions : II Molecular basis model
J. Phys. B 29 1079 - 1092 1996 T
- $Li^+ - Na(3s, 3p)$
impact parameter semiclassical
1 - 45 keV
- 96T36 Mancev, I.
Single-electron capture by hydrogen atoms and helium ions from helium atoms
Phys. Rev. A 54 423 - 431 1996 T
- $H + He \rightarrow H^+ + He^+ ; He^+ + He \rightarrow He + He^+$
4-body corrected first Born approx.
20 - 3000 keV/amu
- 96T37 McCann, J. F. Glass, J. T. Crothers, D. S. F.
The energy dependence of relativistic nonradiative electron capture
J. Phys. B 29 6155-6164 1996 T
- relativistic OBK2
asymptotic form $\sigma \approx (1/F)ln^2F$.
- 96T38 Ostrovski, V. N. Taulberg, K.
Quantum tunnelling and classical above-barrier transitions in electron detachment from negative ions by negatively charged projectiles
J. Phys. B 29 2573 - 2587 1996 T
- $H^+ + H \rightarrow H^+ + H + e$
tunnelling, classical above-barrier model
2 - 500 keV/amu
- 96T49 Selberg, N. Biedmann, C. Cederquist, H.
Semiempirical scaling laws for electron capture at low energies
Phys. Rev. A 54 4127 - 4135 1996 T
- scaling law
- 96T40 Sidky, E. Simonsen, H. J. T.
Velocity-matching model for electron capture in keV atomic collisions
Phys. Rev. A 54 1417 - 1429 1996 T
- semiclassical theory
- 96T41 Suzuki, S. Shimakura, N. Kimura, M.
Molecular-orbital treatment of electron capture in an external magnetic field : collisions of B^{+} ions with H atoms
J. Phys. B 29 1063 - 1078 1996 T
- $B^{+} + H \rightarrow B^{2+}(1s3p, 1s3d)$
MO
122.5 eV/amu
 $B=2.35 \times 10^4 T$
Tokesi, K. Hock, G.
- 96T42 Double electron capture in $He^{2+} + He$ collisions up to 1500 keV/amu projectile impact
J. Phys. B 29 L119 - 125 1996 T
- $He^{2+} + He(1s^2) \rightarrow He(1s^2) + He^{2+}$
4-body-CTMC
100 - 1500 keV/amu

- 96T43 Wang, J. Olson, R.E. Corneliu, K. Tokesi, K.
 Slow convergence to n^4 -scaling of cross sections in electron capture from Rydberg states
 J. Phys. B 29 L537 - 543 T
 $H^+ + H(n, n-1) \rightarrow H(n^+) + H^+$
 CTMC
- 96T44 Yakhonov, V.L. Amusia, M. Ya.
 Radiative double electron capture in fast heavy ion-atom collisions
 Phys. Letters A 221 328-334 1996 T
 $A^{*+} \rightarrow A^{(n-2)+} + h\nu$ (double electron capture with REC single photon) ($A=10-100$)

A list of finding references for particular combinations of collision partners

an example :

H <--- projectile ion

q = -1 : 77E12(He)

charge reference number (target)

(the first two numbers : the year of publication)

(the third : P;proceedings/review/book, E;experiment, T;theory.)

(the last : target atom/ molecules)

* : excited or metastable state

Atomic ion species

H

- q = -1 : 77E12(He,Ar,Xe,N₂), 80E33(He,Ar,H₂,N₂,O₂), 81E21(H,He,Ne,Ar,H₂,N₂), 81E24(Na), 83E54(H₂), 84E52(He,Ne,Ar), 85E74(Na,H₂), 86E62(He,Ar,Xe), 87E2(He,Ne,Ar), 87E23(H,H₂), 87E75(Na,K), 87E76(Cs), 88E51(Li,Na,Mg,Ca,Sr,Cs), 90E19(N₂), 90E20(H), 91E17(Na(3s,3p)), 91E50(H⁻), 94E51(He,Ar,K,Kr,Xe,H₂,O₂,CO₂,C₂H₂), 95E1(He,Ne,Ar), 95E8(He,Ne,Ar,Xe,H₂,N₂), 95E36(H⁻), 95E37(Ne^{q+}:q=1-4,Ar^{q+}:q=1-8,Xe^{q+}:q=1-8), 95E45(He,Ar,Kr,Xe,H₂,O₂,CO₂,C₂H₂), 96E14(SF₆,CH₄,CO), 96E37(He⁺), 96E51(He)

- : 85T41(Ne), 84T42(Cs⁺), 88T23(Na), 91T46(He,Ne,Ar,Kr,Xe,H,N,O), 96T11(Ne⁴⁺,Ar⁴⁺,Xe⁴⁺), 96T38(H⁻)

- q = 0 : 79E15(Na,K,Cs), 79E24(H,H₂), 80E14(Na,K,Rb,Cs), 80E30(H,H₂), 80E35(H), 80E36(H), 82E23(Cs,N₂), 83E31(Ca,Sr), 83E56(H(2s)), 84E22(Na), 84E49(O₂), 85E1(Mg), 86E13(He,Ne,Ar,Kr,Xe,H₂), 87E2(He,Ne,Ar), 87E20(Na,K,Rb), 87E24(H,H₂), 88E28(H₂,N₂,O₂,CO,CH₄), 88E51(Li,Na,Mg,Ca,Sr,Cs), 88E54(N₂,O₂), 89E18(He), 89E43(Ar), 90E19(N₂), 91E37(Ne,Ar), 91E53(H₂,N₂,O₂,He,Ar), 94E51(He,Ar,K,Kr,Xe,H₂,O₂,CO₂,C₂H₂), 95E8(He,Ne,Ar,Xe,H₂,N₂), 95E29(He,Ne,Ar), 95E30(He,Ne,Ar), 95E45(He,Ar,Kr,Xe,H₂,O₂,CO₂,C₂H₂), 96E40(N₂), 96E41(H₂,O₂)
- : 79T4(H), 80T2(H), 85T48(Na), 86T5(Na), 86T27(Na), 87T51(H), 88T62(Cs), 89T44(Ne), 90T41(He,Ne,Ar), 90T22(H), 90T29(H,Ar), 91T42(H₂),

- 91T46(He,Ne,Ar,Kr,Xe,H,N,O), 91T88(Ar), 92T66(Na(3s)), 93T17(H), 93T56(H), 93T57(H₂), 93T58(C), 93T59(Ne), 93T61(O₂(v=0)), 95T32(H), 95T34(H₂), 96T36(He)

q = 0* : 79E6(He,Ne,Ar,Kr), 84E49(O₂), 93E4(He,Ne)

; 90T41(He,Ne,Ar)

q = 1 : 69E1(N₂), 74E1(Ar), 77E1(N,O,Ne), 77E5(Cs), 78E14(He,Ne,Ar,Kr,Xe),

79E10(CO,CO₂,N₂O), 79E11(Mg,Ar,Ba), 79E12(Mg,Ar,Ba), 79E15(Na,K,Cs),

79E18(Cs), 79E19(Ne,Ar,CH₄), 80E12(Cs), 80E14(Na,K,Rb,Cs), 80E18(He,

Ne,Ar,H₂,N₂,O₂), 80E23(Ar), 80E24(CH₄,C₂H₂,C₂H₄,C₂H₆,C₃H₆,C₃H₈),

80E25(H₂), 80E35(H), 80E38(Li⁺), 81E33(H), 81E44(H), 82E2(CH₄,C₂H₂,

C₃H₆,C₄H₈), 82E10(He), 82E25(Na,K,Rb,Cs), 82E28(C,Ne), 82E29(C,Ne,Ar),

82E30(C), 82E32(H,D), 82E40(H₂), 82E47(H,H₂), 83E28(He,Ne,Ar,Kr,Xe,Hg,

H₂,N₂,O₂,NO,CO₂,SO₂,NO₂,NH₃,CH₄,C₂H₂), 82E51(H,D), 83E31(Ca,Sr), 83E35

(C⁺,N⁺), 83E40(Ar), 83E41(He), 83E44(He,Ne,Ar,Kr,H₂,N₂,CO,CH₄,CO₂),

83E58(He⁺), 84E4(Li), 84E7(Na,K), 84E16(Ne,Ar,Kr), 84E17(Mg), 84E21

(H₂), 84E42(H⁻), 84E46(Li), 84E49(O₂), 84E54(He), 85E3(Kr), 85E4(Li),

85E5(Li), 85E7(Cs), 85E33(Li), 85E34(Li,Na,Mg), 85E37(Ar), 85E41(CO,

CH₄,C₂H₆,C₃H₈), 85E44(H₂,D₂), 85E49(C), 85E55(H⁻), 85E59(He⁺), 85E63

(C,N), 85E65(Li), 85E69(Mg), 85E71(Ne,CH₄,C₂H₂,C₂H₄,C₂H₆,C₃H₆), (CH₂)₃,

C₃H₈,C₄H₈,O₂,CO,CO₂,CF₄,C₂F₆,SF₆), 85E18(Ne,Na,Mg), 86E19(K), 86E20

(H₂,D₂), 86E23(He), 86E24(He,Ar), 86E27(Ne), 86E28(He), 86E37(H),

86E43(Na,K,Rb,Cs), 86E63(H), 86E68(H₂,D₂), 86E70(He), 86E78(O₂),

86E91(He,Ne,Ar,Kr,Xe), 87E2(He,Ne,Ar), 87E5(Na,Na(3p)), 87E6(Na),

87E11(Kr), 87E20(Na,K,Rb), 87E22(H₂O), 87E23(H,H₂), 87E26(He,Ne,Ar),

87E28(He,Ne,Ar), 87E29(He), 87E32(C⁺,N⁺), 87E34(Ne), 87E43(He),

87E53(He), 87E56(CO₂,N₂O), 87E57(H₂), 87E64(H⁻), 87E65(H⁻), 87E68(H,

He,H₂), 87E73(He,Ne,Kr,Xe), 87E74(Li,CH₄,C₂H₂,C₂H₄,C₂H₆,C₃H₆,C₃H₈,I₂,

C₃H₈,C₄H₈,CO,CO₂), 87E83(Xe), 87E86(CH₄), 88E3(22Ne), 88E7(CH₄),

88E13(Na), 88E51(Li,Na,Mg,Ca,Sr,Cs), 89E2(He), 89E13(He), 89E17(Cs),

89E33(He), 89E34(Ne,Ar,Kr,Xe), 89E40(Kr,Xe), 89E53(He), 89E57(H₂),

89E65(H₂), 90E2(He), 90E12(Na(3s),Na^{*}(3p)), 90E13(N₂,O₂,CO,CO₂,NO,

CH₄), 90E22(Mg), 90E19(N₂), 90E36(Ar), 90E40(Na^{*}(3p)), 90E50(CO),

90E65(SF₆), 91E15(H), 91E13(He), 91E19(H₂), 91E21(K), 91E22(Na(3s),

Na^{*}(3p)), 91E20(Li,Na,K), 91E24(Ne), 91E28(Sr⁺,Ba⁺), 91E29(Tl⁺),

91E34(Ar), 91E60(H₂(X)), 91E62(He), 92E19(Na^{*}(3p)), 92E34(Na^{*}(3s,

3p)), 92E38(He,Ne,Ar), 92E39(He), 92E40(Mg), 92E50(He), 92E53(H⁻),

93E5(C₂H₄), 93E24(Ar), 93E30(H), 93E55(N₂), 93E57(He,Ar), 93E58

(He), 87T33(He), 87T34(C), 87T39(H), 87T45(H), 87T46(H*(2s)), 87T47(He), 87T52(H⁻), 87T53(Na), 87T55(He), 87T56(He⁺, Li²⁺, Be³⁺, B⁴⁺, C⁵⁺), 87T59(H), 87T62(CO₂), 87T65(Li), 88TJ(C,Ar), 88T2(H,He), 88T3(Ne), 88T4(H₂), 88T5(Hc,N,O), 88T7(H(2s)), 88T9(He,Li), 88T12(H⁺, U⁹²⁺), 88T13(H), 88T14(N,O,Ar), 88T15(H⁻), 88T24(H,O,Ne,Ar), 88T26(O₂), 88T27(He⁺, Li²⁺, Be³⁺, B⁴⁺, C⁵⁺), 88T31(He), 88T37(H), 88T38(Ne), 88T39(C,O,Ne), 88T48(H), 88T51(H,He⁺, Li²⁺), 88T56(He), 88T64(He⁺), 88T67(H,He⁺, Li²⁺), 89T1(H,He), 89T5(H₂), 89T7(H,He), 89T8(H), 89T10(He,Li), 89T14(He,C), 89T15(H,He), 89T16(H), 89T25(H₂), 89T35(Ne,He⁺), 89T36(C), 89T45(H₂), 89T46(H₂), 89T48(H), 89T49(H), 89T50(H₂), 90T1(Na*(3p)), 90T4(H,He), 90T10(Na(3s), Na*(3p)), 90T11(H), 90T12(Ne), 90T20(O₂), 90T31(H₂,He), 90T33(Na(3s,3p)), 90T35(H,He⁺, Li²⁺), 90T36(H⁻), 90T37(He), 90T38(He⁺), 90T39(Ar), 90T40(H), 90T47(C), 90T49(Li(2s), Na(3s)), 91T7(H), 91T11(H), 91T17(Na), 91T24(H,He,C,Ne,Ar), 91T25(H), 91T28(C), 91T34(He), 91T35(Be²⁺, B⁴⁺, C⁵⁺, N⁶⁺, O⁷⁺), 91T36(He⁺, Li⁺, Li²⁺), 91T37(N,O,Ne), 91T38(C,N,O,Ne,Ar), 91T44(H), 91T50(He), 91T52(He), 91T53(He), 91T55(H), 91T57(He), 91T58(He⁺, Li⁺, Li²⁺), 91T59(He⁺), 91T64(CH₄, N₂, Ne), 92T1(Li, Na, K, Rb), 92T5(Na, K, Rb, Cs), 92T6(C,Ne,Ar), 92T14(He, Be²⁺, B³⁺, C⁴⁺, N⁵⁺, O⁶⁺), 92T15(Na*(3p)), 92T17(H), 92T21(O₂), 92T23(H), 92T25(He⁺), 92T30(H₂), 92T31(H₂), 92T39(H,He), 92T40(C,Ne,Ar), 92T42(H), 92T43(H), 92T45(He), 92T46(H), 92T48(H), 92T49(H), 92T53(H), 92T54(He), 92T58(H), 93T3(He), 93T10((Na)_h:n=1-75), 93T11(H, Li²⁺, Ne⁹⁺), 93T13(H), 93T15(H₂, H₂⁺), 93T16(H₂⁺), 93T19(H), 93T21(Na*(3s,3p)), 93T22(H⁻), 93T23(H(2s,2p)), 93T25(H₂:v=0), 93T26(H₂), 93T29(H(n=2,3)), 93T30(H,He⁺), 93T32(H), 93T35(He⁺), 93T36(H, H₂), 93T37(Na(3p)), 93T40(H), 93T41(He), 93T42(H,He), 93T49(H), 93T51(H), 94T2(H(Ls,2s,2p)), 94T3(C,Ne,Ar), 94T5(H), 94T10(H), 94T14(H₂), 94T17(Be³⁺), 94T29(H), 94T30(H,Zr²⁹⁺), 94T41(H), 94T43(H*(4f)), 94T44(H(n=3,4,5)), 94T45(He), 94T49(H), 94T51(H), 94T53(Na*(3p)), 94T54(CI), 94T56(Na*(3p)), 94T58(Li*(2s,2p,3p)), 94T59(H), 94T63(H*(4f_{m1}), 94T67(H(n=25)), 94T68(He⁺), 96T1(H,He), 95T2(H₂), 95T3(C⁻, C⁺, C⁰⁻, O, O⁺, F⁺, F⁻, Si⁻, Si⁺, Cl⁻, Cl⁺), 95T5(H), 95T6(H), 95T9(H⁻), 95T15(H), 95T24(He⁺), 95T25(Na*(3s,3p)), 95T27(CH₄), 95T30(H*(3d,4f,5g), Na(3p)), 95E(Fe,Cu), 96T1(He), 96T5(H), 96T8(He⁺), 96T9(H), 96T10(He), 96T12(He), 96T13(Na*(3s,3p)), 96T15(Na*(3p)), 96T16(Be³⁺), 96T17(H⁻), 96T18(Na(3p_m)), 96T27(O⁷⁺), 96T31(C₂H₂), 96T33(H), 96T34(H*(n=4)), 96T43(H*(n,n-1))

(Na*(3p)), 93E60(Na*(3p)), 93E61(Na(3s)), 93E71(Na(3s)), 94E10(He), 94E12(He), 94E23(Mg), 94E48(Nc), 94E49(Fe), 94E52(Na(3p)), 94E69(Na(3p)), 95E41(Na(3p)), 95E51(He,Ar,Kr), 95E52(Kr), 95E53(Cu), 95E67(Kr), 96E11(Mg), 96E15(Na(3p)), 96E29(He), 96E31(O), 96E42(CS₂), 96E46(O),
; 62T1(H), 73T1(Ar), 74T1(H), 75T1(Ar), 75T4(H), 76T4(He,Ar), 77T1(H), 77T2(H), 77T3(He), 77T8(H), 77T12(H), 77T13(H), 78T3(H), 78T8(C,N,O,Ne,Ar), 78T9(H⁻), 78T10(H), 78T11(H), 78T13(H), 78T17(Cs), 78T19(He,Ar), 79T2(Li), 79T5(He), 79T9(H,He), 79T10(H(2s)), 79T15(Ar), 79T18(He), 79T19(Ar), 79T21(H), 79T22(H), 79T23(H), 79T24(He⁺, Li²⁺), 79T25(H,He,Ar), 79T26(H₂), 79T28(H), 79T29(H), 79T31(H), 79T35(H), 79T37(He⁺, Li²⁺, C⁵⁺), 80T1(C,Ne,Ar), 80T8(O), 80T17(C,N,O,Ne,Ar), 80T20(Ne,Ar,Kr), 80T21(Ne⁹⁺, Ca¹⁹⁺), 80T23(H), 80T24(H,Cu²⁸⁺), 80T25(He⁺, Li²⁺, Be³⁺, C⁵⁺), 80T28(He), 80T29(H), 80T31(H), 80T36(He⁺), 80T39(He⁺), 81T1(H⁻), 81T3(He⁺), 81T4(Ar), 81T5(H,He), 81T8(H), 81T10(He), 81T12(H), 81T14(C,Ne), 81T19(H), 81T20(He,C,Ar,N₂O₂), 81T21(H), 81T22(Ne,Ar), 81T23(H), 81T25(Na,K,Rb), 81T26(H), 81T27(Ar), 81T30(H), 81T34(H⁻), 81T36(H), 81T37(H,He), 81T41(He⁺(1s,2s,2p)), 82T4(H,Ne), 82T7(H), 82T10(Li⁺, Li²⁺), 82T12(H), 82T13(H,He⁺), 82T18(H), 82T20(Na), 82T21(Na,K,Rb,Cs), 82T22(H), 82T23(H), 82T28(Li), 82T30(He⁺), 82T31(H), 82T32(H), 82T34(He), 82T43(He⁺, Li²⁺, C⁵⁺, N⁶⁺), 82T44(Mg⁺, Ca⁺, Sr⁺, Ba⁺), 82T45(Li⁺), 82T46(He⁺), 83T1(Li), 83T2(C,Ne,Ar), 83T5(H⁻), 83T10(Li), 83T12(Li), 83T13(H), 83T14(H), 83T17(H), 83T26(H), 83T30(H,Be,C,O,Ne), 83T37(H⁻), 83T38(H,He), 83T40(Li), 83T46(H(n)), 84T2(C,Ni), 84T3(C,Ni), 84T10(He), 84T12(H), 84T13(He⁺), 84T14(He), 84T19(Na,K), 84T24(H(2s,2p)), 84T25(H,He,C⁵⁺), 84T2(H), 84T30(H), 84T34(Ne), 84T36(H,He,He⁺), 84T39(H,He), 84T40(C,O), 84T41(H,He⁺), 84T42(Cs), 84T45(H), 84T46(He,C,Ne,He⁺, Ar¹⁷⁺), 84T47(He,H₂), 84T53(He), 84T58(H), 84T59(H₂), 85T5(H), 85T10(H), 85T11(H), 85T29(Ne,Si,Ni), 85T31(He), 85T32(H₂), 85T33(He⁺), 85T34(H), 85T36(H,Cs), 85T38(He), 85T41(He), 85T42(H), 85T45(H,He,C,Ne,Ar,Xe), 85T46(H), 85T50(C,N,O,Ne,Ar), 85T51(H), 85T52(He), 85T54(He), 86T1(Na), 86T2(Na), 86T6(H⁻), 86T9(H), 86T10(Na), 86T12(He), 86T16(C,Ar), 86T17(H(2s)), 86T22(H,He), 86T23(H), 86T25(Ar), 86T34(H), 86T41(He), 86T42(H), 86T56(H), 86T58(H⁻), 86T61(He⁺, Li²⁺), 86T62(He), 86T66(H), 86T71(H,He), 86T73(H), 86T77(He,C,N), 87T5(H), 87T6(H(2s)), 87T7(H), 87T10(C,Ne,Ar), 87T11(H,B⁴⁺), 87T14(H), 87T15(Li²⁺), 87T22(He), 87T24(C,N,O,Ne,Ar), 87T31(H), 87T32

91T61(Hg), 91T68(Ar), 92T7(H), 92T28(He), 92T29(H⁺), 92T68(He),
 93T6(Hg), 93T7(Hg), 93T60(H⁺), 94T16(Na*(3s,3p)), 94T18(H), 94T21(H⁺),
 94T38(C), 94T39(O), 95T16(He), 95T18(He), 95T21(He), 95T28(H), 95T32
 (H,He⁺), 95T37(Na*(3s,3p)), 96T23(He,Ne,Ar,Kr), 96T36(He)
 q = 1 : 85T54(H,He⁺(2s)), 91E58(Cd*)
 q = 2 : 75E1(He), 75E2(H), 75E3(He), 76E11(H,He,Ar,Kr,K,H₂,N₂,O₂), 78E4(He,Ne,
 Kr), 78E5(H,He), 78E8(H,He), 79E7(He,Ne,Ar,Kr,Xe), 80E25(H₂), 81E2(Li),
 81E44(H), 82E7(He,Ne,Ar,N₂), 82E9(Ne,Ar,Kr,Xe), 82E13(Li), 82E14(Li),
 82E17(C), 82E19(Ne), 82E22(Li), 82E24(Li), 82E29(C,Ne,Ar), 82E40(H₂),
 82E47(H), 83E15(Ne,Ar,Kr,Xe,N₂), 83E23(O₂), 83E28(He,Ne,Ar,Kr,Xe,Hg,
 H₂,N₂,O₂,NO,CO₂,SO₂,NO₂,NH₃,CH₄,C₂H₂), 83E33(Xe), 83E53(Li), 84E8(Li),
 84E15(He,Ne,N₂,Sr), 84E31(Ne,Ar,N₂), 84E46(Li), 85E20(H), 85E21(H,He),
 85E26(Li), 85E33(Li), 85E61(He,Ne,Ar,H₂,N₂,O₂,CO,CO₂,CH₄,H₂O), 85E65
 (Li), 86E4(He,Ne,Ar,Kr), 86E18(Ne,Na,Mg), 86E19(K), 86E46(H⁺), 86E51
 (Li), 86E60(H⁺), 86E70(He), 87E19(He,Ne,Ar,Kr), 87E43(He), 87E53(He),
 87E78(O₂), 87E79(He), 88E9(He,Ne,Ar,Kr), 88E10(He,Ne,Ar,Kr), 89E4(Li),
 89E6(Ar,N₂), 89E28(H,He), 89E38(Ne,Ar), 89E53(He), 89E57(H₂),
 89E68(He), 90E10(Xe), 90E25(He,H₂), 90E49(Li,Na,K), 90E50(CO),
 91E3(Na(3s),Na*(3p)), 91E10(H⁺), 91E11(H⁺), 91E15(H), 91E16(H₂),
 91E25(H), 91E38(D₂,N₂,O₂), 91E46(He), 92E1(Na*(3p)), 92E11(He),
 92E16(H,He), 92E17(He), 92E49(Na(3s),Na*(3p)), 92E18(Li), 92E26(O, O₂),
 92E30(H₂,He), 92E35(Zn), 92E37(Na), 92E40(Mg), 93E1(He,Ne,Ar,Kr,Xe,
 H₂), 93E16(He), 93E21(Na(3s),Na*(3p)), 93E22(Na(3s),Na*(3p)), 93E23
 (Li(2s),Li*(2p)), 93E64(Na*(3p)), 93E66(H₂,N₂,O₂,CO,CO₂,H₂O), 94E8(D₂),
 94E15(z=6-8), 94E18(He), 94E26(H₂), 94E29(He), 94E46(C), 94E49(Fe),
 94E58(Na(3s)), 95E2(D), 95E18(H₂), 95E19(H,He,Li,Na), 95E35(He⁺),
 95E38(He), 95E49(Na(3s)), 95E53(Cu), 95E66(Na), 95E67(Fe,Cu),
 96E17(CO), 96E27(V,Cr,Cu,Ge,Nb,Ag,Sn), 96E47(O),
 ; 74T2(H), 77T3(He), 77T4(H), 77T5(H), 77T12(H), 77T13(H), 77T14(H),
 78T2(H⁺), 78T3(H), 78T10(H), 78T11(H), 78T13(H), 78T18(H), 79T3(He),
 79T10(H(2s)), 79T16(H), 79T18(He), 79T25(H,He,Ar), 79T27(Cu), 79T51
 (H), 79T38(He), 80T3(Ar), 80T4(H), 80T11(H), 80T12(H), 80T15(He),
 80T16(He), 80T31(H), 80T33(H), 80T37(p⁷*,s¹2⁺*), 81T2(Li), 81T3(H),
 81T4(Ar), 81T8(H), 81T9(H), 81T12(H), 81T13(H), 81T14(C,Ne), 81T16
 (He), 81T20(He,C), 81T24(H), 81T30(H), 81T42(He⁺,Li²⁺,Be³⁺,C⁵⁺,F⁸⁺),
 82T24(H), 82T28(Li), 82T30(H), 82T35(H), 82T36(H), 82T40(O²⁺), 82T41
 (He⁺,Li²⁺,Be³⁺,C⁵⁺,Fe²⁵⁺), 82T42(He⁺), 83T7(H), 83T9(He), 83T12(Li),

D
 q = -1 : 80E17(Na,Rb,Cs), 83E54(H₂), 87E14(Cs), 87E75(Na,K), 87E76(Cs),
 90E20(H)
 ; 83T41(Ne)
 q = 0 : 80E17(Na,Rb,Cs), 87E14(Cs),
 q = 1 : 79E13(Mg,Ca,Sr,Ba), 80E17(Na,Rb,Cs), 82E32(H,D), 87E14(Cs), 91E20
 (Li,Na,K)
 He
 q = 0 : 82E37(H₂), 86E61(H₂), 89E66(He,Ar), 90E45(H₂,O₂,CH₄,CO,CO₂), 92E35(Zn)
 ; 89T54(Ne), 92T36(He), 92T68(He)
 q = 1 : 63E1(N₂,O₂), 65E1(N₂,O₂), 70E2(N₂), 76E2(He), 76E11(He,Ar,Kr,H₂,N₂,
 O₂), 76E12(He,Ar,Kr,H₂,N₂,O₂), 77E3(Xe,Ar), 77E5(Cs), 78E3(He),
 78E14(He,Ne,Ar,Kr,Xe), 79E8(Ar), 79E20(He), 81E16(Na,K,Rb,Cs), 81E27
 (H), 82E7(He,Ne,Ar,N₂), 82E22(Li), 82E37(Hg), 82E37(H₂), 82E47(H),
 83E19(Ne), 83E23(O₂), 83E33(Xe), 83E39(He⁺), 83E47(Cs), 84E15(He,Ne,
 N₂,Sr), 84E16(Ne,Ar,Kr), 84E46(Li), 85E5(Li), 85E6(Li), 85E33(Li),
 85E34(Li,Na,Mg), 85E62(H₂O), 85E76(Cd), 86E2(O₂), 86E18(Ne,Na,Mg),
 86E66(He⁺), 86E67(B⁺), 87E11(Xe), 87E17(He,Ar,H₂), 87E18(Li,Na),
 87E54(He⁺), 87E93(He⁺), 87E96(N₂), 88E9(He,Ne,Ar,Kr), 88E10(He,Ne,Ar,
 Kr), 88E11(H,D₂), 88E24(Xe), 88E33(Ne), 88E41(Na), 88E59(H₂), 89E29
 (Na), 89E34(Ne,Ar,Kr,Xe), 89E54(H₂), 90E13(H₂,N₂,O₂,CO,NO), 90E34
 (H₂,N₂,O₂,CO,CO₂,N₂O,CH₄,C₂H₂,C₂H₄,C₂H₆), 90E46(He⁺), 91E2(He,Ne,Ar),
 91E15(H), 91E16(H₂), 91E58(Cd), 91E64(He), 91E65(He), 92E35(Zn), 93E45
 (SF₆), 93E48(H₂,He), 93E49(Ar), 93E54(He), 94E43(Ar), 94E47(He), 94E44
 (He⁺), 94E50(H⁺), 94E52(Na*(3p)), 95E12(He), 95E13(Ne), 95E16(O⁻),
 95E56(Na*(3s,3p)), 96E34(Ar)
 ; 62T1(He), 78T15(Ar,Cd,Cs), 78T16(Li), 79T4(H), 79T17(He,Ne,Ar,Kr,Xe),
 81T24(He⁺), 81T28(H), 81T35(Na,K,Rb,Cs), 82T45(He²⁺,B³⁺,C⁴,O⁶⁺),
 83T11(H), 83T18(H), 83T28(H), 83T47(He²⁺), 83T48(He⁺),
 83T43(Rb), 83T44(Hg), 83T45(Hg), 84T9(Li), 85T59(H,He⁺), 85E71(Ne,CH₄,
 C₂H₂,C₂H₄,C₂H₆,C₃H₆,C₃H₈,C₄H₈,O₂,CO,CO₂,CF₄,C₂F₆,SF₆),
 86T12(Li⁺), 86T14(He⁺), 86T31(He⁺), 86T63(Ne), 86T70(Zn,Cd), 87T17(H⁺),
 87T20(He⁺), 87T36(³He), 87T69(Cd), 88T18(H), 88T20(He), 88T47(Na),
 89T22(H), 89T24(He⁺), 89T42(CO₂), 89T51(H), 89T54(Ne), 90T15(H⁺),
 90T16(Na), 90T32(Na*(3p)), 91T29(H₂,He), 91T33(H₂), 91T42(H₂),

; 54T2(H), 80T10(H), 82T19(H), 84T5(H), 84T43(H), 85T16(H), 86T47(Li),
 87T28(H), 91T8(H), 91T42(H₂)
 q = 3 : 79E15(Na,K,Cs), 80E37(H), 81E43(H), 81E46(He,H₂), 82E29(C,Ne,Ar),
 82E40(H₂), 87E53(He)
 ; 77T5(H), 77T12(H), 77T13(H), 78T11(H), 78T20(He), 79T30(H), 79T31(H),
 80T4(H), 80T10(H), 81T6(H), 81T8(H), 81T12(H), 81T14(C,N), 81T20(C,Ne),
 81T29(H), 81T30(H), 82T3(H), 82T4(Ne⁹⁺), 82T6(H), 82T10(H), 82T14(H),
 82T24(H), 82T27(H), 82T32(H), 82T33(H), 82T39(Li⁺), 82T42(Li²⁺),
 83T13(H), 83T16(H), 83T20(H), 83T25(H), 84T5(H), 84T11(H,H⁺,H⁺), 84T43
 (H), 84T52(H,He,Li,Be,B,C,Ne,Na,Mg,K,Ar,Cs), 84T53(He), 84T54(H), 85T2
 (Li,Na), 85T6(H), 85T52(He), 85T54(He), 86T13(He), 86T16(C), 86T28
 (He), 86T46(He), 86T52(He), 86T77(C,N), 87T5(H), 87T6(H(2s)), 87T22
 (He), 87T25(He), 88T6(He), 88T39(C,O,Ne), 88T51(H), 88T67(H), 89T41
 (Li), 89T59(H), 90T28(C,Ne), 90T31(H₂,He), 90T35(H,Li²⁺), 90T47(C),
 91T8(H), 91T50(He), 92T8(He), 92T17(He), 92T40(C), 92T53(H), 93T2(He),
 93T11(H,Ne⁹⁺), 93T52(H⁺(2s,2p)), 94T2(H), 94T58(Li⁺(2s,2p,3p)), 94T59
 (Li²⁺), 94T61(H), 95T17(H,He), 95T5(H), 95T39(He⁺(1s2s)), 96T6(He),
 96T10(He), 96T12(He), 96T14(H), 96T21(He), 96T28(H(1s),H⁺(2s))

He

q = 1 : 79E17(He,Ne), 88E14(He), 92E54(H,H₂,He), 94T20(H)
 q = 2 : 83E60(Ar,H₂), 90E53(H₂,Be), 92E54(H,H₂,He)
 ; 54T1(H), 86T60(H), 88T55(Li), 89T6(Be⁺)
 q = 3 : 83E60(Ar,H₂), 92E54(H,H₂,He)
 ; 78T20(He), 88T53(H), 94T59(Be⁺)
 q = 4 : 83E60(Ar,H₂), 92E54(H,H₂,He), 93E28(Li),
 ; 77T4(H), 77T5(H), 77T9(H), 77T12(H), 77T13(H), 78T3(H), 78T11(H),
 79T10(H(2s)), 79T13(H), 79T30(H), 80T4(H), 81T8(H), 81T30(H), 82T2(H),
 82T24(H), 82T27(H), 82T39(Be²⁺), 83T20(H), 83T25(He), 83T30(He), 84T22
 (H), 84T37(H), 84T53(He), 84T54(H), 84T57(H), 85T58(H), 86T45(He),
 87T5(H), 91T8(H), 92T32(He), 92T53(H), 92T59(H(1s),H⁺(2s)), 93T11(H,
 Ne⁹⁺), 93T12(H⁺(2s)), 93T28(He), 94T58(Li⁺(2s,2p,3p)), 94T59(Be³⁺),
 94T61(H), 95T39(He⁺(1s2s)), 96T14(H)

B

q = 1 : 83E23(O₂), 92E54(H,H₂,He), 93E40(Ne,O₂),
 q = 2 : 80E29(H), 83E60(Ar,H₂), 86E47(H⁻), 92E54(H,H₂,He), 95E3(C⁺)

83T17(H), 83T20(H), 83T27(He), 83T30(He), 83T47(³He⁺), 83T40(Li),
 84T14(He), 84T15(He), 84T16(H,Li), 84T17(Li), 84T22(H), 84T41(H),
 84T43(H), 84T52(Li,Be,B,C,Ne,Na,Mg,K,Ar,Cs), 84T54(H), 85T7(He,Li,Ar,
 Kr), 85T17(H), 85T22(Li), 85T29(O,Ne,Si), 85T36(Li), 85T52(He), 85T54
 (He), 85T57(H), 85T62(H), 86T13(Li,Li(2s)), 86T16(H,C), 86T42(He),
 86T77(H,C,N), 87T4(Li), 87T5(H), 87T6(H(2s)), 87T9(He), 87T16(Li,
 Li(2p)), 87T17(H), 87T18(H), 87T22(He), 87T23(He), 87T25(He), 87T50
 (Na), 87T57(H), 88T16(He), 88T19(H), 88T34(He), 88T39(C,O,Ne), 88T51
 (H), 88T59(H⁻), 88T64(H), 88T65(H), 88T67(H), 89T6(He⁺), 89T10(He,Li),
 89T14(Li), 89T24(He), 89T32(He), 89T45(H₂), 89T54(Ne), 89T55(H), 89T57
 (Hg), 89T59(H), 89T60(He), 90T4(H), 90T21(H), 90T26(Na), 90T28(C,Ne),
 90T31(H₂,He), 90T35(H), 90T47(C), 91T18(He), 91T19(H), 91T23(He),
 91T31(H⁺(2s)), 91T35(Be²⁺,B⁴⁺,C⁵⁺,N⁶⁺,O⁷⁺), 91T37(Ne), 91T38(Ne),
 91T39(He), 91T47(H₂), 91T50(He), 91T62(He), 91T65(H), 91T67(H(n=1,2)),
 92T8(He), 92T14(He,Li⁺,Be²⁺,B³⁺,C⁴⁺,N⁵⁺,O⁶⁺), 92T22(H), 92T31(H₂),
 92T40(Ne), 92T44(H), 92T53(H), 92T55(H), 92T56(H), 92T58(H), 93T4(He),
 93T5(He), 93T11(H,Ne⁹⁺), 93T23(H⁺(2s,2p)), 93T29(H⁺(n=2,3)), 93T35
 (H⁺(1s,2s,2p)), 93T45(Na⁺(3p)), 93T46(H₂), 93T52(H⁺(2s,2p)), 94T2(H),
 94T5(H), 94T8(He), 94T14(H₂), 94T15(Na⁺(3p)), 94T19(H), 94T13(H,He),
 94T25(He), 94T31(He), 94T48(He), 94T50(H₂), 94T51(H), 94T58(Li⁺(2s,2p,
 3p)), 94T59(He⁺), 94T61(H), 95T17(He), 95T5(H), 95T7(He), 95T13(He⁺),
 95T24(H), 95T31(H), 96T2(Na(3s)), 96T6(He), 96T7(H), 96T10(He), 96T12
 (He), 96T21(He), 96T42(He)

Li

q = -1 : 82E49(Ar,H₂,N₂,CO₂), 84E52(He,Ne,Ar)
 q = 0 : 86E58(Cs)
 q = 1 : 69E1(N₂), 76E5(He,Ar), 79E9(Li), 81E35(Li⁺), 82E40(H₂), 84E48(Li⁺),
 85E24(Mg,Ca,Sr,Ba), 86E74(He), 87E59(H⁻), 87E102(Ne), 88E52(Ar,Kr),
 90E63(He,Ne,Ar), 91E52(H,H₂), 94E50(D⁻), 94E52(Na⁺(3s,3p)), 96E30
 (Na⁺(3s,3p)), 96E49(Na(3s))
 ; 76T8(Li), 80T10(H), 81T32(Li), 82T8(Li⁺), 82T9(Li⁺), 82T19(H),
 82T38(Li⁺), 83T24(Ca), 84T5(H), 84T49(Li), 84T55(Na), 86T38(He),
 86T55(Na), 86T59(He), 87T8(Li⁺), 88T17(H), 88T54(Li), 88T55(Be⁺),
 90T30(H⁻), 92T24(Na), 92T29(H⁻), 94T15(Na⁺(3p)), 94T46(Na⁺(3s,3p)),
 94T47(Na⁺(3p)), 94T59(Li), 95T35(Na⁺(3s,3p)), 96T35(Na⁺(3s,3p))
 q = 2 : 81E43(H), 81E46(He,H₂), 82T10(H), 82E40(H₂), 91E30(H₂,He), 91E52(H,H₂,He)

$q = 2$: 78E4(He), 79E21(He,Ne), 79E22(He,Ne,Ar), 80E25(H₂), 80E29(H), 81E43(H), 81E45(H), 82E40(H₂), 82E48(H*(n=9-24)), 83E27(He,Ne), 83E32(H), 84E19(He,Ne,Ar,H₂), 84E43(H), 84E51(C,CH₄,C₂H₆,C₂H₂), 85E2(Au), 85E27(H), 85E30(He,H₂), 85E50(H,H₂), 85E51(H,H₂), 86E30(He), 87E8(He,Ar,Xe,H₂), 87E42(H,H₂), 87E44(He,Ar,Xe,H₂), 87E56(H), 88E2(He,Ne,Ar,Kr,Xe,H₂), 88E23(H), 88E24(He,Ne,Ar), 89E27(H,H₂), 89E41(Kr,Xe,Ar), 90E44(He), 90E51(He), 91E53(He), 92E6(He), 92E15(He), 92E32(H₂), 92E41(He), 92E46(Li), 93E17(He), 95E62(He), 96E8(He,Ne,Ar,Kr,Xe), 96E10(He), 96E12(Ar), 96E13(Ar), 96E29(He), 96E32(He,Ar,Kr,Xe)
; 73T1(Ar), 75T1(Ar), 76T3(H), 76T5(H), 76T6(H), 77T4(H), 77T5(H), 77T13(H), 77T15(H), 77T17(H), 78T7(He,Ar,Kr), 78T11(H), 78T21(H), 79T1(H), 79T10(H*(2s)), 79T14(H), 79T27(Cu), 79T30(H), 79T31(H), 79T32(H), 80T3(Ar), 80T9(H), 80T30(H), 81T5(He), 81T8(H), 81T12(H), 81T17(H), 81T19(H), 81T30(H), 82T2(H), 82T5(H), 82T11(H), 82T15(H), 82T16(H), 82T17(H), 82T29(H), 82T32(H), 82T39(C⁴⁺), 82T42(C⁵⁺), 83T13(H), 83T17(H), 83T20(H), 83T22(H), 83T23(H), 83T30(C), 83T32(H,H₂), 84T20(H), 84T22(H), 84T26(H), 84T31(H,He), 84T32(He), 84T33(He), 84T37(H), 84T48(H), 84T53(He), 84T54(H), 85T3(Al-U), 85T13(H), 85T25(Al¹²⁺,Cu²⁺,Ag⁴⁶⁺), 85T34(H), 85T36(He), 85T60(Al,NI,Cu,Ag,Ta,Au), 85T64(H), 86T11(H), 86T13(He), 86T32(He), 86T33(He), 86T35(He), 86T40(H,H₂), 86T76(He), 87T5(H), 87T6(H*(2s)), 87T12(z=12-92), 87T25(He), 87T35(He), 87T37(H,He), 87T44(He), 87T59(z=15-92), 88T32(H), 88T57(Al), 89T34(H), 89T37(Al,Cu,Ag,Ta,Au), 89T39(H), 89T60(He), 90T13(Au), 90T31(H₂,He), 90T35(H), 91T8(H), 91T13(He), 91T14(He), 91T15(Au), 91T26(He), 91T50(He), 92T37(H), 92T40(Ar), 92T42(Au), 92T53(H), 92T67(Li(2s)), 93T38(Al,Cu,Ag,Ta,Au), 93T54(He), 94T24(He), 94T29(z=10-92), 94T30(z=10-92), 94T58(Li*(2s,2p,3p)), 94T61(H), 94T62(H), 95T17(H,He), 95T39(He*(1s2s)), 95T45(He), 96T10(He), 96T14(H)

N

$q = 1$: 68E1(N), 76E4(He,Ne,Ar), 77E5(Cs), 79E25(Ar,H₂,N₂,O₂,CO,NO,CO₂), 80E8(He,Ne,Ar,Kr,Xe), 80E22(Ne), 80E34(H₂,N₂), 82E45(H₂,N₂), 82E48(H*(n=9-24)), 84E32(Ar,Air), 85E7(Cs), 87E18(Li,Na), 88E30(HgCl,HgBr,HgI), 89E48(O⁻), 90E14(CO₂), 90E26(He,H₂), 90E29(He), 93E26(O⁻), 95E9(H₂O:v=0)
; 62T1(H), 79T7(H), 84T31(H,He), 85T53(N), 95T26(He)

q = 1*

$q = 2$: 78E4(He), 79E21(He,Ne), 79E22(He,Ne,Ar), 80E25(H₂), 80E29(H), 81E43(H), 81E45(H), 82E40(H₂), 82E48(H*(n=9-24)), 83E27(He,Ne), 83E32(H), 84E19(Li), 84E28(He,Ne,Ar,Kr,Xe,H₂,N₂), 85E72(H,H₂), 86E1(Li), 86E6(He), 86E79(Kr,Xe), 87E77(H₂,N₂), 88E42(H₂), 90E43(He), 93E41(He,Ne,Ar),
; 77T6(H), 80T6(H,He), 80T7(H,He), 81T18(H), 83T19(H), 84T31(H,He), 86T3(H), 91T8(H), 93T62(He), 95T19(H)
 $q = 3$: 80E29(H), 80E32(H*(n=8-24)), 81E43(H), 81E45(H), 82E40(H₂), 82E48(H*(n=9-24)), 84E11(Li), 86E64(H₂), 87E77(H₂,N₂), 88E8(H₂), 89E30(H), 96E25(H₂,He,Ne,Ar)
; 77T7(H), 77T13(H), 78T20(H), 79T20(H), 79T39(H), 80T6(H,He), 80T7(H,He), 80T22(H), 80T30(H), 81T15(H), 82T40(C²⁺), 83T3(H), 83T19(H), 83T29(H), 84T6(H), 84T31(H,He), 84T43(H), 84T44(H), 85T20(H,H₂), 85T55(H), 86T74(H), 91T8(H), 93T27(H)
 $q = 4$: 80E29(H), 81E43(H), 81E45(H), 82E12(He), 82E18(He), 82E40(H₂), 82E48(H*(n=9-24)), 87E30(He), 87E77(H₂,N₂), 89E30(H), 91E40(He), 93E47(He), 95E11(D)
; 76T3(H), 77T13(H), 80T7(H,He), 80T30(H), 82T40(C³⁺), 84T31(H,He), 84T43(H), 84T64(H), 90T34(Cs), 91T8(H), 92T20(H), 92T52(H), 95T43(H,D), 77E2(He), 80E29(H), 81E15(He,Ne,Ar,H₂,CH₄,NH₃), 81E43(H), 81E45(H), 82E12(He), 82E40(H₂), 82E48(H*(n=9-24)), 83E1(H), 83E37(He), 85E13(He,H₂), 85E25(H,H₂), 85E28(H), 85E29(H,He,H₂), 87E10(He), 87E30(He), 87E42(H,H₂), 88E50(He,H₂), 88E57(He), 89E12(He), 89E30(H), 90E37(H₂), 93E28(Li), 93E29(He), 94E4(He), 94E53(Li), 95E19(Li), 95E47(Li), 95E66(He,Li)
; 76T3(H), 77T13(H), 80T30(H), 81T33(H), 84T27(H), 84T31(H,He), 84T32(He), 84T43(H), 85T20(H,H₂), 85T21(H), 86T18(H,H₂), 87T2(He), 88T8(He), 88T30(H), 89T3(He), 89T6(N⁴⁺), 91T8(H), 92T26(He), 94T59(N⁴⁺), 95T36(Cs), 95T44(C₆₀)
; 94E7(H₂)

$q = 9$: 77E4(He), 78E11(Si), 79E5(Al), 81F9(He), 81E10(Tl), 82F35(He), 83E14(Tl), 85E50(H, H₂), 85E51(H, H₂), 86E22(Ne), 87E25(Ne), 87E64(H₂, CH₄, C₂H₄, C₂H₆, C₃H₆, C₃H₈), 92E41(He), 93E18(He), 94E36(Ar), 94E39(He, Ne, Ar, Kr, Xe), 95E17(Ne, Ar), 96E19(Ne)
; 73F1(Ar), 75F1(Ar), 77F4(H), 77F5(H), 78F7(Ne, Ar, Kr), 79F18(Ne), 80T20(Ar), 81T16(Ar), 81T30(H), 82T39(F⁷⁺), 83T20(H), 83T22(H), 85T64(H), 87T37(H, He), 91T50(He), 93T8(H*(nl), He*(nl)), 95T17(H, He), 96T10(He)

Ne
 $q = 1$: 70E2(N₂), 70E3(Ar), 74E2(Cs), 77E5(Cs), 77E10(He, Ar, H₂), 77E11(He), 78E13(He, Ne, Ar, Kr, Xe), 78E14(He, Ne, Ar, Kr, Xe), 79E8(Ar), 80E7(Ne), 80E13(He, Xe, H₂), 81E17(O₂), 81E17(O₂), 82E3(He, Ne, Ar), 82E11(Ne), 82E33(Li), 83E23(O₂), 83E33(Xe), 83E43(Ne, Xe), 83E52(Li), 85E5(Li), 87E18(Li, Na), 96E48(Na*(3s, 3p))
; 62T1(Ne), 85T56(Ne), 87T1(Na), 87T69(Hg)

$q = 2$: 70E3(Ar), 77E10(He, Ar, H₂), 77E11(He), 78E4(Ne, Ar), 78E9(He, Ne, Ar, Kr, Xe), 78E13(He, Ne, Ar, Kr, Xe), 79E7(He, Ne, Ar, Kr, Xe), 80E13(He, Xe, H₂), 80E16(Xe), 80E19(He, Ne, Ar, Kr, Xe), 81E7(He), 81E12(H), 81E43(H), 82E3(He, Ne, Ar), 82E4(Xe), 83E8(Ne), 83E9(He), 83E13(He, Ne, Ar, Kr, Xe), 83E20(Xe), 83E23(O₂), 83E24(He), 83E25(He, H₂), 83E28(He, Ne, Ar, Kr, Xe), Hg, H₂, N₂, O₂, NO, CO₂, SO₂, NO₂, NH₃, CH₄, C₂H₂), 83E33(Xe), 83E43(Ne, Xe), 83E52(Li), 84E20(H₂), 84E23(Xe), 84E27(He), 84E30(He, Ne, Ar), 84E47(Li), 85E15(H, H₂), 86E1(Li), 86E10(Ne), 88E48(Li), 89E19(H₂), 89E47(N₂), 90E48(Li, Na, K), 96E2(Na(3s, 3p))
; 79T6(H), 80T6(H, He), 80T7(H, He), 83T19(H), 84T43(H), 85T23(Ne), 91T22(H)

$q = 3$: 70E3(Ar), 77E10(He, Ar, H₂), 77E11(He), 78E13(He, Ne, Ar, Kr, Xe), 80E13(He, Xe, H₂), 80E25(H₂), 81E7(He), 81E12(H), 81E43(H), 82E3(He, Ne, Ar), 82E38(Ne), 83E8(Ne), 83E9(He), 83E13(He, Ne, Ar, Kr, Xe), 83E24(He), 83E25(He, H₂), 83E33(Xe), 83E43(Ne, Xe), 84E20(H₂), 84E27(He), 84E40(He), 84E47(Li), 85E15(H, H₂), 86E10(Ne), 87E71(He), 88E58(H), 89E37(He, Ne), 94E55(He, Ne, Ar)
; 80T6(H, He), 80T7(H, He), 83T19(H), 84T43(H), 92T16(H)

$q = 4$: 70E3(Ar), 77E10(He, Ar, H₂), 77E11(He), 78E13(He, Ne, Ar, Kr, Xe), 81E4(He), 81E7(He), 81E12(H), 81E43(H), 82E3(He, Ne, Ar), 82E38(Ne), 83E8(Ne), 83E9(He), 83E13(He, Ne, Ar, Kr, Xe), 83E24(He), 83E25(He, H₂), 83E33(Xe), 83E43(Ne, Xe), 84E20(H₂), 84E27(He), 84E40(He), 84E47(Li), 85E15(H, H₂), 86E10(Ne), 87E71(He), 88E58(H), 89E37(He, Ne), 94E55(He, Ne, Ar)
; 80T6(H, He), 80T7(H, He), 83T19(H), 84T43(H), 92T16(H)

$q = 8$: 78E12(He), 81E9(He), 82E12(He), 82E31(Ne), 82E35(He), 84E45(He), 85E51(H, H₂), 86E22(Ne), 89E55(H₂), 90E11(H₂), 95E17(Ne, Ar), 95E60(He), 84T32(He), 85T19(Ne), 90T43(H₂)
; 82T40(O⁴⁺), 82T40(O⁴⁺), 82T40(O⁴⁺), 82T40(O⁴⁺)

$q = 6$: 82E12(He), 84E45(He), 85E73(He, Ne, Ar), 88E47(H₂), 88E57(He), 89F62(He, H₂), 90E47(Ne), 90E60(H₂), 91E5(H₂), 94E20(He, Ne), 95E17(Ne, Ar)
; 89T11(H₂), 92T34(H₂)

$q = 7$: 82E12(He), 83E50(He), 84E34(He, Ne), 84E45(He), 86E57(He), 91F35(H₂, He), 94E4(He), 95E17(Ne, Ar)
; 78T15(Ar), 84T32(He)

$q = 8$: 78E12(He), 81E9(He), 82E12(He), 82E31(Ne), 82E35(He), 84E45(He), 85E51(H, H₂), 86E22(Ne), 89E55(H₂), 90E11(H₂), 95E17(Ne, Ar), 95E60(He), 84T32(He), 85T19(Ne), 90T43(H₂)

$q = -1$: 80E35(He, Ar, H₂, N₂, O₂), 88E40(Ne, N₂), 90E38(He, Ne), 94E27(H)

$q = 0$: 88E60(He, Ne, Ar, Kr, Xe)

$q = 1$: 90T2(Ne, Ar), 96E42(CS₂)

$q = 2$: 95E17(Ne, Ar)

$q = 3$: 95E17(Ne, Ar)

$q = 4$: 95E17(Ne, Ar)

$q = 5$: 95E17(Ne, Ar)

$q = 6$: 82E12(He), 84E45(He), 85E73(He, Ne, Ar), 88E47(H₂), 88E57(He), 89F62(He, H₂), 90E47(Ne), 90E60(H₂), 91E5(H₂), 94E20(He, Ne), 95E17(Ne, Ar)

$q = 7$: 82E12(He), 83E50(He), 84E34(He, Ne), 84E45(He), 86E57(He), 91F35(H₂, He), 94E4(He), 95E17(Ne, Ar)

$q = 8$: 78E12(He), 81E9(He), 82E12(He), 82E31(Ne), 82E35(He), 84E45(He), 85E51(H, H₂), 86E22(Ne), 89E55(H₂), 90E11(H₂), 95E17(Ne, Ar), 95E60(He), 84T32(He), 85T19(Ne), 90T43(H₂)

; 76T6(H), 77T4(H), 77T5(H), 77T13(H), 79T31(H), 79T35(H), 80T13(H), 80T23(H), 80T24(H, Cu²⁸⁺), 81T30(H), 82T39(Ne⁸⁺), 82T42(Ne³⁺), 83T15(H), 83T20(H), 83T22(H), 83T30(Ne), 83T32(H₂), 84T48(H), 85T3(Al-U), 85T16(Ne⁹⁺, Zn²⁹⁺, Sn⁴⁹⁺, Yb⁶⁹⁺, Th⁸⁹⁺), 85T25(Al¹²⁺, Cu²⁸⁺, Ag⁴⁶⁺), 85T26(He), 85T41(He), 85T47(He, Ne), 85T60(Al, Ni, Cu, Ag, Ta, Au), 85T64(H), 86T11(H), 86T26(Be³⁺, Al¹²⁺, Cu²⁸⁺, Au⁷⁸⁺), 87T12(z=12-92), 87T14(Al, Zn, Ag, Ta, U), 87T35(He), 87T41(Al, Zn, Ag, Ta, U), 87T59(z=15-92), 88T48(Al, Zn, Ag, Ta, U), 89T31(Be), 89T37(Cu, Ag, Ta, Au), 90T31(H₂, He), 90T35(H), 91T15(Cu, Ag, Ta, Au), 92T16(H), 92T42(Al, Zn, Ag, Ta, Au), 93T8(H* (1s, 2s, 2p)), 93T38(Cu, Ag, Ta, Au), 94T29(z=10-92), 94T30(z=10-92), 94T36(), 95T40(He), 95T48(H), 96T14(H)

Na

q = -1 : 84E52(He, Ne, Ar), 86E53(H₂, D₂, N₂, O₂, CO, CO₂, CH₄), 94E17(H)
 q = 0 : 93T63(I)
 q = 1 : 69E1(N₂), 76E7(Ne), 79E16(Ne), 81E36(Na⁺), 84E5(Na, Na* (3p)), 86E12(Na), 87E59(O⁻), 87E103(Na* (3p)), 90E28(Na* (nl)), 91E7(Na* (3p)), 91E23(Na* (3p)), 93E25(Li*(1s²nlm)), 94E16(Li*(n)), 95E16(O⁻)
 ; 76T8(Na), 84T55(Li), 86T5(H⁻), 86T10(H), 86T27(H⁻), 86T47(Na), 86T55(Li), 87T1(Na), 90T34(Na* (3p)), 91T12(Na), 94T9(Li*(nl)), 94T32(Li (n=25)), 94T44(Li*(n=25)), 95T36(Na* (nl)), 96T29(Na* (28d, 26d)), 96T34(Li*(n=25))
 q = 11 : 94E39(Ne, Ar, Kr, Xe)
 ; 83T20(H)

Mg

q = 1 : 70E1(Ne, Ar, N₂), 78E7(Mg), 82E27(Ca), 87E101(He, Ar), 88E14(He), 90E22(Mg, Zn)
 q = 2 : 78E7(Mg), 80E2(Mg), 81E40(H₂, He), 83E28(He, Ne, Ar, Kr, Xe, Hg, H₂, N₂, O₂, NO, CO₂, SO₂, NO₂, NH₃, CH₄, C₂H₂), 90E22(Mg, Zn)
 ; 54T1(H), 78T20(H), 80T7(H, He), 80T9(H), 89T6(Mg⁺)
 q = 3 : 78T20(He), 80T7(H, He), 81E40(H₂, He),
 q = 4 : 80T7(H, He), 81E40(H₂, He),
 q = 5 : 81E40(H₂, He),
 q = 6 : 84T35(H)
 q = 9 : 91E5(H₂)
 q = 12 : 81E10(Tl), 83E14(Tl)

84E20(H₂), 84E27(He), 84E36(Ne), 84E40(He), 84E47(Li), 85E15(H, H₂), 86E21(D, D₂), 87E71(He), 94E55(He, Ne, Ar)
 ; 80T7(H, He), 84T43(H), 88T58(He), 92T16(H)
 q = 5 : 81E7(He), 81E43(H), 82E38(Ne), 83F9(He), 83E13(He, Ne, Ar, Kr, Xe), 83E24(He), 83E25(He, H₂), 83E43(Ne, Xe), 84E20(H₂), 84E27(He), 84E40(He), 84E47(Li), 85E15(H, H₂), 85E30(He), 86E21(D, D₂), 87E71(He), 88E31(Na), 88E57(He), 89E1(He), 91E42(He), 92E46(Li), 92E48(He), 94E55(He, Ne, Ar), 96E12(Ar)
 ; 82T40(F⁵⁺), 89T28(He), 92T16(H)
 q = 6 : 80E25(H₂), 81E7(He), 82E38(Ne), 83E8(Ne), 83E9(He), 83E12(He), 83E13(He, Ne, Ar, Kr, Xe), 83E43(Ne, Xe), 84E27(He), 84E39(He), 84E40(He), 84E47(Li), 85E15(H, H₂), 85E30(He), 86E21(D, D₂), 87E71(He), 88E31(Na), 88E57(He), 89E1(He), 91E42(He), 92E46(Li), 92E48(He), 94E55(He, Ne, Ar), 96E12(Ar)
 ; 82T40(F⁵⁺), 89T28(He), 92T16(H)
 q = 7 : 82E12(He), 82E38(Ne), 83E9(He), 83E13(He, Ne, Ar, Kr, Xe), 83E43(Ne, Xe), 84E27(He), 84E40(He), 84E45(He), 85E15(H, H₂), 86E17(H₂), 86E21(D, D₂), 86E48(He), 86E49(He), 88E31(Na), 88E44(Ne), 91E45(He, Ar, Kr, Xe), 92E46(Li), 94E20(He, Ne)
 ; 92T16(H), 95T48(H)
 q = 8 : 80E25(H₂), 81E3(Ne), 81E15(He, Ne, Ar, H₂, CH₄, NH₃), 82E1(He, Ne, Ar, Xe, CH₄), 82E12(He), 82E38(Ne), 83E1(H), 83E9(He), 83E43(Ne, Xe), 84E27(He), 84E40(He), 84E45(He), 85E10(H₂), 85E11(He, H₂), 85E31(He), 85E45(Na), 86E14(He), 86E49(He), 87E8(He), 87E42(H, H₂), 87E44(He, Ar), 87E62(He, H₂), 88E31(Na), 88E57(He), 89E12(He), 91E6(H₂, He), 91E36(Na), 92E46(Li), 92E55(Na), 93E56(He), 94E4(He)
 ; 84T32(He), 88T30(H), 91T10(H₂, He), 92T12(He), 92T16(H), 93T14(He), 95T48(H)

q = 9

: 80E25(H₂), 82E12(He), 82E20(He, Ne, Ar, Xe), 82E38(Ne), 83E1(H), 83E43(Ne, Xe), 84E45(He), 85E51(H, H₂), 85E71(H₂), 87E42(H, H₂), 87E44(He), 87E90(³He, ⁴He), 88E31(Na), 88E56(He, H₂), 92E46(Li), 92E56(Ne)
 ; 84T32(He), 87T38(H₂), 91T60(Ne), 92T16(H), 92T60(Ne), 95T48(H)
 q = 10 : 73E1(He, Ne), 80E25(H₂), 81E15(He, Ne, Ar, H₂, CH₄, NH₃), 81E20(Ne), 81E26(H₂, He), 82E15(He, Ne, H₂, N₂, O₂, CH₄), 82E20(He, Ne, Ar, Xe), 82E38(Ne), 83E1(H), 83E4(He), 83E43(Ne, Xe), 85E50(H, H₂), 85E51(H, H₂), 87E90(³He, ⁴He), 88E31(Na), 89E60(He, Ne, Ar), 94E9(He), 94E19(He), 94E39(He, Ne, Ar, Kr, Xe), 94E42(Ne), 95E33(He), 96E7(He), 96E9(He), 96E32(Ne, Ar, Kr, Xe), 96E33(He)

80E9(Na), 80E10(Na), 80E19(He, Ne, Ar, Kr, Xe), 80E27(H, H₂), 80E31(H₂),
 81E7(He), 81E8(He, Ne, Ar, Xe), 81E11(He, Xe), 81E13(He), 81E22(N₂), 81E30
 (D₂), 81E31(H), 82E8(He, Ne), 82E16(Ar, Kr, Xe), 82E21(Na), 82E48
 (H(n=9-24)), 83E9(Li), 83E13(Ar, Xe), 83E17(He, Ne, Ar), 83E21(He), 83E23
 (O₂), 83E24(He), 83E27(He, Ne), 83E28(He, Ne, Ar, Kr, Xe, Hg, H₂, N₂, O₂, NO,
 CO₂, SO₂, NO₂, NH₃, CH₄, C₂H₂), 83E30(N₂), 83E33(Xe), 83E48(N₂, O₂, CO, CO₂,
 CH₄, C₂H₆), 83E49(Ar), 84E3(Ar), 84E20(H₂), 84E27(He), 84E28(He, Ne, Ar,
 Kr, Xe, H₂, N₂), 84E47(Li), 84E53(He), 85E15(H, H₂), 85E40(He, Ne, Ar),
 85E45(Ar), 85E57(Ar), 86E1(Li), 86E8(Ne, Ar, Kr), 86E31(He, H₂), 86E44
 (Ar), 87E13(Ar), 87E21(K), 87E38(He, Ne, Ar, Kr, Xe, O₂, NO, N₂O, NH₃, CO₂,
 CH₄, C₂H₆, 1-C₄H₈, C₆H₆), 88E29(He), 89E32(He), 89E44(F⁻), 89E56(Li, Na,
 Mg, K), 90E23(Cu), 90E24(He, Ar), 90E39(Na, K, Rb, Cs), 90E48(Li, Na, K),
 91E18(He, Ar, H₂, N₂, O₂, CO₂), 91E43(Li, Na, K, Rb, Cs), 91E51(Na, K, Rb, Cs),
 93E36(Ar), 93E65(He), 94E30(Ne), 94E61(Cs), 96E2(Na* (3s, 3p))
 ; 85T23(Ne), 86T29(He), 86T67(He), 86T50(He), 87T64(He)
 q = 3 : 75E4(Ar), 76E6(Kr, N₂), 76E10(He), 78E1(He), 80E25(H₂), 82E8(He, Ne),
 78E4(He), 78E13(He, Ne, Ar, Kr, Xe), 80E3(Ar), 80E27(H, H₂), 80E31(H₂),
 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13(He), 81E30(D₂), 81E31(H), 82E48
 (H(n=9-24)), 83E4(D₂), 83E9(He, Li), 83E13(He), 81E30(D₂), 81E31(H), 82E48
 (He), 83E33(Xe), 83E38(He), 83E55(H), 84E3(Ar), 84E20(H₂), 84E24(Ar),
 84E27(He), 84E29(He), 84E47(Li), 85E15(H, H₂), 85E38(H₂), 85E43(He, Ne,
 Ar, Kr), 85E58(He, Ne, Ar, Kr), 86E8(Ne, Ar, Kr), 86E26(He, Ne, Ar, Kr, Xe),
 86E31(He, H₂), 86E69(He), 86E82(Ar), 87E13(Ar), 87E41(Ar³⁺), 87E81(Ar),
 89E35(Ar, Kr), 89E37(Ne, Ar), 89E44(H⁻), 92E21(H₂, Ar), 95T36(Cs)
 q = 4 : 75E4(Ar), 76E6(Kr, N₂), 76E10(He), 78E1(He), 78E13(He, Ne, Ar, Kr, Xe),
 80E3(Ar), 80E27(H, H₂), 80E31(H₂), 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13
 (Ne), 81E30(D₂), 81E31(H), 82E48(H(n=9-24)), 83E4(D₂), 83E9(He, Li),
 83E13(Ar, Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E20(H₂),
 84E27(He), 84E47(Li), 85E8(Ar), 85E15(H, H₂), 85E58(He, Ne, Ar, Kr),
 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E38(He, H₂), 86E69(He),
 87E1(H), 87E13(Ar), 87E52(H, He, H₂), 88E63(He, Ne, Ar, Kr), 89E15(Ar),
 89E44(H⁻), 89E63(Ar), 90E4(Ar), 90E5(Ar), 90E52(CH₄), 92E21(H₂, Ar),
 93E75(He, Ar), 94E40(Ne), 96E24(C₆₀), 96E16(He, Ar)
 q = 5 : 75E4(Ar), 76E6(Kr, N₂), 76E10(He), 78E1(He), 78E13(He, Ne, Ar, Kr, Xe),
 80E3(Ar), 80E27(H, H₂), 80E31(H₂), 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13
 (Ne), 81E31(H), 82E48(H^{*}(n=9-24)), 83E4(D₂), 83E9(He, Li), 83E13(Ar,
 Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E20(H₂), 84E27(He),

q = 15 : 81E18(Ar), 87E66(H₂), 91E49(H₂), 96E36(SI<100>)
 ; 85T19(Ar), 88T44(H₂), 91T5(H₂), 92T3(H, Be³⁺, Ne⁹⁺, S¹⁵⁺), 92T61(Ar)
 q = 16 : 81E10(Tl), 81E18(Ar), 83E14(Tl), 87E67(Ar), 93E67(Tl), 94E60(Fe, Ni),
 94E67(Al, P, Au), 96E36(SI<100>)
 ; 77T5(H), 81T30(H), 83T8(H), 83T20(H), 84T29(C), 85T27(Ne), 89T18
 (z=10-92), 89T58(A^{z+}; A=1-92), 95T10(Cu)
Cl
 q = -1 : 80E33(He, Ar, H₂, N₂, O₂), 85E74(Na, Mg, Ar), 88E22(He, Ne, Ar, Kr, Xe), 88E40
 (Ar), 94E27(H)
 q = 1 : 88E19(He), 92E62(Xe)
 q = 2 : 88E19(He, Ne, Ar, Kr, Xe)
 q = 5 : 94E36(Ar)
 q = 6 : 96E53(He)
 q = 7 : 96E53(He)
 q = 8 : 94E36(Ar), 96E53(He)
 q = 9 : 96E53(He)
 q = 10 : 94E36(Ar), 96E53(He)
 q = 11 : 86E30(He)
 q = 15 : 89E58(C)
 q = 16 : 89E58(C), 95E57(SI)
 q = 17 : 83E14(Tl), 86E76(Tl), 89E58(C), 95E57(SI)
 ; 78T7(Ne, Ar, Kr), 83T8(H), 83T22(H)
Ar
 q = 1 : 70E2(N₂), 74E2(Cs), 76E9(Ar), 77E5(Cs), 78E4(Ar), 78E13(He, Ne, Ar, Kr,
 Xe), 78E14(He, Ne, Ar, Kr, Xe), 80E7(Ar), 80E11(Ar), 81E5(Ar), 81E17(O₂),
 82E8(He, Ne), 82E11(Ar), 82E48(H^{*}(n=9-24)), 83E23(O₂), 83E30(N₂), 83E33
 (Xe), 84E3(Ar), 86E8(Ne, Ar, Kr), 86E34(N₂), 86E35(N₂), 86E41(N, O₂),
 87E17(He, Ar, H₂), 87E18(Li, Na), 87E97(H₂S, CS₂, NO₂), 88E72(H₂), 88E32
 (H₂, N₂, CO), 88E34(N₂), 88E48(Li), 89E44(H⁻), 89E49(H₂, N₂, O₂, CO),
 89E59(N₂), 90E28(Na^{*}(nL)), 93E34(He), 93E35(O₂), 93E65(He), 93E73
 (Na^{*}(nLm)), 94E22(NO), 96E42(CS₂), 96E48(Na^{*}(3s, 3p))
 ; 62T1(Ar), 86T8(H₂), 86T64(N₂), 86T65(H₂), 87T1(Na), 87T63(H), 89T12
 (N₂), 93T50(SI)
 q = 2 : 75E4(Ar), 76E6(Kr, N₂), 76E9(Ar), 77E9(Ne, Ar, Kr), 78E4(He, Ne, Ar, Kr),
 78E13(He, Ne, Ar, Kr, Xe), 79E7(He, Ne, Ar, Kr, Xe), 80E3(Ar), 80E6(He, Ne, Ar),

84E47(Li), 85E8(Ar), 85E15(H, H₂), 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E38(He, H₂), 86E69(He), 87E13(Ar), 87E52(H, He, H₂), 88E15(D), 88E63(He, Ne, Ar, Kr), 89E44(H⁻), 92E21(H₂, Ar), 93E75(He, Ar), 94E1(Ar), 95E65(He, H₂), 96E16(He, Ar) 96E24(C₆₀)

q = 6 : 75E4(Ar), 75E6(Ne, Ar, Kr, Xe, N₂), 76E5(Kr, N₂), 76E10(He), 78E1(He), 78E13(He, Ne, Ar, Kr, Xe), 79E4(He, Ne, Ar, Kr, Xe), 80E3(Ar), 80E5(H₂), 80E15(He), 80E25(H₂), 80E27(H, H₂), 80E31(H₂), 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13(Ne), 81E30(D₂), 81E31(H), 83E4(D₂), 83E9(He, Li), 83E13(Ar, Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E20(H₂), 84E27(He), 84E35(Ne, Ar), 84E47(Li), 85E8(Ar), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E38(He, H₂), 86E69(He), 87E1(H, H₂), 87E16(Ar), 87E52(H, He, H₂), 89E1(He), 89E44(H⁻), 89E63(Ar), 90E5(Ar), 91E1(He), 92E2(He), 92E21(H₂, Ar), 93E2(Ar), 94E1(Ar), 94E40(Ne), 95E28(H₂), 95E65(He, H₂), 96E12(Ar), 96E16(He, Ar)

; 78T4(He, Ar), 83T31(He), 84T35(H), 88T28(D), 89T29(He), 89T30(H), 93T9(He, Ne, Ar), 95T47(H, He)

q = 7 : 75E4(Ar), 76E6(Kr, N₂), 76E10(He), 78E1(He), 78E13(He, Ne, Ar, Kr, Xe), 80E3(Ar), 80E25(H₂), 80E27(H, H₂), 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13(Ne), 81E30(D₂), 83E4(He), 83E9(Li), 83E13(Ar, Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E20(H₂), 84E27(He), 84E47(Li), 85E8(Ar), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E38(He, H₂), 86E69(He), 87E16(Ar), 87E47(He), 87E48(He), 89E44(H⁻), 90E16(Ar), 90E31(He, Ne, Ar), 92E60(H₂, He), 93E2(Ar), 93E9(H₂, He), 93E10(H₂, He), 93E42(Na^{*}(3s, 3p)), 93E70(Na(3s, 3p)), 94E1(Ar), 94E31(Li), 95E28(H₂), 96E16(He, Ar)

; 78T4(He, Ar)

q = 8 : 76E10(He), 78E13(He, Ne, Ar, Kr, Xe), 80E3(Ar), 80E25(H₂), 80E27(H, H₂), 81E7(He), 81E8(He, Ne, Ar, Xe), 81E13(Ne), 81E30(D₂), 83E4(D₂), 83E9(Li), 83E13(Ar, Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E27(He), 84E47(Li), 85E8(Ar), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E69(He), 87E16(Ar), 87E47(He), 87E48(He), 89E44(H⁻), 90E16(Ar), 90E31(He, Ne, Ar), 92E60(H₂, He), 93E2(Ar), 93E9(H₂, He), 93E10(H₂, He), 93E42(Na^{*}(3s, 3p)), 93E70(Na(3s, 3p)), 94E1(Ar), 94E31(Li), 95E28(H₂), 96E16(He, Ar)

; 78T4(He, Ar)

q = 9 : 80E3(Ar), 80E25(H₂), 80E27(H, H₂), 81E7(He), 81E13(Ne), 81E30(D₂), 83E4(D₂), 83E9(Li), 83E13(Ar, Xe), 83E24(He), 83E38(He), 83E55(H), 84E3(Ar), 84E27(He), 84E47(Li), 85E8(Ar), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E8(Ne, Ar, Kr), 86E21(D, D₂), 86E31(He, H₂), 86E69(He), 87E16(Ar), 87E47(He), 87E48(He), 89E44(H⁻), 90E16(Ar), 90E31(He, Ne, Ar), 92E60(H₂, He), 93E2(Ar), 93E9(H₂, He), 93E10(H₂, He), 93E42(Na^{*}(3s, 3p)), 93E70(Na(3s, 3p)), 94E1(Ar), 94E31(Li), 95E28(H₂), 96E16(He, Ar)

; 85T41(He), 85T47(He), 86E9(H, H^{*}(n))

q = 10 : 80E3(Ar), 80E25(H₂), 81E7(He), 81E26(H₂, He), 83E4(D₂), 83E9(Li), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E38(He, H₂), 87E16(Ar), 89E63(Ar), 90E52(CH₄), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar)

q = 11 : 80E3(Ar), 81E30(D₂), 83E4(D₂), 86E38(He, H₂), 87E15(Ar), 87E16(Ar), 90E16(Ar), 91E45(He, Ar, Kr, Xe), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar), 95E28(H₂), 96E50(Ar)

q = 12 : 80E3(Ar), 81E30(D₂), 83E4(D₂), 86E38(He, H₂), 87E16(Ar), 89E63(Ar), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar), 96E50(Ar)

q = 13 : 83E4(D₂), 86E38(He, H₂), 87E16(Ar), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E64(N₂, CO), 94E65(Ar), 96E45(C₆₀), 96E50(Ar)

q = 14 : 83E4(D₂), 86E38(He, H₂), 89E63(Ar), 90E52(CH₄), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar), 96E45(C₆₀), 96E50(Ar), 96E52(CO)

q = 15 : 83E4(D₂), 84E44(Xe), 86E38(He, H₂), 92E1(Ar), 93E2(Ar), 93E3(Ar), 93E68(H₂, He), 94E1(Ar), 94E65(Ar), 95E5(He), 96E45(C₆₀), 96E50(Ar)

q = 16 : 83E4(D₂), 84E19(Ar), 84E44(Xe), 93E2(Ar), 93E68(H₂, He), 93E74(He), 94E1(Ar), 94E65(Ar), 95E5(He), 96E24(C₆₀), 96E50(Ar)

q = 17 : 84E19(Ar, H₂), 84E44(Xe), 93E2(Ar), 94E1(Ar), 95E5(He), 96E5(C₆₀), 96E24(C₆₀)

; 85T41(He), 85T47(He), 86E9(H, H^{*}(n))

q = 18 : 73E1(He, Ne), 84E19(Ar, H₂), 85E18(N₂), 85E60(N₂), 95E5(He), 96E6(C₆₀), 96E7(He)

; 76T6(H), 77T5(H), 77T13(H), 80T13(H), 80T24(H, Cu²⁸⁺), 81T30(H), 83T8(H), 83T20(H), 83T21(H), 83T22(H), 83T32(H₂), 85T3(Al - U), 85T25(Al¹²⁺, Cu²⁸⁺, Ag⁴⁶⁺), 85T60(Al, Ni, Cu, Ag, Ta, Au), 87T12(z=12-92), 87T59(z=15-92), 89T31(Be), 89T37(Cu, Ag, Ta, Au), 90T13(Ag), 91T15(Cu, Ag, Ta, Au), 92T42(Cu, Ag, Ta, Au), 93T3((Cu, Ag, Ta, Au), 94T29(z=10-92),

96E50(Ar)

; 85T3(He), 88T8(He, Ne, Ar, Kr, Xe, D₂), 88T30(H), 90T34(Cs), 94T60(C₆₀), 80E3(Ar), 80E25(H₂), 80E27(H, H₂), 81E7(He), 81E13(Ne), 81E30(D₂), 83E4(D₂), 83E9(Li), 83E13(Ar, Xe), 83E55(H), 84E3(Ar), 84E27(He), 84E47(Li), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E38(He, H₂), 87E16(Ar), 87E15(Ar), 89E63(Ar), 90E52(CH₄), 92E2(Ar), 92E57(Ne), 93E2(Ar), 93E68(H₂, He), 94E1(Ar, Kr, Xe), 92E24(Cs), 92E33(Ar), 92E57(Ne), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E64(N₂, CO), 94E65(Ar), 95E28(H₂), 96E50(Ar)

q = 9 : 80E3(Ar), 80E25(H₂), 80E27(H, H₂), 81E7(He), 81E13(Ne), 81E30(D₂), 83E4(D₂), 83E9(Li), 83E13(Ar, Xe), 83E55(H), 84E3(Ar), 84E27(He), 84E47(Li), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E38(He, H₂), 87E16(Ar), 87E15(Ar), 89E63(Ar), 90E52(CH₄), 92E2(Ar), 92E57(Ne), 93E2(Ar), 93E68(H₂, He), 94E1(Ar, Kr, Xe), 92E24(Cs), 92E33(Ar), 92E57(Ne), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E64(N₂, CO), 94E65(Ar), 95E28(H₂), 96E50(Ar)

q = 10 : 80E3(Ar), 80E25(H₂), 81E7(He), 81E26(H₂, He), 83E4(D₂), 83E9(Li), 85E15(H, H₂), 85E39(Ne, Ar, Xe), 85E54(Ne, Ar, Xe), 86E38(He, H₂), 87E16(Ar), 89E63(Ar), 90E52(CH₄), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar)

q = 11 : 80E3(Ar), 81E30(D₂), 83E4(D₂), 86E38(He, H₂), 87E15(Ar), 87E16(Ar), 90E16(Ar), 91E45(He, Ar, Kr, Xe), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar)

q = 12 : 80E3(Ar), 81E30(D₂), 83E4(D₂), 86E38(He, H₂), 87E16(Ar), 89E63(Ar), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar), 96E50(Ar)

q = 13 : 83E4(D₂), 86E38(He, H₂), 87E16(Ar), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E64(N₂, CO), 94E65(Ar), 96E45(C₆₀), 96E50(Ar)

q = 14 : 83E4(D₂), 86E38(He, H₂), 89E63(Ar), 90E52(CH₄), 93E2(Ar), 93E68(H₂, He), 94E1(Ar), 94E40(Ne), 94E64(N₂, CO), 94E65(Ar), 96E45(C₆₀), 96E50(Ar), 96E52(CO)

q = 15 : 83E4(D₂), 84E44(Xe), 86E38(He, H₂), 92E1(Ar), 93E2(Ar), 93E3(Ar), 93E68(H₂, He), 94E1(Ar), 94E65(Ar), 95E5(He), 96E45(C₆₀), 96E50(Ar)

q = 16 : 83E4(D₂), 84E19(Ar), 84E44(Xe), 93E2(Ar), 93E68(H₂, He), 93E74(He), 94E1(Ar), 94E65(Ar), 95E5(He), 96E24(C₆₀), 96E50(Ar)

q = 17 : 84E19(Ar, H₂), 84E44(Xe), 93E2(Ar), 94E1(Ar), 95E5(He), 96E5(C₆₀), 96E24(C₆₀)

; 85T41(He), 85T47(He), 86E9(H, H^{*}(n))

q = 18 : 73E1(He, Ne), 84E19(Ar, H₂), 85E18(N₂), 85E60(N₂), 95E5(He), 96E6(C₆₀), 96E7(He)

; 76T6(H), 77T5(H), 77T13(H), 80T13(H), 80T24(H, Cu²⁸⁺), 81T30(H), 83T8(H), 83T20(H), 83T21(H), 83T22(H), 83T32(H₂), 85T3(Al - U), 85T25(Al¹²⁺, Cu²⁸⁺, Ag⁴⁶⁺), 85T60(Al, Ni, Cu, Ag, Ta, Au), 87T12(z=12-92), 87T59(z=15-92), 89T31(Be), 89T37(Cu, Ag, Ta, Au), 90T13(Ag), 91T15(Cu, Ag, Ta, Au), 92T42(Cu, Ag, Ta, Au), 93T3((Cu, Ag, Ta, Au), 94T29(z=10-92),

94T30(z=10-92), 95T14(H,He)

K

q = -1 : 84E52(He,Ne,Ar), 86E53(H₂,D₂,N₂,O₂,CO,CO₂,CH₄), 94E17(H)
q = 1 : 80E1(K), 81E36(K⁺), 87E91(He,Ne), 88E55(Na), 90E6(Na*(4d)), 90E21
(Na(4d)), 95E34(Na(24d,25s))
; 62T1(K), 76T8(K), 86T47(K)

Ca

q = 0 : 93T24(Ca(n1))
q = 1 : 86E45(Mg,Sr), 92E45(Na)
; 62T1(Ca), 76T8(Ca)
q = 2 : 83E28(He,Ne,Ar,Kr,Xe,Hg,H₂,N₂,O₂,NO,CO₂,SO₂,NO₂,NH₃,CH₄,C₂H₂)
q = 10 : 86E59(He,H₂), 86E80(He,H₂)
; 90T6(H₂)
q = 11 : 86E59(He,H₂), 86E80(He,H₂)
; 90T6(H₂)
q = 12 : 86E59(He,H₂), 86E80(He,H₂)
; 90T6(H₂)
q = 13 : 86E59(He,H₂), 86E80(He,H₂)
q = 14 : 86E59(He,H₂), 86E80(He,H₂)
q = 15 : 86E59(He,H₂), 86E80(He,H₂)
q = 16 : 84E43(He), 85E66(He), 86E5(H₂), 86E59(He,H₂), 86E80(He,H₂)
; 90T6(H₂), 90T9(H₂,He)

q = 17 : 84E43(He), 85E66(He), 86E5(H₂), 86E59(He,H₂), 86E80(He,H₂), 88E43(Ar)
; 88T43(He,H₂), 89T4(He,H₂), 89T26(He), 90T6(H₂), 90T9(H₂,He)
q = 18 : 84E43(He), 85E66(He), 86E5(H₂), 86E59(He,H₂), 86E80(He,H₂), 88E37
(He,Ne,Ar,Kr,Xe,H₂,N₂)
; 90T6(H₂), 90T9(H₂,He)

q = 19 : 86E5(H₂), 86E59(He,H₂), 86E80(He,H₂), 88E37(He,Ne,Ar,Kr,Xe,H₂,N₂)
; 90T9(H₂,He)

q = 20 : 88E37(He,Ne,Ar,Kr,Xe,H₂,N₂)

; 77T4(H), 79T31(H), 81T30(H), 83T20(H), 83T22(H), 86T32(Ne)

Sc

q = 12 : 91E31(He)

Tl

q = -1 : 85E74(Na,Mg,Ar)

q = 1 : 82E44(Tl₊)

q = 2 : 95E50(He), 95E64(H,H₂)

q = 3 : 95E50(H₂,He), 95E64(H)

; 83T34(H⁺), 95E50(H,H₂,He)

q = 4 : 95E50(H₂), 95E64(H,H₂,He)

; 83T34(H), 85T36(H), 88T22(H), 91T32(H), 91T65(H), 95T46(H₂,He),
95T47(H)

q = 5 : 91T32(H), 95E64(H)

q = 6 : 91T32(H), 95E64(H)

q = 7 : 91T32(H), 95E64(H)

q = 8 : 91T32(H), 95E64(H)

q = 9 : 91T32(H), 95E64(H)

q = 10 : 91T32(H), 95E64(H)

q = 11 : 91T32(H), 95E64(H)

q = 12 : 95E64(H)

q = 13 : 91E31(He), 95E64(H)

q = 14 : 95E64(H)

q = 15 : 95E64(H)

q = 16 : 95E64(H)

q = 17 : 95E64(H)

q = 18 : 95E64(H)

q = 19 : 88E36(H₂), 95E64(H)
; 89T4(He,H₂)

q = 20 : 95E64(H)

q = 21 : 95E64(H)

q = 22 : 83T22(H)

; 95T6(H)

V

q = 18 : 85E35(He), 85E66(He)

q = 19 : 84E43(He), 85E35(He), 85E66(He)

q = 20 : 84E43(He), 85E35(He), 85E66(He)

; 89T4(He,H₂)

q = 21 : 84E43(He), 85E35(He)

q = 22 : 85E35(He)

q = 23 : 85E35(He)

; 95T6(H)

Cr

q = 1 : 78E2(He,N₂), 84E32(Ar,Air)

q = 4 : 91T32(H)

q = 6 : 84T35(H), 91T32(H), 91T65(H)

q = 8 : 91T32(H)

q = 10 : 91T32(H)

q = 13 : 91T32(H)

q = 24 : 83T20(H), 83T22(H)

Fe

q = 1 : 70E1(Ne,Ar,N₂), 84E32(Ar,Air), 87E61(H,He, H₂)

q = 2 : 87T43(H)

q = 3 : 81E29(H₂), 89E42(H,H₂), 93E46(H,He), 95E67(H,He)

q = 4 : 81E28(He,Ne,Ar,Kr,Xe,H₂,N₂,O₂,Cl₄,CO₂,CHF₃,CF₄,SF₆), 83E42(H,H₂),
93E46(H,He), 95E67(H,He)

; 91T32(H)

q = 5 : 80E27(H,H₂), 83E42(H,H₂), 86E7(Ar)

; 91T32(H)

q = 6 : 80E27(H,H₂), 83E42(H,H₂), 83E59(H₂)

; 91T32(H)

q = 7 : 81E29(H₂), 83E42(H,H₂), 95E65(He)

q = 8 : 83E42(H,H₂), 95E65(He,H₂)

; 91T32(H), 91T65(H), 95T46(H₂)

q = 9 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂)

; 92T4(H₂)

q = 10 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂), 86E7(Ar)

; 91T32(H)

q = 11 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂)

q = 12 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂), 86E7(Ar), 87E55(Ar)

; 85T43(H), 91T32(H)

q = 13 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂)

; 85T43(H)

q = 14 : 78E2(H,H₂), 81E29(H₂), 83E42(H,H₂)

; 85T43(H)

q = 15 : 78E2(H,H₂), 81E29(H₂), 86E7(Ar), 87E55(Ne,Ar,Kr,Xe)

; 85T43(H), 91T32(H)

q = 16 : 78E2(H,H₂), 81E29(H₂),

; 85T43(H)

q = 17 : 78E2(H,H₂), 91E31(He), 96E5(He)

; 85T43(H)

q = 18 : 78E2(H,H₂), 81E29(H₂),

; 85T43(H)

q = 20 : 78E2(H,H₂), 81E29(H₂), 84E19(Ar), 86E7(Ar), 87E55(Ne,Ar,Kr,Xe)

; 91T32(H)

q = 21 : 78E2(H,H₂), 81E29(H₂), 84E19(Ar), 87E55(Ar)

q = 22 : 78E2(H,H₂), 81E29(H₂),

q = 23 : 78E2(H,H₂), 81E29(H₂), 84E19(Ar), 92E14(H₂)

q = 24 : 78E2(H,H₂), 81E29(H₂), 84E19(Ar), 92E14(H₂)

; 81T19(H), 93T41(C,Si,Ar,Cu,Zr)

q = 25 : 78E2(H,H₂), 81E29(H₂), 84E19(Ar), 86E7(Ar), 92E14(H₂)

q = 26 : 83E7(He,Ne,Ar), 84E19(Ar), 84E26(He,Ne,Ar,N₂), 84E50(Ar,Kr,Zr,Ag,Sn),
85E18(He,N₂)

; 77T13(H), 79T33(H), 80T13(H), 81T12(H), 83T22(H), 91T32(H), 95T6(H)

Ni

q = 2 : 87T43(H)

q = 4 : 95E64(H)

q = 5 : 95E64(H)

; 91T32(H)

; 91T32(H)

q = 6 : 95E64(H)

; 91T32(H)

q = 8 : 95E64(H)

; 91T32(H)

q = 10 : 95E64(H)

; 91T32(H)

q = 12 : 95E64(H)

; 91T32(H)

q = 13 : 95E64(H)

q = 14 : 91T32(H)

q = 15 : 95E64(H)

q = 17 : 95E64(H), 95E65(H₂)

: 91T32(H)

q = 19 : 88E45(Kr), 95E64(H)
q = 20 : 88E45(Kr), 95E64(H)
q = 21 : 88E45(Kr), 95E64(H)
q = 22 : 88E45(Kr), 95E64(H)
q = 23 : 95E64(H)
q = 24 : 95E64(H)
q = 25 : 89T4(He, H₂), 95E64(H)
q = 26 : 95E64(H)
q = 27 : 95E64(H)
q = 28 : 95E64(H)
: 83T20(H), 83T22(H)

Cu

q = 1 : 70E1(Ne, Ar, N₂)
q = 6 : 96E53(He)
q = 7 : 96E53(He)
q = 8 : 96E53(He)
q = 9 : 96E53(He)
q = 10 : 96E53(He)
q = 20 : 91E31(He)
q = 29 : 83T22(H), 89T43(Cu²⁹⁺)

Zn

q = 1 : 90E22(Zn)
q = 2 : 80T9(H)
q = 30 : 77T4(H)

Ga

q = 1 : 92E36(Ga), 92E61(Ga), 93E50(Ga)

Ge

q = 1 : 84E32(Ar, Al, r)
q = 29 : 88E36(H₂)
: 89T4(He, H₂)
q = 30 : 90E33(H₂)

q = 31 : 90E55(Ne), 92E28(H₂), 92E58(Ne), 92E59(H₂)

: 91T5(H₂)

As

q = 1 : 84E32(Ar, Al, r)
q = -1 : 80E33(He, Ar, H₂, N₂, O₂)
Br
q = -1 : 80E33(He, Ar, H₂, N₂, O₂), 94E27(H)
q = 0 : 90E17(He, Ne, Ar, Kr, Xe)

Kr

q = 1 : 70E2(N₂), 75E5(Cs), 77E5(Cs), 78E14(He, Ne, Ar, Kr, Xe), 80E7(Kr),
81E5(Kr), 82E43(Kr), 83E23(O₂), 83E30(N₂), 87E87(Kr), 87E88(Kr),
88E32(CO), 94E25(CH₄), 95E9(H₂O; v=0)
: 62T1(Kr).

q = 2 : 78E6(Kr), 79E7(He, Ne, Ar, Kr, Xe), 80E19(He, Ne, Ar, Kr, Xe), 80E31(H₂), 81E7
(He), 81E17(He, Ne, Xe), 82E43(Kr), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe),
83E26(He, H₂), 83E28(He, Ne, Ar, Kr, Xe, Hg, H₂, N₂, O₂, NO, CO₂, SO₂, NO₂, NH₃,
CH₄, C₂H₂), 83E30(N₂), 83E45(Kr), 83E57(H, H₂), 84E20(H₂, N₂, CO₂, CH₄,
C₂H₆, C₃H₈), 84E27(He), 84E56(Ne), 84E47(Li), 85E40(He, Ne, Ar), 85E47
(H₂), 85E53(He, Ne), 86E1(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆,
C₃H₈), 86E44(Kr), 87E37(He, Ne, Ar, Kr, Xe), 87E84(He), 89E20(Ne)
: 85T23(Ne), 88T49(He)

q = 3 : 80E31(H₂), 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He,
H₂), 83E45(Kr), 83E57(H), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He),
84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₃H₆, C₃H₈), 86E82(Kr),
87E37(He, Ne, Ar, Kr, Xe), 87E41(Kr³⁺), 88E27(Ar, Kr, Xe), 95E59(Ar)
q = 4 : 80E31(H₂), 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He,
H₂), 83E45(Kr), 83E57(H), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He),
84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 87E37(He, Ne,
Ar, Kr, Xe), 88E27(Ar, Kr)

: 80T14(H₂)

q = 5 : 80E31(H₂), 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26
(He, H₂), 83E45(Kr), 83E57(H), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27
(He), 84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 88E27
(He, Ne, Ar), 95E55(He, H₂)
: 80T14(H₂)

q = 6 : 80E31(H₂), 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E45(Kr), 83E45(Kr), 83E57(H), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 89E1(He), 95E65(He, H₂), 96E12(Ar)
; 80T14(H₂)

q = 7 : 80E31(H₂), 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E45(Kr), 83E45(Kr), 83E57(H), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 89E1(He), 95E65(He, H₂), 96E12(Ar)
; 80T14(H₂)

q = 8 : 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E45(Kr), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E25(He), 84E27(He), 84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 89E11(He, H₂), 92E10(H₂, He), 93E31(He), 95E44(Rb*(17p)), 96E38(Rb*(15p-25p))

q = 9 : 81E7(He), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E45(Kr), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E25(He), 84E27(He), 84E47(Li), 86E31(He, Ne, Ar, Kr, Xe, H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 89E11(He, H₂), 93E31(He)

q = 10 : 81E7(He), 83E13(Ar, Xe), 84E25(He), 84E27(He), 84E47(Li)

q = 11 : 83E13(Ar, Xe), 84E25(He), 84E27(He)

q = 12 : 83E13(Ar, Xe), 84E25(He), 84E27(He)

q = 13 : 84E25(He), 84E27(He), 93E2(Ar)

q = 14 : 84E25(He), 93E2(Ar)

q = 15 : 84E25(He), 93E2(Ar)

q = 16 : 84E25(He), 93E2(Ar)

q = 17 : 84E25(He), 93E2(Ar), 93E44(Kr)

q = 18 : 84E25(He), 87E55(Ne, Ar, Kr, Xe), 90E30(Ar, Kr), 92E25(Kr), 93E2(Ar), 93E44(Kr)

q = 19 : 84E25(He), 93E2(Ar)

q = 20 : 84E25(He), 93E2(Ar)

q = 21 : 93E2(Ar)

q = 22 : 84E25(He), 93E2(Ar)

q = 23 : 84E25(He), 93E2(Ar)

q = 24 : 93E2(Ar)

q = 25 : 84E25(He), 93E2(Ar)

q = 26 : 93E2(Ar)

q = 27 : 93E2(Ar)

q = 28 : 93E2(Ar), 96E24(C₆₀)

q = 29 : 93E2(Ar)

q = 30 : 93E2(Ar)

q = 31 : 93E2(Ar)

q = 32 : 93E2(Ar)

q = 33 : 93E2(Ar)

q = 34 : 93E2(Ar), 94E11(C, Si, Ar, Cu, Zr), 95E63(H₂)
; 93T41(C, Si, Ar, Cu, Zr)

q = 36 : 81E6(Tl, Mn, Ni, Cu, Zr, Ag), 86E50(C, Ne, Al, Si, Ar, Cr, Cu, Zr, Sb), 90E35(C, Al, Cu), 96E1(Si<110>)
; 77T13(H), 80T13(H), 83T21(H), 83T22(H), 89T31(Be)

Rb
q = 1 : 86E55(Na)
; 76T8(Rb), 86T47(Rb)

Sr
q = 1 : 88E55(Na), 91E28(H⁺), 92E31(Mg, Ca), 92E45(Na, Rb)
q = 38 : 83T20(H)

Zr
q = 40 : 83T22(H)

Nb
q = 2 : 91E61(C₆H₆)
q = 23 : 81E42(H₂)
q = 24 : 92T4(H₂)
q = 28 : 81E42(H₂), 84E19(H₂), 89E7(He, H₂)
; 90T5(H₂)

q = 29 : 89E7(He, H₂)
; 90T5(H₂)

q = 30 : 89E7(He, H₂)
; 90T5(H₂)

q = 31 : 81E42(H₂), 84E19(Ar, H₂), 87E9(H₂), 89E7(He, H₂)
; 89T27(H₂), 90T5(H₂)

q = 32 : 89E7(He, H₂)
; 90T5(H₂)

q = 34 : 81E42(H₂), 84E19(H₂)

Mo
q = 36 : 81E42(H₂)

Mo

q = 3 : 95E64(H)
q = 4 : 95E64(H, H₂)
q = 5 : 95E64(H, H₂)
q = 6 : 92E22(Ar), 95E64(H, H₂)
q = 7 : 95E64(H, H₂)
q = 8 : 95E64(H, H₂)
q = 9 : 95E64(H, H₂)
q = 10 : 95E64(H, H₂)
q = 11 : 95E64(H, H₂)
q = 12 : 95E64(H, H₂)
q = 13 : 95E64(H, H₂)
q = 14 : 95E64(H, H₂)
q = 15 : 95E64(H, H₂)
q = 16 : 95E64(H, H₂)
q = 17 : 95E64(H, H₂)
q = 18 : 95E64(H, H₂)
q = 19 : 95E64(H)

q = 20 : 95E64(H)

q = 21 : 95E64(H)

q = 22 : 95E64(H)

q = 23 : 95E64(H)

q = 24 : 95E64(H)

q = 25 : 95E64(H)

q = 26 : 95E64(H)

q = 27 : 95E64(H)

q = 28 : 95E64(H)

q = 29 : 95E64(H)

q = 30 : 95E64(H)

q = 42 : 95E64(H)

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q = 42 : 95E64(H)

q = 42 : 95E64(H)

q = 42 : 95E64(H)

Cd

q = 2 : 80T9(H)

q = 48 : 83T22(H)

In

q = 1 : 84E32(Ar, Air)

Sb

q = 1 : 84E32(Ar, Air)

I

q = -1 : 80E33(He, Ar, H₂, N₂, O₂), 94E27(H)

q = 0 : 89E26(He, Ne, Ar, Kr, Xe)

q = 1 : 87E40(Mg)

q = 1 : 87E40(Mg)

q = 5 : 86E38(He, H₂), 90E9(He)

q = 6 : 86E38(He, H₂), 90E9(He), 96E53(He)

q = 7 : 86E38(He, H₂), 90E9(He), 95E31(He, Ar), 96E53(He)

q = 8 : 86E38(He, H₂), 90E9(He), 95E31(He, Ar), 96E53(He)

q = 9 : 86E38(He, H₂), 90E9(He), 96E53(He)

q = 10 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 90E9(He), 95E61(Ne, Ar,

Kr, Xe), 95E42(Ne, Ar, Kr, Xe), 96E53(He)

q = 11 : 86E38(He, H₂), 90E9(He)

q = 12 : 86E38(He, H₂), 88E20(H₂), 88E53(He, H₂), 90E9(He)

q = 13 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 88E20(H₂),

88E53(He, H₂), 90E9(He)

q = 14 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 88E20(H₂), 90E9(He)

q = 15 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 88E20(H₂), 90E9(He),

95E42(Ne, Ar, Kr, Xe)

q = 16 : 86E38(He, H₂), 88E20(H₂), 90E9(He)

q = 17 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 88E20(H₂), 90E9(He)

q = 18 : 86E38(He, H₂), 88E20(H₂)

q = 19 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 90E9(He)

q = 20 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂)

q = 21 : 86E38(He, H₂), 90E9(He)

q = 22 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂)

q = 23 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 90E9(He)

(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E33(He, Ne, Ar, Kr, Xe)
 q = 6 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E33(He, Ne, Ar, Kr, Xe), 89E1(He)
 q = 7 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E33(He, Ne, Ar, Kr, Xe)
 q = 8 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 95E7(Rb(10f)),
 q = 9 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li)
 q = 10 : 79E14(He, Ne, Na, Ar, Kr, Cd, Xe, Cs), 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E36(Ne, Ar, Xe)
 q = 11 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E36(Ne, Ar, Xe), 88E1(He), 91E8(He)
 q = 12 : 80E27(H, H₂), 83E13(Ar, Xe), 83E34(Xe), 84E27(He), 87E36(Ne, Ar, Xe), 88E1(He), 91E8(He), 93E11(Xe)
 q = 13 : 83E13(Ar, Xe), 83E34(Xe), 84E27(He), 87E36(Ne, Ar, Xe), 88E1(He), 91E8(He), 93E11(Xe)
 q = 14 : 83E13(Ar, Xe), 83E34(Xe), 87E36(Ne, Ar, Xe), 88E1(He), 91E8(He), 93E11(Xe)
 q = 15 : 83E13(Ar, Xe), 83E34(Xe), 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 90E1(Xe), 91E8(He), 92E13(Xe), 93E11(Xe)
 q = 16 : 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe), 95E7(Rb(10f))
 q = 17 : 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe)
 q = 18 : 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe)
 q = 19 : 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe)
 q = 20 : 87E36(Ne, Ar, Xe), 88E1(He), 89E14(Xe), 90E1(Xe), 91E8(He), 92E13(Xe), 93E11(Xe)
 q = 21 : 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe)
 q = 22 : 88E1(He), 89E14(Xe), 93E11(Xe)
 q = 23 : 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe)

q = 24 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂)
 q = 25 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂), 90E9(He)
 q = 26 : 85E67(He), 85E68(He), 86E29(He), 86E38(He, H₂)
 q = 27 : 85E67(He), 85E68(He), 86E29(He), 86E38(H₂), 90E9(He)
 q = 28 : 85E67(He), 85E68(He), 86E29(He)
 q = 29 : 85E67(He), 85E68(He), 86E29(He)
 q = 30 : 85E67(He), 85E68(He), 86E29(He)
 q = 31 : 85E67(He), 85E68(He), 86E29(He)
 q = 32 : 85E67(He), 85E68(He), 86E29(He)
 q = 33 : 85E67(He), 85E68(He), 86E29(He)
 q = 34 : 85E67(He), 85E68(He), 86E29(He)
 q = 35 : 85E67(He), 85E68(He), 86E29(He)
 q = 36 : 85E67(He), 85E68(He), 86E29(He)
 q = 37 : 85E67(He), 85E68(He), 86E29(He)
 q = 38 : 85E67(He), 85E68(He), 86E29(He)
 q = 40 : 85E67(He), 85E68(He), 86E29(He)
 q = 41 : 85E67(He), 85E68(He), 86E29(He)
 q = 53 : 89T43(I⁵³⁺)
Xe
 q = 1 : 70E2(N₂), 75E5(Cs), 77E5(Cs), 79E2(Xe), 80E7(Xe), 80E26(Xe+), 81E5(Xe), 82E43(Xe), 83E30(N₂), 86E32(Xe), 91E24(He, Ne, Ar, CH₄) ; 62T1(Xe)
 q = 2 : 79E6(Xe), 79E1(Ar, Xe, H₂, N₂, O₂, CO₂), 79E2(Xe), 79E7(He, Ne, Ar, Kr, Xe), 80E19(He, Ne, Ar, Kr, Xe), 80E27(H, H₂), 82E43(Xe), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 84E56(Ar), 85E38(H₂), 85E40(He, Ne, Ar), 86E1(Li), 87E33(He, Ne, Ar, Kr, Xe), 88E17(He) ; 85T23(Ne)
 q = 3 : 79E2(Xe), 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E33(He, Ne, Ar, Kr, Xe), 88E17(He), 88E27(Ar), 95E59(Ar, Kr)
 q = 4 : 79E2(Xe), 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34(Xe), 84E20(H₂, N₂, CO₂, CH₄, C₂H₆, C₃H₈), 84E27(He), 84E47(Li), 87E33(He, Ne, Ar, Kr, Xe), 88E17(He), 88E27(Ar), 95E59(Ar, Kr)
 q = 5 : 80E27(H, H₂), 83E13(Ar, Xe), 83E24(He, Ne, Ar, Kr, Xe), 83E26(He, H₂), 83E34

q = 24 : 88E1(He), 89E14(Xe), 93E11(Xe)
 q = 25 : 88E1(He), 89E14(Xe), 90E1(Xe), 91E8(He), 92E13(Xe), 93E11(Xe), 95E6(He)
 (He)
 q = 26 : 88E1(He), 89E14(Xe), 93E11(Xe), 95E6(He)
 q = 27 : 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe), 93E13(Xe), 95E6(He),
 96E24(C₆₀)
 q = 28 : 88E1(He), 89E14(Xe), 92E13(Xe), 93E11(Xe), 95E6(He)
 q = 29 : 88E1(He), 89E14(Xe), 91E8(He), 93E11(Xe), 95E6(He)
 q = 30 : 88E1(He), 89E14(Xe), 90E1(Xe), 93E11(Xe), 92E13(Xe), 95E46(Ar), 95E6(He)
 (He)
 q = 31 : 88E1(He), 89E14(Xe), 90E1(Xe), 91E8(He), 93E11(Xe), 92E13(He,Xe),
 95E6(He)
 q = 32 : 89E14(Xe), 93E11(Xe), 92E13(He,Xe), 95E6(He), 95E7(Rb(10f))
 q = 33 : 89E14(Xe), 93E11(Xe), 92E13(He), 95E6(He)
 q = 34 : 89E14(Xe), 93E11(Xe), 95E6(He)
 q = 35 : 89E14(Xe), 90E1(Xe), 93E11(Xe), 92E13(He,Xe), 95E6(He), 96E3(H)
 q = 36 : 92E13(He,Xe), 93E11(Xe), 95E6(He)
 q = 37 : 92E13(He,Xe), 93E11(Xe), 95E6(He)
 q = 38 : 95E6(He)
 q = 39 : 95E6(He)
 q = 40 : 92E13(He), 95E6(He), 95E7(Rb(10f))
 q = 41 : 95E6(He)
 q = 42 : 92E13(He,Xe), 95E6(He)
 q = 43 : 95E6(He), 96E3(H)
 q = 44 : 95E6(He), 96E3(H)
 q = 45 : 96E3(H)
 q = 46 : 96E3(H)
 q = 51 : 88E36(H₂)
 q = 52 : 85E52(Be,Al,Cu,Ag,Au,MyIar), 86E71(Be,U), 87E4(Al,Cu,Ag,Au), 92E3(SI<110>);
 86T26(Be³⁺,Al¹²⁺,Cu²⁸⁺,Au⁷⁸⁺)
 q = 53 : 85E52(Be,Al,Cu,Ag,Au,MyIar), 87E3(SI), 87E4(Al,Cu,Ag,Au)
 q = 54 : 85E52(Be,Al,Cu,Ag,Au,MyIar), 86E71(Be,U), 87E72(Be,Ni,Ta), 87E4(Al,Cu,Ag,Au)
 ; 83T21(H), 83T22(H), 86T26(Be³⁺,Al¹²⁺,Cu²⁸⁺,Au⁷⁸⁺), 87T29(Be), 88T61(Ag,Au), 89T31(Be), 93T38(Al,Cu,Ag,Ta,Au)

Cs
 q = -1 : 86E54(He,Ne,Ar,Kr,Xe,D₂,N₂,O₂,CO,CO₂,SO₂,N₂O,CH₄,SF₆)
 q = 1 : 81E34(Cs⁺), 81E37(Cs⁺), 82E50(Cs⁺)
 ; 76T8(Cs), 81T43(Cs⁺), 82T8(Cs⁺), 86T47(Cs)
 q = 2 : 81E40(H₂,He,Ne,Kr), 86E39(Ar,Kr,Xe,H₂,N₂,O₂)
 q = 3 : 81E40(H₂,He,Ne,Kr), 86E39(He,Ne,Ar,Kr,Xe,H₂,N₂,O₂)
 q = 4 : 81E40(H₂,He,Ne,Kr)
 q = 5 : 81E40(H₂,He,Ne,Kr),

Ba
 q = 1 : 90E54(Na), 91E28(H⁺), 92E45(Na,Rb,Cs)
 ; 80T38(Ba⁺)

La
 q = 40 : 87E9(H₂)
 ; 92T4(H₂)

q = 57 : 87E72(Be,Ni,Ta), 94E3(Cu,Ag,Au)
 ; 95T10(Cu,Ag,Au)

Nd
 q = 1 : 95T41(Nd)

Sm
 q = 34 : 86E52(Xe)
 q = 35 : 86E52(Xe)
 q = 36 : 86E52(Xe)
 q = 37 : 86E52(Xe)
 q = 38 : 86E52(Xe)
 q = 39 : 86E52(Xe)
 q = 40 : 86E52(Xe)
 q = 41 : 86E52(Xe)
 q = 42 : 86E52(Xe)
 q = 43 : 86E52(Xe)
 q = 44 : 86E52(Xe)
 q = 45 : 86E52(Xe)
 q = 46 : 86E52(Xe)
 q = 47 : 86E52(Xe)

q = 48 : 86E52(Xe)
q = 49 : 86E52(Xe)
q = 50 : 86E52(Xe)
q = 51 : 86E52(Xe)
q = 52 : 86E52(Xe)

Gd

q = 1 : 91E47(Gd), 94E24(Gd), 96E22(Gd*), 96E23(Gd*)
; 95T41(Gd)
q = 37 : 87E55(Ar,Xe)

Dy

q = 4 : 92E20(H,H₂)
q = 5 : 92E20(H,H₂)
q = 6 : 92E20(H,H₂)
q = 7 : 92E20(H,H₂)
q = 8 : 92E20(H,H₂)
q = 9 : 92E20(H,H₂)
q = 10 : 92E20(H,H₂)
q = 11 : 92E20(H,H₂)
q = 12 : 92E20(H,H₂)
q = 13 : 92E20(H,H₂)
q = 14 : 92E20(H,H₂)
q = 15 : 92E20(H,H₂)
q = 16 : 92E20(H,H₂)
q = 17 : 92E20(H,H₂)
q = 18 : 92E20(H,H₂)
q = 19 : 92E20(H,H₂)
q = 20 : 92E20(H,H₂)
q = 66 : 93E8(Ar)

Er

q = 1 : 73E2(He,N₂)
q = 2 : 73E2(He,N₂)

Ta

q = 3 : 95E60(H₂)

q = 4 : 92E20(H,H₂), 95E50(H₂)
q = 5 : 92E20(H,H₂), 95E50(H₂)
q = 6 : 92E20(H,H₂)
q = 7 : 92E20(H,H₂)
q = 8 : 92E20(H,H₂)
q = 9 : 92E20(H,H₂)
q = 10 : 92E20(H,H₂)
q = 11 : 92E20(H,H₂)
q = 12 : 92E20(H,H₂)
q = 13 : 92E20(H,H₂)
q = 14 : 92E20(H,H₂)
q = 15 : 92E20(H,H₂)
q = 16 : 92E20(H,H₂)
q = 17 : 92E20(H,H₂)
q = 18 : 92E20(H,H₂)
q = 19 : 92E20(H,H₂)
q = 20 : 92E20(H,H₂)
q = 21 : 92E20(H,H₂)
q = 73 : 89T31(Be)

W

q = 2 : 90E27(Ar)
q = 3 : 95E64(H)
q = 4 : 95E64(H)
q = 5 : 95E64(H,H₂)
q = 6 : 95E64(H,H₂)
q = 7 : 95E64(H,H₂)
q = 8 : 95E64(H,H₂)
q = 9 : 95E64(H,H₂)
q = 10 : 95E64(H,H₂)
q = 12 : 95E64(H,H₂)
q = 13 : 95E64(H,H₂)
q = 14 : 95E64(H,H₂)
q = 15 : 95E64(H,H₂)
q = 16 : 95E64(H)
q = 17 : 95E64(H)
q = 18 : 95E64(H)

q = 19 : 95E64(H)
q = 20 : 95E64(H)
q = 21 : 95E64(H)
q = 22 : 95E64(H)
q = 23 : 95E64(H)
q = 24 : 95E64(H)
q = 25 : 95E64(H)
q = 26 : 95E64(H)
q = 27 : 95E64(H)
q = 28 : 95E64(H)
q = 29 : 95E64(H)
q = 30 : 95E64(H)
q = 74 : 95E64(H)
; 83T22(H)

Re
q = 6 : 92E20(H, H₂)
q = 7 : 92E20(H, H₂)
q = 8 : 92E20(H, H₂)
q = 9 : 92E20(H, H₂)
q = 10 : 92E20(H, H₂)
q = 11 : 92E20(H, H₂)
q = 12 : 92E20(H, H₂)
q = 13 : 92E20(H, H₂)
q = 14 : 92E20(H, H₂)
q = 15 : 92E20(H, H₂)
q = 16 : 92E20(H, H₂)
q = 17 : 92E20(H, H₂)
q = 18 : 92E20(H, H₂)
q = 19 : 92E20(H, H₂)
q = 20 : 92E20(H, H₂)

Au
q = 2 : 81E14(He)
q = 3 : 81E14(He), 92E20(H, H₂)
q = 4 : 81E14(He), 92E20(H, H₂)
q = 5 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)

q = 6 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
q = 7 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
; 84T38(He)
q = 8 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
q = 9 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
; 84T38(He)
q = 10 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
; 84T38(He)
q = 11 : 81E14(He), 83E10(He, Ne), 86E30(He), 92E20(H, H₂)
q = 12 : 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 92E20(H, H₂)
; 84T38(He)
q = 13 : 81E12(H₂), 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 92E20(H, H₂)
; 84T38(He),
q = 14 : 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 92E20(H, H₂)
; 84T38(He),
q = 15 : 81E12(H₂), 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 84E1(He), 84E41(H₂),
92E20(H, H₂)
; 84T38(He)
q = 16 : 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 92E20(H, H₂)
; 84T38(He)
q = 17 : 81E14(He), 83E10(He, Ne), 83E18(H₂), 92E20(H, H₂)
q = 18 : 81E14(He), 83E10(He, Ne), 83E18(H₂), 84E41(H₂), 92E20(H, H₂)
; 84T38(He)
q = 19 : 92E20(H, H₂)
q = 20 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
; 84T38(He)
q = 21 : 81E14(He), 83E10(He, Ne), 92E20(H, H₂)
; 84T38(He)
q = 22 : 81E14(He), 92E20(H, H₂)
; 84T38(He)
q = 23 : 81E14(He), 92E20(H, H₂)
; 84T38(He)
q = 24 : 81E14(He), 92E20(H, H₂)
q = 25 : 84T38(He)
q = 52 : 91E30(H₂, He, C, N₂), 93E15(H₂, He)
q = 75 : 91E30(H₂, He, C, N₂)
q = 78 : 93E72(Grass), 94E37(e), 95E55(C, N₂, Al)

q = 79 : 93E27(gLass), 93E72(gLass), 94E37(e), 95E55(C,N₂,Al)
 ; 89T43(Au⁷⁹⁺), 93T31(C⁵⁺,Al¹²⁺,Cu²⁸⁺,Ag⁴⁶⁺,Au⁷⁸⁺), 96T25(Au)

Hg

q = 1 : 62T1(Hg)

Tl

q = 1 : 91E29(Tl⁺)

Pb

q = 2 : 81E40(He)

q = 3 : 81E40(He)

q = 4 : 81E40(He)

q = 5 : 81E40(He)

q = 6 : 81E40(He)

q = 7 : 81E40(He)

q = 8 : 81E40(He)

q = 52 : 81E42(H₂)

q = 53 : 81E42(H₂)

q = 54 : 81E42(H₂)

q = 55 : 81E42(H₂)

q = 57 : 81E42(H₂)

q = 59 : 81E42(H₂)

q = 79 : 88E36(H₂)

q = 81 : 95E55(N₂), 95E39(N₂)

q = 82 : 95E55(N₂)

Bi

q = 2 : 81E40(He,H₂)

q = 3 : 81E40(He,H₂)

q = 4 : 81E40(He,H₂)

q = 5 : 81E40(He,H₂)

q = 6 : 81E40(He,H₂)

q = 7 : 81E40(He,H₂)

q = 20 : 96E24(C₆₀)

q = 38 : 96E24(C₆₀)

q = 44 : 96E24(C₆₀)

q = 46 : 96E24(C₆₀)
 q = 82 : 95E55(C)
 q = 83 : 95E55(C)

Th

q = 73 : 96E3(H)

q = 74 : 96E3(H)

q = 75 : 96E3(H)

q = 76 : 96E3(H)

q = 77 : 96E3(H)

q = 78 : 96E3(H)

q = 79 : 96E3(H)

q = 80 : 96E3(H)

U

q = 1 : 82E39(U)
 ; 88T46(U)

q = 2 : 78T6(Ne)

q = 4 : 92E20(H,H₂)

q = 5 : 92E20(H,H₂)

q = 6 : 92E20(H,H₂)

q = 7 : 92E20(H,H₂)

q = 8 : 92E20(H,H₂)

q = 9 : 92E20(H,H₂)

q = 10 : 92E20(H,H₂)

q = 11 : 92E20(H,H₂)

q = 12 : 92E20(H,H₂)

q = 13 : 92E20(H,H₂)

q = 14 : 92E20(H,H₂)

q = 15 : 92E20(H,H₂)

q = 16 : 92E20(H,H₂)

q = 17 : 90E9(He), 92E20(H,H₂)

q = 18 : 90E9(He), 92E20(H,H₂)

q = 19 : 90E9(He), 92E20(H,H₂)

q = 20 : 90E9(He), 92E20(H,H₂)

q = 21 : 90E9(He), 92E20(H,H₂)

q = 22 : 90E9(He), 92E20(H,H₂)

q = 23 : 90E9(He), 92E20(H,H₂)
 q = 24 : 90E9(He), 92E20(H,H₂)
 q = 25 : 90E9(He), 92E20(H,H₂)
 q = 26 : 90E9(He)
 q = 27 : 90E9(He)
 q = 28 : 90E9(He)
 q = 29 : 90E9(He)
 q = 30 : 90E9(He)
 q = 31 : 90E9(He)
 q = 32 : 89T40(Ne), 90E9(He)
 q = 33 : 90E9(He)
 q = 34 : 90E9(He)
 q = 35 : 90E9(He)
 q = 36 : 87E55(Ne,Ar,Kr,Xe), 90E9(He)
 ; 78T6(N,Ne,Ar,Kr)
 q = 37 : 90E9(He)
 q = 38 : 90E9(He)
 q = 40 : 90E9(He)
 q = 41 : 87E55(Ar)
 q = 42 : 90E9(He)
 q = 44 : 86E7(Ar), 87E55(Ne,Ar,Kr,Xe), 90E9(He)
 q = 46 : 96E24(C₆₀)
 q = 48 : 87E55(Ar)
 q = 51 : 84E19(H₂)
 q = 52 : 84E19(H₂)
 q = 53 : 84E19(H₂)
 q = 54 : 84E19(He,Ne,Ar,Xe,N₂)
 q = 55 : 84E19(H₂)
 q = 56 : 84E19(H₂)
 q = 57 : 84E19(H₂)
 q = 58 : 84E19(H₂)
 q = 59 : 84E19(H₂)
 q = 65 : 85E75(Ar,Xe)
 ; 85T61(Ar)
 q = 75 : 85E75(Ar,Xe)
 ; 85T61(Ar)
 q = 83 : 87E4(Al,Cu,Ag,Au)

q = 86 : 91E30(H₂,He), 93E15(H₂,He)
 q = 89 : 87E4(Al,Cu,Ag,Au)
 ; 87T26(C,H₂)
 q = 90 : 87E4(Al,Cu,Ag,Au), 90E62(H₂), 91E30(H₂,He), 94E57(C), 95E24(C), 95E25
 (C)
 q = 91 : 84E18(C,Cu,Ta), 87E4(Al,Cu,Ag,Au), 94E37(e), 95E55(Be,C,N₂,Ar)
 q = 92 : 84E18(C,Cu,Ta), 87E72(Be,Ni,U), 93E7(Au), 95E55(Be,C,N₂,Ar), 95E42
 (N₂)

; 78T6(Ne), 87T29(Be), 88T12(U⁹²⁺), 88T60(U⁹¹⁺), 88T61(U⁹¹⁺), 89T31
 (Be), 89T43(U⁹²⁺), 89T47(U⁹¹⁺), 89T18(z=10-92), 90T40(U⁹¹⁺), 91T16
 (U⁹¹⁺), 93T19(U⁹¹⁺), 93T31(C⁵⁺,Al^{1,2+},Ag⁴⁶⁺,Au⁷⁸⁺,U⁹¹⁺)

Molecular ion species

H₂

q = 1 : 77E5(Cs), 84E13(Na,Mg,Ar,Cs), 85E5(Li), 85E7(Cs), 86E15(Na,Mg,Ar,Cs),
 86E16(Cs), 86E33(H₂), 86E56(He,Ne,Ar), 86E77(Ar), 87E17(He,Ar,H₂),
 87E45(He,Ne,Ar,Kr,Xe), 87E89(He,Ne,Ar,Kr,CH₄,C₂H₆,C₃H₈,C₂H₄,C₃H₆,
 C₄H₈), 87E92(H₂), 87E100(Ne), 88E16(H₂), 91E44(Na(3s,3p)),
 93E63(Na(3s,3p)), 94E39(O₂), 94E52(Na(3p)), 95E58(N₂)
 ; 84T50(Mg), 86T19(H₂), 87T66(Ar), 90T8(H₂), 90T18(He), 95T9(H⁻)

H₃

q = 1 : 77E5(Cs), 85E7(Cs), 92E59(He,Ne,Ar,Xe), 93E33(He,Ne,Ar,Xe), 94E39(O₂)

D₂

q = 1 : 84E38(Cs), 88E16(H₂), 94E39(O₂)

D₃

q = 1 : 84E38(Cs), 94E39(O₂)

N₂

q = 1 : 77E5(Cs), 82E41(Ar,N₂), 84E32(Ar,Air), 85E7(Cs), 86E36(Ar), 86E75(Ar),
 87E51(N₂), 88E12(O₂,NO), 88E30(HgCl,HgBr,HgI), 88E62(H₂), 90E14(CO₂),
 90E27(N₂), 93E19(N₂), 93E37(N₂), 94E22(NO), 94E62(Cs), 94E63(Cs),
 95E58(H₂)
 ; 86T64(Ar), 89T63(Ar)

$q = 2 : 87E51(N_2), 89E22(He, Ne), 91E33(He, Ne, Ar), 96E26(He, Ne, Ar, D_2, N_2, O_2),$
 $q = 2* : 96E28(Kr)$

CN
 $q = 1 : 92E63(Xe)$

CS
 $q = 1 : 92E51(He), 96E41(CS_2)$
 $q = 2 : 92E51(He)$

CS₂
 $q = 2 : 87E50(He, Ne, Ar, Kr, Xe, H_2, N_2, O_2), 88E26(He, Ne, Ar, Kr, Xe)$
 $q = 3 : 87E50(He, Ne, Ar, Kr, Xe, H_2, N_2, O_2), 89E24(Ne, Ar)$

C₄H₅N
 $q = 2 : 87E95(C_4H_5N)$

NI
 $q = 1 : 92E63(Xe)$
 $q = 2 : 88E18(He)$

NO
 $q = 1 : 92E63(Xe)$

OII
 $q = 2 : 88E18(He)$

OCS
 $q = 2 : 88E26(He, Ne, Ar, Kr, Xe), 93E53(He, Ne, Ar, Kr, Xe)$
 $q = 3 : 87E49(Ar, Kr, Xe, H_2, N_2, O_2, CH_4), 89E24(Ne, Ar)$

SH
 $q = 2 : 88E18(He)$

K_n (n=1-14)
 $q = 1 : 90E64(Cs)$

Ar₂
 $q = 1 : 87E97(H_2S, CS_2, NO_2)$

$q = 2 : 87E51(N_2), 89E22(He, Ne), 91E33(He, Ne, Ar), 96E26(He, Ne, Ar, D_2, N_2, O_2),$
 $q = 2* : 96E28(Kr)$

O₂
 $q = 1 : 84E32(Ar, Alr), 84E38(Cs), 87E72(Cs), 89E67(O_2, CH_4), 92E63(Xe)$
 $q = 2 : 93E69(Na, K, Cs)$
 $q = 2 : 94T66(Na, K, Cs)$

CO
 $q = 1 : 86E77(Ar), 87E69(He, Ne, Ar)$
 $q = 2 : 87E60(Ne), 89E23(Ne), 93E59(He, Ne, Ar, Kr, Xe)$

CO₂
 $q = 2 : 88E26(He, Ne, Ar, Kr, Xe), 93E52(He, Ne, Ar, Kr, Xe)$

CF
 $q = 1 : 87E69(He, Ne, Ar), 92E63(Xe)$
 $q = 2 : 93E43(He, Ne, Ar, Kr, Xe)$

CF₂
 $q = 2 : 93E43(He, Ne, Ar, Kr, Xe)$

CH
 $q = 1 : 86E40(Kr, N_2, CH_4, Alr), 92E63(Xe)$
 $q = 2 : 88E18(He)$

CH₂
 $q = 1 : 86E40(Kr, N_2, CH_4, Alr)$

CH₃
 $q = 1 : 86E40(Kr, N_2, CH_4, Alr)$

CH₄
 $q = 1 : 86E40(Kr, N_2, CH_4, Alr)$

CH₅
 $q = 1 : 86E40(Kr, N_2, CH_4, Alr)$

Na_n (n=1-21)

q = 1 : 88E6(Cs), 90E64(Cs)

(Au)_n (n=2-4)

q = 2 : 88E52(Ar, Kr, Xe, N₂, O₂, CO)

C₆₀

q = 1 : 95E54(Xe, C₆₀)

q = 2 : 94E28(H₂, He, Ar, Kr, Xe, NO), 95E54(Xe, C₆₀)

q = 3 : 94E28(H₂, He, Ar, Kr, Xe, NO)

C₇₀

q = 1 : 95E54(Xe, C₆₀)

q = 2 : 95E54(Xe, C₆₀)

q = 3 : 95E54(Xe, C₆₀)

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*Bibliography on Electron Transfer Processes in Ion-
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Impact from Monoatomic Solids at Normal Incidence; Oct. 1995*
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Bibliography on Electron Transfer Processes in Ion-ion / Atom / Molecule Collisions -Updated 1997 -; May 1997