ISSN 0915-6364

NATIONAL INSTITUTE FOR FUSION SCIENCE

Bibliography of Electron and Photon Cross Sections
with Atoms and Molecules
Published in the 20th Century
– Water vapour –

M. Hayashi

(Received - Nov. 28, 2003)

NIFS-DATA-81 Dec. 2003

TOKI, JAPAN

Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century

—— Water vapour ——*

Makoto Hayashi

(Gaseous Electronics Institute)

Bibliographies of original and review reports of experiments or theories of electron and photon cross sections and also electron swarm data are presented for atomic or molecular species with specified targets. These works covered 17 atoms and 51 molecules. The present bibliography is only for water vapour (H_2O, D_2O and HDO). About 1200 papers were compiled. A comprehensive author index is included. The bibliography covers the period 1915 through 2000 for H_2O. Finally, author's comments for electron collision cross sections and photodissociation processes of H_2O are given.

Keywords : H_2O molecule, collision cross sections, electron, elastic scattering, rotational, vibrational and electronic excitations, dissociation, ionization photon, photoabsorption, photodissociation, photoexcitation, photoionization, electron swarm, drift velocity, diffusion coefficient, ionization coefficient, excitation and ionization energies, transition probabilities, lifetimes of excited states

---

* This work was carried out under the collaboration research program at National Institute for Fusion Science.

Introduction

History

This bibliography is the result of a continuing literature survey which was begun around 1970 and originally encompassed only electron collision cross section and electron swarm data. The organization responsible for continuing this survey is Nagoya Institute of Technology, Nagoya. From 1994, the work continued to Gaseous Electronics Insititute, Nagoya. In 1997, the collection of photon cross section references was begun. The search for references in both cases was retrospective and included all papers reporting measurements, theoretical calculations or reviews and data compilations of such cross sections and electron swarm data.

Scope

This bibliography contains references to original research papers which report experiments or theoretical calculations of cross sections for electron and photon collisions with water vapour H_2O. The review papers on this subject are also included. Some water vapour molecule cluster papers are included. Some conference reports, company or agency reports and PhD thesis are included. Water vapour ion papers and positron collision papers are not included in principle.

Papers reporting the following data are included.

For electron collision cross section :

1) elastic scattering
2) rotational excitation
3) vibrational excitation
4) electronic excitation
5) dissociation
6) ionization
7) attachment
8) grand total scattering (sum of elastic and inelastic cross sections)
9) metastable nitrogen molecules
10) electron swarm parameters (drift velocity, diffusion coefficient)
11) excitation and ionization coefficients

For photon collision cross section :

1) photoabsorption
2) photoexcitation and fluorescence
3) photodissociation
4) photoionization

For some related data :

1) excitation and ionization energies
2) transition probabilities
3) lifetimes of excited states
4) others

The energy range for electron cross section data is usually 0 - 10 keV, but some higher electron energy papers are included. The wavelength range for photon cross section data is from microwave to X-ray. Most papers are concerned with infrared, visible and ultraviolet ray region.

The bibliography includes the papers published in the 20th century, from 1901 to 2000. Oldest paper in this list is given by J.S.Townsend (1915). So for this water vapour bibliography, published papers from 1915 to 1999 are compiled by alphabetical order of the first author's surname of the paper. And the references published in 2000 and plus some old papers found very recently after compilation are added as " Addenda of References for H_2O (1) and (2) ". In total, about 1200 papers are compiled in the water vapour molecule bibliography.

Organization

This report consists of four parts : introduction, the bibliography and its addenda, author index, and some comments on electron collision cross sections.

Bibliography

In this section the complete citation for all references are given. At first following classifications are shown :

E : Elastic collision
R : Rotational excitation
V : Vibrational excitation
EX : electronic EXcitation
D : Dissociation
I : Ionization
A : Attachment
ME : MEtastable argon
S : electron Swarm
O : Others (photon cross sections and the others)

All authors' initials and surname, journal name, volume, inclusive pages and year of publication are given as well as the title, and some additional information in the square bracket [ ]. E and T in the square bracket mean experiment and theory.

Bibliography for H_2O are divided into two parts :

Author Index

In this section all authors are listed alphabetically by surname. After each author's name is a list of page numbers indicating which references he or she authored or coauthored.

Some Comments on Electron Collision Cross Sections and Photodissociation Processes for H_2O

Acknowledgments

The author would like to say many thanks to :
Kazuo Takayanagi and Yukikazu Itikawa of ISAS, Tokyo and Sagamihara,
Hiroyuki Tawara of NIFS, Nagoya and Toki,
Yoshiharu Nakamura of Keio University, Kanagawa,
Yoshihiko Hatano of Tokyo Institute of Technology, Tokyo
for continuous support and encouragement.

The author also would like to say many thanks to the librarians of the following organizations :
Nagoya Institute of Technology, Nagoya
Nagoya University, Nagoya (five libraries)
Institute of Plasma Physics, Nagoya University
National Institute for Fusion Science, Toki
Institute for Molecular Science, Okazaki

Finally, the author would like to say many thanks to Kayo Hirono for longstanding support for the preparation of these bibliographies.

References for H_2O, HDO and D_2O

and radical OH and OD (1900 - 1999)

(Water vapour, Deuterated water, Heavy water)

E : Elastic collision,
V : Vibrational excitation,
D : Dissociation,
A : Attachment,
S : Swarm,
O : The others,
R : Rotational excitation,
EX : Electronic excitation,
I : Ionization,
QT : Grand total cross section,
α : Ionization coefficient,
[ ]: Additional informations,
E : Exp., T : Theory.

The oldest paper in this list is given by J. S. Townsend (1915).

O E. H. Abramson, J. Zhang and D. G. Imre : J. Chem. Phys. 93, 947-950 (1990)・
A linear $^1B_2$ state of the water molecule. [T, H_2O]

O H. Agren, V. Carravetta, H. J. Aa. Jensen, P. Jørgensen and J. Olsen : Phys. Rev. A47, 3810-3823 (1993)
Multiconfiguration linear-response approaches to the calculation of absolute photoionization cross sections : HF, H_2O, and Ne.
[T, $h\nu$, H_2O, HF, Ne]

O R. Akamatsu and K. O-ohta : J. Phys. Soc. Jpn. 44, 589-597 (1978)
Semiclassical approach to the abnormal rotation of $OH(A^2\Sigma^+)$ resulting from H_2O photodissociation. [T, $h\nu$, H_2O]

O M. I. Al-Joboury and T. W. Turner : J. Chem. Soc. 4434-4441 (1964)
Molecular photoelectron spectroscopy. Part II. A summary of ionization potentials. [E, $h\nu$, H_2O, D_2O, O_2, CO, NO, H_2S, CS_2, SO_2, NO_2, N_2O, CO_2, NH_3, CH_4 - C_5H_{12}, etc.]

E S. Altshuler : Phys. Rev. 107, 114-117 (1957)・
Theory of low-energy electron scattering by polar molecules.
[T, H_2O, NH_3; 0.36 - 1 eV]

O R. D. Amos : J. Chem. Soc. Faraday Trans. II 83, 1595-1607 (1987)
Geometries, harmonic frequencies and infrared and Raman intensities for H_2O, NH_3 and CH_4. [T, H_2O, NH_3, CH_4]

O P. Andresen and E. W. Rothe : Chem. Phys. Lett. 86, 270-274 (1982)
Laser photodissociation of H_2O at 157 nm : Rotational energy distribution in product $OH(X^2\Pi)$. [E, $h\nu$, H_2O]

O P. Andresen, G. S. Ondrey and B. Titze : Phys. Rev. Lett. 50, 486-488 (1983a)
Creation of population invesions in the Λ doublets of OH by the photodissociation of H_2O at 157 nm : A possible mechanism for the astronomical maser. [E, $h\nu$, H_2O]

O P. Andresen and E. W. Rothe : J. Chem. Phys. 78, 989-990 (1983b)
Polarized LIF spectroscopy of OH formed by the photodissociation of H_2O by polarized 157 nm light. [E, $h\nu$, H_2O]

O P. Andresen, G. S. Ondrey, B. Titze and E. W. Rothe : J. Chem. Phys. 80, 2548-2569 (1984)
Nuclear and electron dynamics in the photodissociation of water. [E, $h\nu$, H_2O]

O P. Andresen and E. W. Rothe : J. Chem. Phys. 82, 3634-3640 (1985a)
Analysis of chemical dynamics via Λ doubling : Directed lobes in product molecules and transition states. [T, H_2O, HO, NO, etc.]

O P. Andresen, V. Beushausen, D. Hausler, H. W. Lulf and E. W. Rothe : J. Chem. Phys. 83, 1429-1430 (1985b)
Strong propensity rules in the photodissociation of a single rotational quantum state of vibrationally excited H_2O. [E, $h\nu$, $H_2O(v)$]

O P. Andresen : Astron. Astrophys. 154, 42-54 (1986)
Classification of pump mechanisms for astronomical OH masers and a maser model for the H_2O photodissociation pump mechanism. [T, $h\nu$, H_2O]

O P. Andresen and R. Schinke : in Molecular Photodissociation Dynamics, M. N. R. Ashfold and J. E. Baggott (Ed), Royal Society of Chemistry, 61- (1987)

EX V. Ya. Antonchenko, N. V. Gloskovskaya, V. V. Ilyin and K. Heinzinger : Ukr. J. Phys. (41, 198-204) (1996)
Calculation of properties of a water molecule and its dissociation products in the frame of the polarization model. [T, H_2O]

I J. Appell and J. Durup : Int. J. Mass Spectrom. Ion Phys. 10, 247-265 (1973)
The formation of protons by impact of low energy electrons on water molecules. [E, H_2O, D_2O; 18 - 40 eV]

M. B. Arfa → M. Ben Arfa

O M. P. Arroyo and R. K. Hanson : Appl. Opt. 32, 6104-6116 (1993)
Absorption measurements of water-vapor concentration, temperature, and line-shape parameters using a tunable InGaAsP diode laser. [E, $h\nu$, H_2O]

O M. P. Arroyo, S. Langlois and R. K. Hanson : Appl. Opt. 33, 3296-3307 (1994)
Diode-laser absorption technique for simultaneous measurements of multiple gasdynamic parameters in high-speed flows containing water vapor. [E, $h\nu$, H_2O]

O M. N. R. Ashfold, J. M. Bayley and R. N. Dixon : Chem. Phys. 84, 35-50 (1984a) · Molecular predissociation dynamics revealed through multiphoton ionisation spectroscopy. I. The C $^1B_1$ states of H_2O and D_2O. [E, hν, H_2O, D_2O]

O M. N. R. Ashfold, J. M. Bayley and R. N. Dixon : Can. J. Phys. 62, 1806-1833 (1984b) · The 4s ← $1b_1$ and 3d ← $1b_1$ Rydberg states of H_2O and D_2O : Spectroscopy and predissociation dynamics. [E, hν, H_2O, D_2O]

O M. N. R. Ashfold and J. M. Bayley : J. Chem. Soc. Faraday Trans. 86, 213-214 (1990) Characterisation of the $E^1B_1(3da_1 \leftarrow 1b_1)$ Rydberg state of water by resonance-enhanced multiphoton ionisation (MPI) spectroscopy. [E, D_2O]

R O. Ashihara : ISAS Report No. 530, Tokyo 1-18 (1975) ·
V The electron energy loss rates by polar molecules. [T]

O N. Astoin, A. Johannin-Gilles et B. Vodar : Compt. Rend. Acad. Sci. 237, 558-561 (1953)
Absorption de la vapeur d'eau dans l'ultraviolet extreme. [E, hν, H_2O]

O N. Astoin, A. Johannin-Gilles et B. Vodar : Compt. Rend. Acad. Sci. 242, 2327-2329 (1956)
Sur le spetre d'absorption de la vapeur d'eau et d'eau lourde dans l'ultraviolet extreme. [E, hν, H_2O]

O N. Astoin : J. Res. Cent. Nat. Rech. Sci. 38, 1-22 (1957)
Spectrographie dans l'ultraviolet extreme absorption de NO, N_2O, H_2O, et D_2O (gazeux). [, H_2O, D_2O, NO, N_2O]

EX R. Azria et F. Fiquet-Fayard : Compt. Rend. Acad. Sci. B273, 944-947 (1971)
Sur l'excitation de l'eau par impact electronique entre 3 et 6 eV.
[E, H_2O; 3 - 6 eV]

O T. L. Bailey and E. E. Muschlitz, Jr. : Chem. Phys. Lett. 115, 519-521 (1985)
Resonant negative ion states of H_2O as observed by measurement of the OH ($A^2\Sigma \rightarrow X^2\Pi$) emission following near-threshold electron impact.
[E, H_2O]

S V. A. Bailey and W. E. Duncanson : Phil. Mag. 10, 145-160 (1930)
On the behaviour of electrons amongst the molecules NH_3, H_2O and HCl.
[E, H_2O, NH_3, HCl]

O A. D. Baker, C. R. Brundle and D. W. Turner : Int. J. Mass Spectrom. Ion Phys. 1, 443-454 (1968)
Interpretation of photoelectron spectra, especially those of benzene and water. [E, hν, H_2O, C_6H_6, O_2]

O G. G. Balint-Kurti and R. N. Yardley : Chem. Phys. Lett. 36, 342-344 (1975)
Investigation of the B $^2B_2$ state of H_2O^+ using valence-bond techniques.
[T, H_2O]

O G. G. Balint-Kurti : J. Chem. Phys. 84, 4443-4454 (1986)
Dynamics of OH Λ-doublet production through photodissociation of water in its first absorption band. I. Formal theory. [T, hν, H_2O]

O M. S. Banna and D. A. Shirley : J. Chem. Phys. 63, 4759-4766 (1975)
Molecular photoelectron spectroscopy at 132.3 eV. The second-row hydrides. [E, H_2O, NH_3, CH_4; HF, Ne]

O E. F. Barker : Rev. Mod. Phys. 14, 198-203 (1942)
Spectra of simple molecules. The infra-red spectra of triatomic molecules.
[review, H_2O, CO_2, N_2O, SO_2, HCN]

E G. Basavaraju, S. M. Bharathi, K. G. Bhushan, S. Maji and S. H. Patil : Phys. Scr. 60, 28-31 (1999)
A unified description of elastic, high energy electron-molecule scattering.
[T, H_2O, CH_4, C_2H_4, C_2H_6, CO, N_2, O_2, CO_2; 1 keV for H_2O]

O A. Bauer, M. Godon and B. Duterage : J. Quant. Spectrosc. Radiat. Transf. 33, 167-175 (1985)
Self- and air-broadened linewidth of the 183 GHz absorption in water vapor. [E, $h\nu$, H_2O; 299 - 251 K]

O A. Bauer, B. Deterage and M. Godon : J. Quant. Spectrosc. Radiat. Transf. 36, 307-318 (1986)
Temperature dependence of water-vapor absorption in the wing of the 183 GHz line. [E, $h\nu$, H_2O, $H_2O + N_2$; 295 - 375 K]

O A. Bauer, M. Godon, J. Carlier, Q. Ma and R. H. Tipping : J. Quant. Spectrosc. Radiat. Transf. 50, 463-475 (1993)
Absorption by H_2O and $H_2O - N_2$ mixtures at 153 GHz.
[E and T, $h\nu$, H_2O, $H_2O + N_2$]

O W. Baumann und R. Mecke : Z. Phys. 81, 445-464 (1933)
Das Rotationsschwingungsspektrum des Wasserdampfes. II.
[E, $h\nu$, H_2O; I. R. Mecke (1933), III. K. Freudenberg (1933)]

O A. O. Bawagan, L. Y. Lee, K. T. Leung and C. E. Brion : Chem. Phys. 99, 367-382 (1985)
An investigation of the valence orbitals of water by high momentum resolution electron momentum spectroscopy. [E, H_2O]

O A. O. Bawagan, C. E. Brion, E. R. Davidson and D. Feller : Chem. Phys. 113, 19-42 (1987)
Electron momentum spectroscopy of the valence orbitals of H_2O and D_2O : Quantitative comparisons using Hartree-Fock limit and correlated wavefunctions. [E and T, H_2O, D_2O]

O A. O. Bawagan and C. E. Brion : Chem. Phys. 144, 167-178 (1990)
A new method for incorporating momentum resolution effects and defining the momentum scale in electron momentum spectroscopy.
[E, H_2O, D_2O, Ar; see Addenda, A. O. Bawagan (1987)]

E K. D. Bayes, D. Kivelson and S. C. Wong : J. Chem. Phys. 37, 1217-1225 (1962)
Measurement by cyclotron resonance of molecular cross sections for elastic collisions with 295°K electrons.
[E, H_2O, CO_2, N_2, N_2O, SO_2, NH_3, CF_3H, etc.]

E V. I. Bazhanov : J. Struct. Chem. 31, 540-544 (1990)
Calculation of intensity of high-energy electron scattering by molecules of water and carbon tetrachloride. [T, H_2O, CCl_4]

E T. V. Bazhenova, Yu. S. Lobastov and A. D. Kotlyarov : Sov. Phys. Dokl. 21, 220-222 (1976)
Cross section for collision of electrons with H_2O molecules in a thermally ionized gas behind a shock wave at T = 2500 - 3500 °K.
[E, H_2O]

O G. E. Becker and S. H. Autler : Phys. Rev. 70, 300-307 (1946)
Water vapor absorption of electromagnetic radiation in the centimeter wave-length range. [E, $h\nu$, H_2O]

EX K. Becker, B. Stumpf and G. Schulz : Chem. Phys. 53, 31-38 (1980a)
Polarisation of the OH ($A^2\Sigma^+$, $v' = 0 \rightarrow X^2\Pi_i$, $v'' = 0$) fluorescence produced electron impact on water vapour.
[E, H_2O; OH emission, 11.9 - 500 eV]

EX K. Becker, B. Stumpf and G. Schulz : Chem. Phys. Lett. 73, 102-105 (1980b)・
Crossed-beam investigations of the OH($A^2\Sigma^+ \rightarrow X^2\Pi_i$) emission spectrum after dissociative excitation of water by electron impact.
[E, H_2O; OH emission, 9.3 - 100 eV]

EX K. Becker, B. Stumpf and G. Schulz : J. Phys. B14, L517-L522 (1981)
Polarised emission from highly rotational excited OH($A^2\Sigma^+$) radicals produced by dissociative electron-impact excitation of H_2O.
[E, H_2O]

EX K. Becker and G. Schulz : Can. J. Phys. 60, 1168-1175 (1982)・
Excitation and polarization analysis of the OD fragment radiation produced by dissociative electron impact on D_2O. [E, D_2O; th. - 1000 eV]

EX C. I. M. Beenakker, F. J. de Heer, H. B. Krop and G. R. Mohlmann : Chem. Phys. 6, 445-454 (1974)・
Dissociative excitation of water by electron impact.
[E, H_2O; emission c. s. from OH, O and H, th. - 1000 eV]

O M. J. M. Beerlage and D. Feil : J. Elect. Spectrosc. Relat. Phenom. 12, 161-167 (1977)
A modified plane wave model for calculating UV photoionization cross-sections. [T, $h\nu$, H_2O, N_2, CO, HF, $(CN)_2$, etc.]

A D. S. Belic, M. Landau and R. I. Hall : J. Phys. B14, 175-190 (1981) ○K
Energy and angular dependence of H^- (D^-) ions produced by dissociative electron attachment to H_2O (D_2O). [E, H_2O, D_2O]

O S. Bell : J. Mol. Spectrosc. 16, 205-213 (1965)
The spectra of H_2O and D_2O in the vacuum ultraviolet.
[E, $h\nu$, H_2O, D_2O]

V M. Ben Arfa, F. Edard and M. Tronc : Chem. Phys. Lett. 167, 602-606 (1990) ○K
Isotope effect in resonant vibrational excitation of H_2O (D_2O), NH_3 (ND_3), CH_4 (CD_4). [E, H_2O, D_2O, NH_3, ND_3, CH_4, CD_4]

O W. S. Benedict : Phys. Rev. 74, 1246-1247 (1948)
New bands in the vibration-rotation spectrum of water vapor.
[E, hν, H_2O]

O W. S. Benedict and E. K. Plyler : J. Res. Natl. Bur. Stand. 46, 246-265 (1951)
Absorption spectra of water vapor and carbon dioxide in the region of 2.7 microns. [E, hν, H_2O, CO_2]

O W. S. Benedict, H. H. Claassen and J. H. Shaw : J. Res. Natl. Bur. Stand. 49, 91-132 (1952)
Absorption spectrum of water vapor between 4.5 and 13 microns.
[E, hν, H_2O]

O W. S. Benedict, A. M. Bass and E. K. Plyler : J. Res. Natl. Bur. Stand. 52, 161-176 (1954)
Flame-emission spectrum of water vapor in the 1.9-micron region.
[E, hν, H_2O]

O W. S. Benedict, N. Gailar and E. K. Plyler : J. Chem. Phys. 24, 1139-1165 (1956)
Rotation-vibration spectra of deuterated water vapor.
[E, hν, D_2O, HDO; 1.25 - 4.1 μ]

O W. S. Benedict and L. D. Kaplan : J. Chem. Phys. 30, 383-399 (1959)
Calculation of line widths in H_2O - N_2 collisions. [T, hν, H_2O]

O W. S. Benedict and L. D. Kaplan : J. Quant. Spectrosc. Radiat. Transf. 4, 453-469 (1964)
Calculation of line widths in H_2O - H_2O and H_2O - O_2 collisions.
[T, hν, H_2O]

O K. D. Beyer und K. H. Welge : Z. Naturforsch. 19a, 19-28 (1964)
Photodissoziationen von H_2, N_2, O_2, NO, CO, H_2O, CO_2 und NH_3 in extremen Vakuum-UV. [E, hν, H_2O, NO, etc.; <1000 A]

O K. D. Beyer und K. H. Welge : Z. Naturforsch. 22a, 1161-1170 (1967)
Photodissoziation zu elektronisch angeregten Bruchstucken von H_2, H_2O und NH_3 im extremen Vakuum-UV. II. [E, hν, H_2O, H_2, NH_3]

EX K. Bhanuprakash, P. Chandra, C. Chabalowski and R. J. Buenker : Chem. Phys. 138, 215-221 (1989)・
Theoretical study of the generalized oscillator strength for the A^1B_1-X^1A_1 transition in the water molecule. [T, H_2O]

S S. F. Biagi : Nucl. Instrum. Meth. A283, 716-722 (1989)・
A multiterm Boltzmann analysis of drift velocity, diffusion, gain and megnetic-field effects in argon-methane-water-vapour mixtures.
[T, H_2O + Ar + CH_4, cross section set for H_2O]

E R. Bijker, R. D. Amado and L. A. Collins : Phys. Rev. A42, 6414-6422 (1990)
Hybrid approach to electron scattering from polar molecules.
[T, rigid-rotor molecule]

O D. M. Bishop, J. R. Hoyland and R. G. Parr : Mol. Phys. 6, 467-476 (1963)
Simple one-center calculation of breathing force constants and equilibrium internuclear distances for NH_3, H_2O, and HF. [T, H_2O, NH_3, HF]

O D. M. Bishop and A. A. Wu : J. Chem. Phys. 54, 2917-2924 (1971a)
Investigation of the $^1A_1$ excited states of water. [T, H_2O]

O D. M. Bishop and A. A. Wu : Theor. Chim. Acta 21, 287-300 (1971b)
An investigation of the $^1B_1$ excited states of water. [T, H_2O]

O D. M. Bishop and L. M. Cheung : J. Phys. Chem. Ref. Data 11, 119-133 (1982)・
Vibrational contributions to molecular dipole polarizabilities.
[compilation, H_2O, HF - HI, DCl, CO, NO, CO_2, CS_2, N_2O, O_3, OCS, SO_2, BCl_3, BF_3, H_2CO, NF_3, NH_3, PF_3, PH_3, CCl_4, CF_4, CH_4, CHF_3, SiH_4, GeH_4, SF_6, C_6H_6, C_6F_6, etc.]

O A. J. Blake and J. H. Carver : J. Chem. Phys. 47, 1038-1044 (1967)
Determination of partial photoionization cross sections by photoelectron spectroscopy. [E, $h\nu$, H_2O, Ar, H_2, O_2, N_2]

I M. Bobeldijk, W. J. van der Zande and P. G. Kistemaker : Chem. Phys. 179, 125-130 (1994)・
Simple models for the calculation of photoionization and electron impact ionization cross sections of polyatomic molecules.
[T, H_2O, NH_3, C_3H_6, C_6H_6, $C_{10}H_{22}$, etc.]

O L. P. Boivin, W. F. Davidson, R. S. Storey, D. Sinclair and E. D. Earle : Appl. Opt. 25, 877-882 (1986)
Determination of the attenuation coefficients of visible and ultraviolet radiation in heavy water. [E, H_2O, D_2O; liquid?]

O R. C. Bolden and N. D. Twiddy : Faraday Discuss. Chem. Soc. 53, 192-200 (1972)・
A flowing afterglow study of water vapour. [E, H_2O]

I M. A. Bolorizadeh and M. E. Rudd : Argonne Natl. Lab. Rep. No, 84-28, 52-53 (1984)
Absolute doubly differential cross sections for the ionization of water vapor by electron impact. [E, H_2O]

I M. A. Bolorizadeh and M. E. Rudd : Phys. Rev. A33, 882-887 (1986) K
Angular and energy dependence of cross sections for ejection of electrons from water vapor. I. 50 - 2000 eV electron impact. [E, H_2O; 15 - 150°]

EX N. Bose and W. Sroka : Z. Naturforsch. 28a, 22-26 (1973)
Dissociative excitation processes in H_2O. [E, H_2O; 8th ICPEAC 357 (1973)]

EX N. Bose : Phys. Lett. A65, 402-404 (1978)
Electron impact resonances of the water molecules observed in the $A^2\Sigma^+ \rightarrow X^2\Pi_i$ radiation of OH and OD. [E, H_2O, D_2O]

O G. Bosschieter and J. Errera : J. Physiq. Radium 8, 229-232 (1937)
Intermolecular association and infra-red absorption of water.
[E, $h\nu$, H_2O]

O R. Botter and J. Carlier : J. Elect. Spectrosc. Relat. Phenom. 12, 55-66 (1977)
Spectre de photoelectrons et calcul des facteurs de Franck-Condon pour H_2O, D_2O, HDO. [E, H_2O, D_2O, HDO]

O L. Bouby and H. Abgrall : 5th ICPEAC, Leningrad 584-585 (1967)·
Attachment of thermal electrons to oxygen in the presence of varions compounds as a third body.
[E, O_2; third body H_2O, C_2H_4, CO_2, H_2S, NH_3, CH_3OH, etc.]

A Y. Bouteiller, C. Desfrancois, J. P. Schermann, Z. Latajka and B. Silvi : J. Chem. Phys. 108, 7967-7972 (1998)
Calculation of electronic affinity and vertical detachment energy of the water dimer complex using the density functional theory. [T, $(H_2O)_2$]

A N. E. Bradbury and H. E. Tatel : J. Chem. Phys. 2, 835-840 (1934)
The formation of negative ions in gases. Part II. CO_2, N_2O, SO_2, H_2S and H_2O. [E, H_2O, CO_2, N_2O, SO_2, H_2S]

O S. L. Bragg and J. D. Kelley : Appl. Opt. 26, 506-513 (1987)
Atmospheric water vapor absorption at 1.3 μm. [E, $h\nu$, H_2O]

O B. Brehm : Z. Naturforsch. 21a, 196-209 (1966)
Massenspektrometrische Untersuchung der Photoionisation von Molekulen.
[E, $h\nu$, H_2O, D_2O, Xe, Hg, O_2, C_2H_2, C_2H_4, C_4H_6, C_6H_6, CH_4, C_7H_{16}]

E M. Breitenstein, R. J. Mawhorter, H. Meyer and A. Schweig : Mol. Phys. 57, 81-88 (1986)·
Vibrational effects on electron-molecule scattering for polyatomics in the first Born approximation : H_2O. [T, H_2O]

O M. Breitenstein, H. Meyer and A. Schweig : Chem. Phys. 112, 199-203 (1987)
CI calculation of electron and X-ray scattering cross sections of non-linear molecules : H_2O and NH_3.
[T, H_2O, NH_3; configuration interaction]

E D. J. Brenner and M. Zaider : Los Alamos Natl. Labo. Report LA-UR-82-1934, (1982)
A computationally convenient parameterization of the angular distributions of low energy electrons elastically scattered water vapor. [T, H_2O]

E L. M. Brescansin, M. A. P. Lima, T. L. Gibson, V. McKoy and W. M. Huo : J. Chem. Phys. 85, 1854-1858 (1986)
Studies of electron-molecule collisions : Applications to e - H_2O.
[T, H_2O]

E L. M. Brescansin, M. A. P. Lima, L. E. Machado and M. -T. Lee : Braz. J. Phys. 22, 221-226 (1992)
Low energy elastic scattering by water molecules. [T, H_2O]

I C. E. Brion : Radiat. Res. 64, 37-52 (1975)
"Photoelectron" spectroscopy by electron impact : Coincidence studies of scattered and ejected electrons. [E, H_2O, NH_3, Ne, Ar, Kr]

0 C.E.Brion and J.P.Thomson : J.Elect.Spectrosc.Relat.Phenom.33, 287-300 (1984a)・
Compilation of valence shell molecular photoelectron branching ratios as a function of energy. [compilation, H_2O, HF, HCl, HBr, O_2, NO, CO, N_2, NH_3, CH_4, CO_2, COS, CS_2, N_2O]

0 C.E.Brion and J.P.Thomson : J.Elect.Spectrosc.Relat.Phenom.33, 301-331 (1984b)・
Compilation of dipole oscillator strengths (cross sections) for the photoabsorption, photoionization and ionic fragmentation of molecules. [compilation, H_2O, H_2, CO, N_2, O_2, NO, HF, HCl, HBr, NH_3, CH_4, N_2O, CO_2, COS, CS_2, SF_6]

0 C.E.Brion and F.Carnovale : Chem.Phys.100, 291-296 (1985a)
The absolute partial photoionization cross section for the production of the X^2B_1 state of H_2O^+. [E, $h\nu$, H_2O; 12 - 34 eV]

0 C.E.Brion : Comments At.Mol.Phys.16, 249-270 (1985b)・
Absolute oscillator strengths for photoabsorption and photoionization processes by fast electron impact.
[comments, $h\nu$, H_2O, CO_2, SO_2, NO, HF, HBr]

0 C.E.Brion, D.W.Lindle, P.A.Heimann, T.A.Ferrett, M.N.Piancastelli and D.A.Shirley : Chem.Phys.Lett.128, 118-122 (1986a)
Photoelectron branching ratios and partial photoionization cross sections for production of the $(2a_1)^{-1}$ state of H_2O up to 200 eV. [E, H_2O]

1 C.E.Brion : Int.J.Quant.Chem.29, 1397-1428 (1986b)
Looking at orbitals in the laboratory : The experimental investigation of molecular wavefunctions and binding energies by electron momentum spectroscopy. [E, review, H_2O, H, Ar, H_2, NO, CO_2, CS_2, OCS, CF_4, etc.]

E J.P.Bromberg : 9th ICPEAC, Seattle 98-111 (1975)○K
Measurement of absolute collision cross sections of electrons elastically scattered by gases. [E, H_2O, CO, N_2, He, Ne, Kr, Hg, NH_3, CH_2F_2]

0 L.R.Brown, C.B.Farmer, C.P.Rinsland and R.A.Toth : Appl.Opt.26, 5154-5182 (1987)
Molecular line parameters for the atmospheric trace molecule spectroscopy experiment.
[compilation, $h\nu$, H_2O, CO_2, O_3, N_2O, CO, CH_4, O_2, NO, SO_2, etc.]

0 L.R.Brown and C.Plymate : J.Quant.Spectrosc.Radiat.Transf.56, 263-282 (1996)
H_2-broadened $H_2{}^{16}O$ in four infrared bands between 55 and 4045 cm^{-1}.
[E, $h\nu$, H_2O]

QT E.Bruche : Ann.Phys.1, 93-134 (1929)
Wirkungsquerschnitt und Molekelbau in der Pseudoedelgasreihe : Ne-HF-H_2O-NH_3-CH_4. [E,

0 C.R.Brundle and D.W.Turner : Proc.Roy.Soc.London A307, 27-36 (1968)
High resolution molecular photoelectron spectroscopy. II. Water and deuterium oxide. [E, $h\nu$, H_2O, D_2O]

A I. S. Buchel'nikova : Sov. Phys. JETP 35, 783-791 (1959)
Cross sections for the capture of slow electrons by O_2 and H_2O molecules and molecules of halogen compounds. [E, H_2O, O_2,

E S. J. Buckman, R. J. Gulley and M. J. Brunger : in Electron Collisions with
V Molecules, Clusters, and Surfaces, Plenum, Royal Holloway 87-104 (1994)
Low energy electron scattering by polar polyatomic molecules.
[review, H_2O, NH_3, O_3, N_2O, H_2S, SO_2]

O M. G. Bucknell, N. C. Handy and S. F. Boys : Mol. Phys. 28, 759-776 (1974a)
Vibration-rotation wavefunctions and energies for any molecule obtained by a variational method. [T, general theory; see next paper]

O M. G. Bucknell and N. C. Handy : Mol. Phys. 28, 777-792 (1974b)
Vibration-rotation wavefunctions and energies for the ground electronic state of the water molecule by a variational method. [T, H_2O]

O R. J. Buenker and S. D. Peyerimhoff : Chem. Phys. Lett. 29, 253-259 (1974)
Calculations of the electronic spectrum of water.
[T, H_2O; ab initio SCF and CI calculations]

O R. J. Buenker and S. D. Peyerimhoff : Theor. Chim. Acta 39, 217-228 (1975)
Energy extrapolation in CI calculations. [T, H_2O, O_2]

O A. D. Bykov, Yu. S. Makushkin and M. R. Cherkasov : Opt. Spectrosc. 39, 501-503 (1975)
Effects of intermolecular interactions on the collisional theory of pressure broadening of an isolated spectral line.
[T, $h\nu$, H_2O; rotational lines]

O A. D. Bykov, Yu. S. Makushkin and O. N. Ulenikov : Opt. Spectrosc. 54, 57-61 (1983)
Effect of isotope substitution on the shift of the centers of vibrational-rotational bands of polyatomic molecules.
[T, $h\nu$, H_2O, O_3, CH_4]

O A. Bykov, O. Naumenko, T. Petrova, A. Scherbakov, L. Sinitsa, J. -Y. Mandin, C. Camy-Peyret and J. -M. Flaud : J. Mol. Spectrosc. 172, 243-253 (1995)
The second decade of $H_2{}^{18}O$: Line position and energy levels.
[E, $h\nu$, H_2O]

O B. L. Bytchkov and V. A. Yuroskii : High Temp. 31, 7-18 (1993)
Modelling of beam plasmas in water vapor.
[compilation, H_2O; H_2O^- ion has a strong effect]]

O I. Cacelli, R. Moccia and V. Carravetta : Chem. Phys. 90, 313-324 (1984)
Photoionisation cross section calculations for H_2O and NH_3 by one-center expansion and Stieltjes technique. [T, $h\nu$, H_2O, NH_3]

O I. Cacelli, V. Carravetta and R. Moccia : J. Chem. Phys. 85, 7038-7045 (1986)
Molecular photoionization cross sections and asymmetry parameters by L^2 basis functions calculations : H_2O. [T, $h\nu$, H_2O]

0 I. Cacelli, V. Carravetta, R. Moccia and A. Rizzo : J. Phys. Chem. 92, 979-982 (1988)
Photoionization and photoabsorption cross section calculations in molecules : CH_4, NH_3, H_2O, and HF. [T, hν, H_2O, CH_4, NH_3, HF]

0 I. Cacelli, V. Carravetta and R. Moccia : J. Chem. Phys. 97, 320-326 (1992)
Molecular differential photoionization cross-section calculations with L^2 basis functions in the random-phase approximation. Results for H_2O.
[T, hν, H_2O]

0 V. E. Cachorro, A. M. de Frutos and J. L. Casanova : Appl. Opt. 26, 501-505 (1987)
Absorption by oxygen and water vapor in the real atmosphere.
[E, H_2O, O_2]

0 P. E. Cade : Bull. Am. Phys. Soc. 11, 42-42 (1966)
Theoretical potential curves for OH^- ($^1\Sigma^+$) and O_2^- ($^2\Pi_g$) negative molecular ions. [T, OH, O_2]

0 C. Cahen, B. E. Grossmann, J. L. Lesne, J. Benard and G. Leboudec : Appl. Opt. 25, 4268-4271 (1986)
Intensities and atmospheric broadening coefficients measured for O_2 and H_2O absorption lines selected for dial monitoring of both temperature and humidity. 2 : H_2O. [E, hν, H_2O, O_2; 720-nm region]

0 R. B. Cairns, H. Harrison and R. I. Schoen : J. Chem. Phys. 55, 4886-4889 (1971)
Dissociative photoionization of H_2O. [E, hν, H_2O; 200 - 1000 A]

0 R. Camilloni, F. A. Gianturco and A. G. Guidoni : Comments At. Mol. Phys. 15, 263-279 (1984)
Wavefunction and mechanisms from electron scattering processes : Highlights of a symposium. [comments, H_2O,

0 C. Camy-Peyret et J. -M. Flaud : Compt. Rend. Acad. Sci. 274B, 974-977 (1972)
Regles de somme pour les rotateurs asymetriques. [general theory]

0 C. Camy-Peyret, J. -M. Flaud, G. Guelachvili and C. Amiot : Mol. Phys. 26, 825-855 (1973a)
High resolution Fourier transform spectrum of water between 2930 and 4255 cm^{-1}. [E, hν, H_2O]

0 C. Camy-Peyret and J. -M. Flaud : Spectrochim. Acta A29, 1711-1715 (1977b)

0 C. Camy-Peyret and J. M. Flaud : J. Mol. Spectrosc. 59, 327-337 (1976a)
The interacting states (030), (110), and (011) of $H_2{}^{16}O$. [T, hν, H_2O]

0 C. Camy-Peyret and J. -M. Flaud : Mol. Phys. 32, 523-537 (1976b)
Line positions and intensities in the ν_2 band of $H_2{}^{16}O$. [T, H_2O]

0 C. Camy-Peyret, J. -M. Flaud and R. A. Toth : J. Mol. Spectrosc. 67, 117-131 (1977a)
Vibration-rotation intensities for the $3\nu_2$, $\nu_1 + \nu_2$, and $\nu_2 + \nu_3$ bands of $H_2{}^{16}O$. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud, J.-P. Maillard and G. Guelachvili : Mol. Phys. 33, 1641-1650 (1977b)
Higher ro-vibrational levels of H_2O deduced from high resolution oxygen-hydrogen flame spectra between 6200 and 9100 cm^{-1}. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud and J.-Y. Mandin : J. Mol. Spectrosc. 70, 361-373 (1978)
Line positions and intensities for the $\nu_1 + \nu_2$ and $\nu_2 + \nu_3$ bands of $H_2{}^{18}O$. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud and J.-P. Maillard : J. Physiq. Lett. 41, L23-L26 (1980a)
The $4\nu_2$ band of $H_2{}^{16}O$. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud et N. Papineau : Compt. Rend. Acad. Sci. 290B, 537-540 (1980b)
La bande ν_2 des especes isotopiques $H_2{}^{17}O$ et $H_2{}^{18}O$. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud and R. A. Toth : J. Mol. Spectrosc. 87, 233-241 (1981a)
The interacting states (020), (100), and (001) of $H_2{}^{17}O$ and $H_2{}^{18}O$.
[E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud and R. A. Toth : Mol. Phys. 42, 595-601 (1981b)
Line positions and intensities for the $2\nu_2$, ν_1 and ν_3 bands of $H_2{}^{17}O$. [E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud, J.-Y. Mandin, J.-P. Chevillard, J. Brault, D. A. Ramsay, M. Vervloet and J. Chauville : J. Mol. Spectrosc. 113, 208-228 (1985)
The high-resolution spectrum of water vapor between 16500 and 25250 cm^{-1}.
[E, hν, H_2O]

0 C. Camy-Peyret, J.-M. Flaud, J.-Y. Mandin, A. Bykov, O. Naumenko, L. Sinitsa and B. Voronin : J. Quant. Spectrosc. Radiat. Transf. 61, 795-812 (1999)
Fourier-transform absorption spectrum of the $H_2{}^{17}O$ molecule in the 9711 - 11335 cm^{-1} spectral region : The first decade of resonating states.
[E, hν, H_2O]

0 T. A. Carlson and G. E. McGuire : J. Elect. Spectrosc. Relat. Phenom. 1, 209-217 (1972/73)
Angular distribution of the photoelectron spectrum of CO_2, COS, CS_2, N_2O, H_2O, and H_2S. [E, hν, H_2O, H_2S, CO_2, COS, CS_2, N_2O]

0 G. D. Carney, L. A. Curtiss and S. R. Langhoff : J. Mol. Spectrosc. 61, 371-381 (1976)
Improved potential functions for bent AB_2 molecules : Water and ozone.
[T, H_2O, O_3]

0 T. Carrington : J. Chem. Phys. 41, 2012-2018 (1964)
Angular momentum distribution and emission spectrum of $OH(^2\Sigma^+)$ in the photodissociation of H_2O. [E, hν, H_2O]

0 D. G. Carroll, A. T. Armstrong and S. P. McGlynn : J. Chem. Phys. 44, 1865-1870 (1966)
Semiempirical molecular orbital calculations. I. The electronic structure of H_2O and H_2S. [T, H_2O, H_2S]

0 P. Carsky, J. Kuhn and R. Zahradnik : J. Mol. Spectrosc. 55, 120-130 (1975)
Semiempirical all-valence-electron MO calculations on the electronic spectra of linear radicals with degenerate ground states.
[T, OH, NO, CH, CF, etc.]

0 S. Carters and I. M. Mills : J. Mol. Spectrosc. 106, 411-422 (1984)
Potential energy surface intersections for triatomic molecules.
[T, H_2O, O_3, NH_2, C_3, HNO]

0 W. F. Chan, G. Cooper and C. E. Brion : Chem. Phys. 178, 387-400 (1993)○
The electronic spectrum of water in the discrete and continuum regions. Absolute optical oscillator strengths for photoabsorption (6 - 200 eV).
[E, $h\nu$, H_2O]

0 Y. S. Chang and J. H. Shaw : J. Quant. Spectrosc. Radiat. Transf. 18, 491-499 (1977)
Intensities and widths of H_2O lines between 1800 and 2100 cm^{-1}.
[E, $h\nu$, H_2O]

S B. Cheung and M. T. Elford : Aust. J. Phys. 43, 755-763 (1990)・K
The drift velocity of electrons in water vapour at low values of E/N.
[E, H_2O; E/N = 1.4 - 40 Td]

0 J. -P. Chevillard, J. -Y. Mandin, J. -M. Flaud and C. Camy-Peyret : Can. J. Phys. 63, 1112-1127 (1985)
$H_2{}^{18}O$: The (030), (110), and (011) interacting states. Line positions and intensities for the $3\nu_2$, $\nu_1 + \nu_2$, and $\nu_2 + \nu_3$ bands.
[E, $h\nu$, H_2O; 4400 - 6100 cm^{-1}]

0 J. -P. Chevillard, J. -Y. Mandin, C. Camy-Peyret and J. -M. Flaud : Can. J. Phys. 64, 746-761 (1986)
The first hexad {(040), (120), (021), (200), (101), (002)} of $H_2{}^{18}O$: experimental energy levels and line intensities. [E, $h\nu$, H_2O]

0 J. -P. Chevillard, J. -Y. Mandin, J. -M. Flaud and C. Camy-Peyret : Can. J. Phys. 65, 777-789 (1987)
$H_2{}^{18}O$: line positions and intensities between 9500 and 11500 cm^{-1}. The (041), (220), (121), (300), (201), (102), and (003) interacting states. [E, $h\nu$, H_2O]

0 J. -P. Chevillard, J. -Y. Mandin, J. -M. Flaud and C. Camy-Peyret : Can. J. Phys. 67, 1065-1084 (1989)
$H_2{}^{16}O$: line positions and intensities between 9500 and 11500 cm^{-1}. The interacting vibrational states (041), (220), (121), (022), (300), (201), (102), and (003). [E, $h\nu$, H_2O; 557 rotational energy levels]

0 M. S. Child and Ch. Jungen : J. Chem. Phys. 93, 7756-7766 (1990)
Quantum defect theory for asymmetric tops : Application to the Rydberg spectrum of H_2O. [T, H_2O]

I H. Cho, S. H. Lee, S. S. Kim and J. S. Jun : New Phys. (South Korea) 32, 401-405 (1992)
Energy distributions of low-energy secondary electrons from N_2, O_2 and H_2O by electron impact. [E, H_2O, N_2, O_2]

S L. G. Christophorou and A. A. Christodoulides : J. Phys. B2, 71-85 (1969)
Scattering of thermal electrons by polar molecules.
[compilation, H_2O, CH_3OH, CH_3CN, $CClF_3$, etc. about 30 molecules]

S L. G. Christophorou and D. Pittman : J. Phys. B3, 1252-1259 (1970) K
Thermal-electron scattering by polar molecules.
[E, H_2O, CH_3OH, C_2H_5OH, etc. ; W, E/N = 3 - 9 Td, 298 - 440 °K]

E L. G. Christophorou, D. R. James and R. A. Mathis : J. Phys. D14, 675-692 (1981)·
Dielectric gas mixtures with polar components.
[E, H_2O, NH_3, CHF_3, CH_2F_2, etc. ; 0 - 6 eV]

EX A. Chutjian, R. I. Hall and S. Trajmar : J. Chem. Phys. 63, 892-898 (1975)·K
Electron-impact excitation of H_2O and D_2O at various scattering angles and impact energies in the energy-loss range 4.2 - 12 eV.
[E, H_2O, D_2O]

O C. R. Claydon, G. A. Segal and H. S. Taylor : J. Chem. Phys. 54, 3799-3816 (1971)
Theoretical interpretation of the optical and electron scattering spectra of H_2O. [T, H_2O]

V P. Cloutier and L. Sanche : Rev. Sci. Instrum. 60, 1054-1060 (1989)·
O A trochoidal spectrometer for the analysis of low-energy inelastically backscattered electrons. [E, H_2O, C_2H_6 on a surface]

O R. J. Cody, C. Maralejo and J. E. Allen, Jr. : J. Chem. Phys. 95, 2491-2496 (1991)
Photodissociation of the hydroxyl radical (OH) at 157 nm.
[E, $h\nu$, OH]

E R. Cohen and A. V. Phelps : Westinghouse Res. Labo., Pittsburgh, (1968)

I D. Coimbra and R. S. Barbieri : 21st ICPEAC, Sendai 317 (1999)·
Theoretical studies of DDCS for water molecules by electron impact : A new approach. [T, H_2O; binary-encounter-Bethe model]

O D. Combecher and J. Kolberbaur : Radia. Prot. Dosim. 13, 23-26 (1985)
The measurement of electron spectra in the track of protons in water vapour. [E, H_2O; primary electron spectrum]

A R. N. Compton and L. G. Christophorou : Phys. Rev. 154, 110-116 (1967) K
Negative-ion formation in H_2O and D_2O. [E, H_2O, D_2O]

EX R. N. Compton, R. H. Huebner, P. W. Reihardt and L. G. Christophorou : J. Chem. Phys. 48, 901-909 (1968)·
Threshold electron impact excitation of atoms and molecules : Detection of triplet and temporary negative ion state.
[E, H_2O, D_2O, He, N_2, HCl, C_6H_6, etc.]

O J. P. Connerade, M. A. Baig, S. P. McGlynn and W. R. S. Garton : J. Phys. B13, L705-L710 (1980)
Rovibronic structure of Rydberg and non-Rydberg states of H_2O and D_2O.
[E, $h\nu$, H_2O, D_2O]

I M. A. Coplan, J. H. Moore and J. P. Doering : Rev. Mod. Phys. 66, 985-1014 (1994)
(e, 2e) spectroscopy. [review, H_2O, C_2H_2]

I R. B. Cordaro, K. C. Hsieh and L. C. McIntyre, Jr. : J. Phys. B19, 1863-1872 (1986)
Electron impact dissociative ionization of hydrogen, water and hydrogen sulphide. [E, H_2O, H_2, H_2S; 20 - 45 eV, detected the proton]

I M. Cottin : J. Chim. Phys. 56, 1024-1035 (1959)
A Etude des ions produits par impact electronique dans la vapeur d'eau.
(Study of the ions produced by electron impact in water vapour.)
[E, H_2O]

O L. H. Coudert : J. Mol. Spectrosc. 181, 246-273 (1997)
Analysis of the line positions and line intensities in the ν_2 band of the water molecule. [analysis, $h\nu$, H_2O; see R. A. Toth (1991)]

O J. A. Coxon : Can. J. Phys. 58, 933-949 (1980)
Optimum molecular constants and term values for the $X^2\Pi$ ($v \leqq 5$) and $A^2\Sigma^+$ ($v \leqq 3$) states of OH. [analysis, $h\nu$, OH]

O J. A. Coxon and S. C. Foster : Can. J. Phys. 60, 41-48 (1982)
Rotational analysis of hydroxyl vibration-rotation emission bands : molecular constants for OH $X^2\Pi$, $6 \leqq v \leqq 10$. [E, $h\nu$, OH]

A J. D. Craggs and C. A. McDowell : Rep. Prog. Phys. 18, 374-422 (1955)
The ionization and dissociation of complex molecules by electron impact.
[review, H_2O, O_2, NO, CO, NH_3, CCl_4, SF_6, CH_3OH, etc.]

R T. E. Cravens and A. Korosmezey : Planet. Space Sci. 34, 961-970 (1986)·
V Vibrational and rotational cooling of electrons by water vapor.
[T, H_2O; deexcitation, 0 - 10 eV]

I T. E. Cravens, J. U. Kozyra, A. F. Nagy, T. I. Gomvosi and M. Kurtz : J. Geophys. Res. 92,
O 7341-7353 (1987)·
Electron impact ionization in the vicinity of comets.
[review, H_2O, CO_2, CO, O, N_2, H]

E O. H. Crawford : Chem. Phys. Lett. 2, 461-463 (1968)
Electron collision frequencies in water vapor.
[T, H_2O, ; q_m for 0.02 - 0.09 eV]

O F. F. Crim : Annu. Rev. Phys. Chem. 44, 397-428 (1993)
Vibrationally mediated photodissociation : Exploring excited-state surfaces and controlling decomposition pathways.
[review, $h\nu$, H_2O, etc.]

S R. W. Crompton, J. A. Rees and R. L. Jory : Aust. J. Phys. 18, 541-551 (1965)
The diffusion and attachment of electrons in water vapour.
[E, H_2O; E/N = 60 - 180 Td]

S R. W. Crompton, J. A. Rees and R. L. Jory : 7th ICPIG, Beograd 83-86 (1966)
A The diffusion and attachment of electrons in H_2O.
[E, H_2O

A M. G. Curtis and I. C. Walker : J. Chem. Soc. Faraday Trans. 88, 2805-2810 (1992)・
Dissociative electron attachment in water and methanol (5 - 14 eV).
[E, H_2O, CH_3OH]

V D. Cvejanovic, L. Andric and R. I. Hall : J. Phys. B26, 2899-2911 (1993) K
Excitation of high vibrational levels of H_2O and D_2O by electron impact.
[E, H_2O, D_2O; 4 - 10 eV]

O F. W. Dalby and H. H. Nielsen : J. Chem. Phys. 25, 934-940 (1956)
Infrared spectrum of water vapor. Part I — The 6.26 μ region.
[E, hν, H_2O; 5.26 - 7.14 μ]

O A. Dalgarno : in Applied Atomic Collision Physics, Vol. 1, Academic 427-464 (1982)・
Molecules in interstellar space.
[review, H_2O, H_2, CO, SO_2, NH_3, CH_3OH, NO, H_2S, OCS, O_3, H_2CO, etc.]

E A. Danjo and H. Nishimura : J. Phys. Soc. Jpn. 54, 1224-1227 (1985)○
Elastic scattering of electrons from H_2O molecule.
[E, H_2O; DCS, 4 - 200 eV, 10 / 20 - 120°]

EX F. J. da Paixao and M. A. P. Lima : Int. Sympo. Electron- and Photon-Molecule Collisions and Swarms, Berkeley, H-15 (1995)
Electron scattering by open-shell molecules with the Schwinger multichannel method : Applications to NO, OH, CH, and CN molecules.
[T, OH, NO, CH, CN]

D M. Darrach and J. W. McConkey : Chem. Phys. Lett. 184, 141-146 (1991a)・K
Rotationally resolved laser-induced fluorescence studies of OH(X, v=0) produced by electron-impact dissociation of jet-cooled H_2O and CH_3OH.
[E, H_2O, CH_3OH; 100 - 400 eV]

D M. Darrach and J. W. McConkey : 17th ICPEAC, Brisbane 266-266 (1991b)
Study of electron-impact dissociation of molecules into ground state fragments using laser induced fluorescence detection. [E, H_2O, 300 eV]

D M. Darrach and J. W. McConkey : 18th ICPEAC, Aarhus 329 (1993a)
Absolute cross sections for dissociation of H_2O by electron impact.
[E, H_2O]

D M. Darrach and J. W. McConkey : AIP Conf. Proc. 295, 18th ICPEAC, Aarhus, 811-819 (1993b)○
Absolute cross sections for dissociation of H_2O by electron impact.
[E, H_2O; production of OH, 25 - 250 eV]

O D. David, A. Strugano, I. Bar and S. Rosenwaks : J. Chem. Phys. 98, 409-419 (1993a)
State-to-state photodissociation of the fundamental symmetric stretch vibration of water prepared by stimulated Raman excitation.
[E, hν, H_2O]

O D. David, I. Bar and S. Rosenwaks : J. Chem. Phys. 99, 4218-4221 (1993b)
Control of fragment alignment via photodissociation from different types of parent rotation. [E, hν, H_2O; 193 nm]

A V. A. Davidenko, B. A. Dolgoshein, S. V. Somov and V. N. Starosel'tsev : Sov. Phys. JETP 30, 49-53 (1970)
Study of electron collisions in nobel gases by means of a streamer chamber. [E, H_2O, He, Ne, Xe, N_2O, N_2; q_a of H_2O 7.5×10^{-21} cm^2 at thermal energy]

O G. R. Davis : J. Quant. Spectrosc. Radiat. Transf. 50, 673-694 (1993)・
The far infrared continuum absorption of water vapour. [E, $h\nu$, H_2O]

V Dayashankar, Suk T. Suh and A. E. S. Green : Int. J. Quant. Chem. : Quant. Chem.
A Sympo. 20, 547-554 (1986)・
Electron impact cross sections and spatial aspects of electron energy degradation in water vapor. [T, H_2O]

O T. P. Debies and J. W. Rabalais : J. Am. Chem. Soc. 97, 487-492 (1975)
Calculated photoionization cross-sections and angular distributions for the isoelectronic series Ne, HF, H_2O, NH_3, and CH_4. [T, $h\nu$, H_2O, etc.]

D J. Debyshire, W. Kedzierski and J. W. McConkey : 20th ICPEAC, Vienna WE107 (1997)
$O(^1S)$ production following electron impact on H_2O and D_2O.
[E, H_2O, D_2O]

O J. E. Decker, G. Xu and S. L. Chin : J. Phys. B25, 3117-3132 (1992)
Intense CO_2 laser ionization of D_2O and $(D_2O)_2$. [E, $h\nu$, D_2O, $(D_2O)_2$]

O D. Dehareng, X. Chapuisat, J.-C. Lorquet, C. Galloy and G. Raseev : J. Chem. Phys. 78, 1246-1264 (1983)
Dynamical study of nonadiabatic unimolecular reactions : The conical interaction between the B^2B_2 and A^2A_1 states of H_2O^+. [T, H_2O^+]

EX F. J. de Heer : Int. J. Radiat. Phys. Chem. 7, 137-153 (1975)・
Superexcited states of molecules produced by electron impact.
[E, H_2O, CH_4, CD_4, C_2H_2, C_2H_4; th.- 5000 eV]

O P. M. Dehmer and D. M. P. Holland : J. Chem. Phys. 94, 3302-3314 (1991)
Photoionization of rotationally cooled H_2O and D_2O in the region 650 - 990 A. [E, $h\nu$, H_2O, D_2O]

O C. Delaye, J.-M. Hartman and J. Taine : Appl. Opt. 28, 5080-5087 (1989)
Calculated tabulations of H_2O line broadening by H_2O, N_2, O_2, and CO_2 at high temperature. [analysis, $h\nu$, H_2O]

O F. C. de Lucia, P. Helminger and W. H. Kirchhoff : J. Phys. Chem. Ref. Data 3, 211-219 (1974)・
Microwave spectra of molecules of astrophysical interest. V. Water vapor.
[review, $h\nu$, H_2O]

D J. Derbyshire, W. Kedzierski and J. M. McConkey : Phys. Rev. Lett. 79, 2229-2232 (1997)
New dissociation channels in D_2O.
[E, D_2O; $O(^1S_0)$ production, q_d max. at 100 eV]

O L. de Reilhac et N. Damany : Spectrochim. Acta 26A, 801-810 (1970)
Spectres d'absorption de H_2O, NH_3 et CH_4 dans l'ultraviolet extreme (100 - 500 A). [E, $h\nu$, H_2O, NH_3, CH_4]

O L. de Reilhac and N. Damany : J. Quant. Spectrosc. Radiat. Transf. 18, 121-131 (1977)・
Photoabsorption cross-section measurements of some gases, from 10 to 50 nm. [E, $h\nu$, H_2O, N_2, O_2, CO, NO, CO_2, N_2O, CH_4, NH_3]

I H. Deutsch, K. Becker and T. D. Mark : Int. J. Mass Spectrom. Ion Process. 167/168, 503-517 (1997)・K
A modified additivity rule for the calculation of electron impact ionization cross-section of molecules AB_n.
[T, H_2O, CO_2, CO, NO, N_2O, NO_2, SO_2, SF_6, etc.]

O M. J. S. Dewar, A. Komornicki, W. Thiel and A. Schweig : Chem. Phys. Lett. 31, 286-290 (1975)
Calculation of photoionization cross sections using ab-initio wave-functions and the plane wave approximation.
[T, $h\nu$, H_2O, N_2, CO, H_2S, CH_4, C_2H_4]

O V. H. Dibeler, J. A. Walker and H. M. Rosenstock : J. Res. Natl. Bur. Stad. 70A, 459-463 (1966)
Mass spectrometric study of photoionization. V. Water and ammonia.
[E, $h\nu$, H_2O, NH_3]

O G. H. F. Diercksen, W. P. Kraemer, T. N. Rescigno, C. F. Bender, B. V. McKoy, S. R. Langhoff and P. W. Langhoff : J. Chem. Phys. 76, 1043-1057 (1982)
Theoretical studies of photoexcitation and ionization in H_2O.
[T, $h\nu$, H_2O]

O R. W. Ditchburn, J. E. S. Bradley, C. G. Cannon and G. Munday : in Rocket Exploration of Upper Atmosphere, R. L. S. Boyd(Ed), Interscience 327-334 (1954)
Absorption cross-sections for Lyman α and neighbouring lines.
[E, $h\nu$, H_2O

I A. J. Dixon, S. Dey, I. E. McCarthy, E. Weigold and G. R. J. Williams : Chem. Phys. 21, 81-88 (1977)
(e, 2e) spectroscopy of H_2O - separation energy spectra and valence orbital electron momentum distributions. [E, H_2O]

A N. Djuric and M. V. Kurepa : 15th ICPEAC, Brighton 341-341 (1987)
Total electron attachment cross sections to the heavy water molecule.
[E, D_2O; 5 - 14.5 eV]

I N. Lj. Djuric, I. M. Cadez and M. V. Kurepa : Int. J. Mass Spectrom. Ion Phys. 83, R7-R10 (1988)○K
H_2O and D_2O total ionization cross-sections by electron impact.
[E, H_2O, D_2O; th. - 150 eV]

O M. P. Docker, A. Hodgson and J. P. Simons : Mol. Phys. 57, 129-147 (1986)
Molecular emission from H_2O/D_2O C $^1B_1$ and photodissociation dynamics on the B $^1A_1$ surface. [E, $h\nu$, H_2O, D_2O]

D T. J. Dolan : J. Phys. D26, 4-8 (1993) K
I Electron and ion collisions with water vapour. [compilation, H_2O]

M. T. do N. Varella → Varella

A F. H. Dorman : J. Chem. Phys. 44, 3856-3863 (1966)
Negative fragment ions from resonance capture processes.
[E, H_2O, NO, N_2O, SO_2, CO_2, CCl_4, CH_4, C_2H_6, C_3H_8, CS_2, O_2, NH_3, etc.]

A M. Doumont, A. Henglein und K. Jager : Z. Naturforsch, 24a, 683-683 (1969)
Die Ionisationsausbeute-Kurve von OH^- aus Wasser.
[E, H_2O; OH^-, O^-, 6 - 13 eV]

O P. Duffy, M. E. Casida, C. E. Brion and D. P. Chong : Chem. Phys. 159, 347-363 (1992)
Assessment of Gaussian-weighted angular resolution functions in the comparison of quantum-mechanically calculated electron momentum distributions with experiment. [T, H_2O, H_2S, Ne - Xe]

O K. F. Dunn, P. F. O'Neill, R. Browning, C. R. Browne and C. J. Latimer : J. Elect. Spectrosc. Relat. Phenom. 79, 475-478 (1996)
The dissociative photoionization of H_2O/D_2O between 20 and 40 eV.
[E, H_2O, D_2O]

O T. H. Dunning, Jr. : J. Chem. Phys. 55, 716-723 (1971)
Gaussian basis functions for use in molecular calculations. Ⅲ.
Contraction of (10s6p) atomic basis sets for the first-row atoms.
[T, H_2O, N_2]

S J. Dutton : J. Phys. Chem. Ref. Data 4, 577-856 (1975)
A survey of electron swarm data. [compilation]

O O. Dutuit, A. Tabche-Fouhaile, I. Nenner, H. Frohlich and P. M. Guyon : J. Chem. Phys. 83, 584-596 (1985)
Photodissociation processes of water vapor below and above the ionization potential. [E, $h\nu$, H_2O]

EX D. A. Edmonson, J. S. Lee and J. P. Doering : J. Chem. Phys. 69, 1445-1452 (1978) K
Inelastic scattering of positive ions and electrons from water : The 4 - 6 eV energy loss region. [E, H_2O]

I H. Ehrhardt und A. Kresling : Z. Naturforsch. 22a, 2036-2043 (1967)·
Die dissoziative Ionization von H_2, O_2, H_2O, CO_2 und Athan.
[E, H_2O, H_2, O_2, CO_2, C_2H_6]

R H. Ehrhardt : in Molecular Processes in Space, Plenum Press 41-64 (1990)·
V Experiments on low-energy electron-molecule collisions.
[review, H_2O, N_2, H_2, CO, HCl, CH_4, CO_2, HF]

O J. H. D. Eland : Chem. Phys. 11, 41-47 (1975)
The predissociations of water ions. [E, H_2O^+, D_2O^+]

S M.T.Elford : 18th ICPIG, Swansea 130-131 (1986)
The ratio D_T/μ for electrons in water vapour at 294 K and low E/N values.
[E, H_2O]

S M.T.Elford : Abstracts of Japan-Australia Workshop on Gaseous Electronics and Its Applications 68-71 (1988)
Electron transport in H_2O vapour : Some recent developments. [E, H_2O]

S M.T.Elford : in Gaseous Electronics and Its Applications, KTK Scientific Publishers 34-50 (1991)
The behaviour of low energy electrons in water vapour. [E, H_2O]

S M.T.Elford : 8th Int.Swarm Seminar, Trondheim 29-31 (1993)
The ratio D_T/μ for electrons in water vapour at 294 K. [E, H_2O]

O M.W.Elsasser : Astrophys.J. 87, 497-507 (1938)
Far infra-red absorption of atmospheric water vapour. [E, $h\nu$, H_2O]

E A.El-Zein, M.J.Brunger and W.R.Newell : 21st ICPEAC, Sendai 310 (1999)
V Electron scattering from water molecules. [E, H_2O; 7.5 eV]

O R.Emery : Infrared Phys. 12, 65-79 (1972)
Atmospheric absorption measurements in the region of 1 mm wavelength.
[E, $h\nu$, H_2O,

O V.Engel, R.Schinke and V.Staemmler : Chem.Phys.Lett. 130, 413-418 (1986a)○
An ab initio calculation of the absorption cross section of water in the first absorption continuum. [T, $h\nu$, H_2O]

O V.Engel : Max-Planck-Institute fur Stromungsforschung, Bericht 14 (1986b)
Theoretische Behandlung der Photodissoziation von Wasser in der ersten Absorptionsbande. [T, $h\nu$, H_2O]

O V.Engel, G.Meijer, A.Bath, P.Andresen and R.Schinke : J.Chem.Phys. 87, 4310-4314 (1987)
The C → A emission in water : Theory and experiment.
[E and T, $h\nu$, H_2O, D_2O]

O V.Engel, R.Schinke and V.Staemmler : J.Chem.Phys. 88, 129-148 (1988a)
Photodissociation dynamics of H_2O and D_2O in the first absorption band : a complete ab initio treatment. [T, $h\nu$, H_2O, D_2O]

O V.Engel and R.Schinke : J.Chem.Phys. 88, 6831-6837 (1988b)○
Isotope effects in the fragmentation of water : the photodissociation of HOD in the first absorption band. [T, $h\nu$, H_2O, HOD, D_2O]

O V.Engel, V.Staemmler, R.L.Vander Wal, F.F.Crim, R.J.Sension, B.Hudson, P.Andresen, S.Henning, K.Weide and R.Schinke : J.Phys.Chem. 96, 3201-3213 (1992)○
Photodissociation of water in the first absorption band : A prototype for dissociation on a repulsive potential energy surface.
[review, E and T, $h\nu$, H_2O]

S D. D. Errett : Thesis, Purdue University, Indiana 1-81 (1951)
The drift velocity of electrons in gases.
[E, $H_2O + N_2$, $H_2O + Ar$]

O M. P. Esplin, R. B. Wattson, M. L. Hoke and L. S. Rothman : J. Quant. Spectrosc. Radiat. Transf. 60, 711-739 (1998)・
High-temperature spectrum of H_2O in the 720 - 1400 cm^{-1} region.
[E, $h\nu$, H_2O; 720 - 1400 cm^{-1}, 1000 K]

E I. I. Fabrikant : J. Phys. B10, 1761-1768 (1977)・
Thermal-electron scattering by polar molecules. [T, H_2O, NH_3, CH_3OH, etc.]

E I. I. Fabrikant : Phys. Lett. 77A, 421-423 (1980)・
V Differential cross sections for electron scattering by polar molecules. Elastic scattering and vibrational excitation. [T, H_2O, HCN, LiF]

E I. I. Fabrikant : J. Phys. B16, 1253-1266 (1983)・
Generalized quantum defect theory for electron scattering by polar molecules. [T, H_2O, LiF, BeO, HCN, HF]

O D. Feller, C. Boyle and E. R. Davidson : J. Chem. Phys. 86, 3424-3440 (1987)
One-electron properties of several small molecules using near Hartree-Fock limit basis sets. [T, H_2O, CO, N_2, H_2S, NH_3, PH_3, HCl, HF]

I F. Fiquet-Fayard : J. Chim. Phys. 62, 1065-1069 (1965)
Comparaison des ionisations simple et double par impact electronique entre 250 at 2200 eV. [E, H_2O, CO_2, C_2H_4, He, Ar, Kr, Na, K]

D F. Fiquet-Fayard et P. M. Guyon : Mol. Phys. 11, 17-30 (1966)
Preionisation et predissociation dans la dissociation des molecules triatomiques par impact electronique. [E, H_2O, H_2S, D_2S]

A F. Fiquet-Fayard : Vacuum 24, 533-547 (1974)・
Theoretical problems in the interpretation of dissociative attachment experiments. [T, H_2O, OH, NO, H_2, O_2, HCl, SO_2]

J. M. Flaud → J. -M. Flaud

O J. -M. Flaud, C. Camy-Peyret et A. Valentin : J. Physiq. 33, 741-747 (1972)
Spectre infrarouge a haute resolution des bandes $\nu_1 + \nu_2$ et $\nu_2 + \nu_3$ de $H_2{}^{16}O$. [E, $h\nu$, H_2O; 5090 - 5580 cm^{-1}]

O J. -M. Flaud and C. Camy-Peyret : Mol. Phys. 26, 811-823 (1973)
The $2\nu_2$, ν_1, and ν_3 bands of $H_2{}^{16}O$. Rotational study of the (000) and (020) states. [E, $h\nu$, H_2O]

O J. -M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 51, 142-150 (1974)
The interacting states (020), (100), and (001) of $H_2{}^{16}O$.
[E, $h\nu$, H_2O]

O J. -M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 55, 278-310 (1975)
Vibration-rotation intensities in H_2O-type molecules application to the $2\nu_2$, ν_1, and ν_3 bands of $H_2{}^{16}O$. [T, H_2O]

0 J.-M. Flaud, C. Camy-Peyret and J. P. Maillard : Mol. Phys. 32, 499-521 (1976a)
Higher ro-vibrational levels of H_2O deduced from high resolution oxygen-hydrogen flame spectra between 2800 - 6200 cm^{-1}. [E, H_2O]

0 J.-M. Flaud, et al. : J. Mol. Spectrosc. 32, 523 (1976b) see p. 86

0 J.-M. Flaud, C. Camy-Peyret, J.-P. Maillard and G. Guelachvili : J. Mol. Spectrosc. 65, 219-228 (1977a)
The H_2O spectrum between 4200 and 5000 cm^{-1}. [E, $h\nu$, H_2O; 333 K]

0 J.-M. Flaud, C. Camy-Peyret and R. A. Toth : J. Mol. Spectrosc. 68, 280-287 (1977b)
The ground state (000) and the interacting states (110) and (011) of $H_2{}^{18}O$. [T, $h\nu$, H_2O; see R. A. Toth (1977a)]

0 J.-M. Flaud, C. Camy-Peyret, J.-Y. Mandin and G. Guelachvili : Mol. Phys. 2, 413-426 (1977c)
$H_2{}^{16}O$ hot bands in the 6.3 μm region. [E, $h\nu$, H_2O]

0 J.-M. Flaud, C. Camy-Peyret, K. Narahari Rao, D.-W. Chen and Y.-S. Hoh : J. Mol. Spectrosc. 75, 339-362 (1979)
Spectrum of water vapor between 8050 and 9370 cm^{-1}.
[E, $h\nu$, H_2O; 333 K]

0 J.-M. Flaud, C. Camy-Peyret and R. A. Toth : Can. J. Phys. 58, 1748-1757 (1980)
Line positions and intensities for the $2\nu_2$, ν_1 and ν_3 bands of $H_2{}^{16}O$. [E, $h\nu$, H_2O]

0 J.-M. Flaud, C. Camy-Peyret and R. A. Toth : Selected Constants Water Vapour Line Parameters from Microwave to Medium Infrared, Pergamon, Elmsford (1981)

0 J.-M. Flaud, C. Camy-Peyret, A. Mahmoudi and G. Guelachvili : Int. J. Infrared Millim. Waves 7, 1063-1090 (1986)
The ν_2 band of $HD^{16}O$. [E, $h\nu$, HDO]

0 J.-M. Flaud, C. Camy-Peyret, A. Bykov, O. Naumenko, T. Petrova, A. Scherbakov and L. Sinitsa : J. Mol. Spectrosc. 183, 300-309 (1997a)
The high-resolution spectrum of water vapor between 11600 and 12750 cm^{-1}.
[E, $h\nu$, H_2O]

0 J.-M. Flaud, C. Camy-Peyret, A. Bykov, O. Naumenko, T. Petrova, A. Scherbakov and L. Sinitsa : J. Mol. Spectrosc. 185, 211-221 (1997b)
The water vapor linestrengths between 11600 and 12750 cm^{-1}.
[E, $h\nu$, H_2O]

0 F. Flouquet and J. A. Horsley : J. Chem. Phys. 60, 3767-3772 (1974)
Ab initio study of the potential energy surface of the B^1A_1 excited state of H_2O. [T, H_2O]

I P. G. Fournier, G. Comtet, J. Fournier, D. P. De Bruijn and J. Los : 15th ICPEAC, Brighton 343 (1987)
Rovibrational distribution of H_2^+ ions formed in electron impact induced dissociation of CH_4, H_2S and H_2O. [E, H_2O, H_2S, CH_4]

O P. E. Fraley and K. Narahari Rao : J. Mol. Spectrosc. 19, 131-136 (1966)
Combinations of sum rules for orthorhombic asymmetric molecules.
[T, H_2O]

O P. E. Fraley, K. Narahari Rao and L. H. Jones : J. Mol. Spectrosc. 29, 312-347 (1969a)
High resolution infrared spectra of water vapor ν_1 and ν_3 bands of $H_2{}^{18}O$. [E, $h\nu$, $H_2{}^{18}O$]

O P. E. Fraley and K. Narahari Rao : J. Mol. Spectrosc. 29, 348-364 (1969b)
High resolution infrared spectra of water vapor. ν_1 and ν_3 bands of $H_2{}^{16}O$. [E, $h\nu$, $H_2{}^{16}O$; ν_1 = 3657.050, ν_3 = 3755.970 cm^{-1}]

O L. Frenkel and D. Woods : Proc. IEEE 54, 498-505 (1966)
The microwave absorption by H_2O vapor and its mixtures with other gases between 100 and 300 Gc/s. [E, $h\nu$, H_2O, H_2O + (N_2, O_2, CO_2)]

O K. Freudenberg und R. Mecke : Z. Phys. 81, 465-481 (1933)
Das Rotationsschwingungsspektrum des Wasserdampfes. Ⅲ.
[E, $h\nu$, H_2O; Ⅰ. R. Mecke (1933), Ⅱ. W. Baumann (1933)]

D R. S. Freund : Chem. Phys. Lett. 29, 135-138 (1971)
Electron-impact dissociation of H_2O and D_2O into metastable fragments.
[E, H_2O, D_2O]

O R. S. Freund : in Rydberg State of Atoms and Molecules, R. F. Stebbings and F. B. Dunning (Ed), Cambridge Univ. Press, Cambridge (1983)

I D. C. Frost and C. A. McDowell : Can. J. Chem. 36, 39-47 (1958)
Excited states of the molecular ions of hydrogen fluoride, hydrogen iodide, water, hydrogen sulphide, and ammonia.
[E, H_2O, H_2S, HF, HI, NH_3; eV for H_2O]

EX T. Fujita, T. Iwai, K. Ogura, S. Watanabe and Y. Watanabe : J. Phys. Soc. Jpn. 42, 1296-1304 (1977a)・
Dissociative excitation of water molecule by electron impacts. Ⅰ.
General survey and the Born approximation. [T, H_2O; th. - 500 eV]

EX T. Fujita, T. Iwai, K. Ogura, S. Watanabe and Y. Watanabe : J. Phys. Soc. Jpn. 42, 1305-1309 (1977b)
Dissociative excitation of water molecule by electron impacts. Ⅱ.
The Glauber approximation. [T, H_2O]

EX T. Fujita, T. Iwai, K. Ogura, S. Watanabe and Y. Watanabe : J. Phys. Soc. Jpn. 44, 286-290 (1978)・
Dissociative excitation of water molecule by electron impacts. Ⅲ.
Core potential correction. [T, H_2O]

EX T. Fujita, T. Iwai, K. Ogura. S. Watanabe and Y. Watanabe : J. Phys. Soc. Jpn. 47, 240-247 (1979)
Dissociative excitation of water molecule by electron impacts. Ⅳ.
The effect of multiple scattering. [T, H_2O]

EX T. Fujita, T. Iwai, K. Ogura, S. Watanabe and Y. Watanabe : J. Phys. Soc. Jpn. 51, 3065-3066 (1982)・
Comment to "Excitation of water molecule by electron impacts. I".
[T, H_2O; th. - 500 eV]

E T. Fujita, K. Ogura and Y. Watanabe : J. Phys. Soc. Jpn. 52, 811-817 (1983)
Elastic scattering of electron by water molecule in high and intermediate energy regions. [T, H_2O; DCS, 50 - 200 eV]

V M. Furlan, M. -J. Hubin-Franskin, J. Delwiche and J. E. Collin : J. Chem. Phys. 95, 1671-1675 (1991)○
Absolute vibrational differential cross sections of water vapor by 30 and 50 eV electron impact. [E, H_2O; (011) and (100, 001) modes, 10 - 60°]

O K. Furuya, F. Koba and T. Ogawa : J. Chem. Phys. 106, 1764-1768 (1997a)
Branching ratio for the production of OD(A) and OH(A) by controlled electron impact on HOD. [E, H_2O + D_2O, HOD]

O K. Furuya, F. Koba and T. Ogawa : J. Chem. Phys. 107, 4979-4984 (1997b)
H(n=4)/D(n=4) branching ratio in the electron-impact dissociation of HOD.
[E, H_2O + D_2O, HOD; 22 - 100 eV]

S J. W. Gallagher, E. C. Beaty, J. Dutton and L. C. Pitchford : JILA Inform. Center Rep. No. 22, 1-258 (1982)・
A compilation of electron swarm data in electro-negative gases.
[compilation, H_2O, CF_4, SF_6, etc.]

S J. W. Gallagher, E. C. Beaty, J. Dutton and L. C. Pitchford : J. Phys. Chem. Ref. Data 12, 109-152 (1983)・
An annotated compilation and appraisal of electron swarm data in electronegative gases. [compilation, H_2O, HCl, Cl_2, CF_4, NH_3, etc.]

O J. W. Gallagher, C. E. Brion, J. A. R. Samson and P. W. Langhoff : J. Phys. Chem. Ref. Data 17, 9-153 (1988)
Absolute cross sections for molecular photoabsorption, partial photo-ionization, and ionic photofragmentation processes.
[compilation, H_2O, NO, H_2, N_2, O_2, CO, CO_2, N_2O, NH_3, CH_4, HF, HCl, HBr, HI, H_2S, CS_2, OCS, SO_2, SF_6, Cl_2, CCl_4]

O R. R. Gamache and R. W. Davies : Appl. Opt. 22, 4013-4019 (1983)
Theoretical calculations of N_2-broadened halfwidths of H_2O using quantum Fourier transform theory. [T, $h\nu$, H_2O]

O R. R. Gamache and L. S. Rothman : J. Mol. Spectrosc. 128, 360-369 (1988)
Temperature dependence of N_2-broadened halfwidths of water : the pure rotation and ν_2 bands. [T, $h\nu$, H_2O]

O R. R. Gamache, S. P. Neshyba, J. J. Plateaux, A. Barbe, L. Regalia and J. B. Pollack : J. Mol. Spectrosc. 170, 131-151 (1992)
CO_2-broadening of water-vapor lines.
[E, $h\nu$, H_2O; ν_1, $2\nu_2$, ν_3 bands, 294.4 K]

O R. R. Gamache, J. -M. Hartmann and L. Rosenmann : J. Quant. Spectrosc. Radiat. Transf. 52, 481-499 (1994)
Collisional broadening of water vapor lines — I. A survey of experimental results. [compilation, E, $h\nu$, H_2O]

O S. D. Gasster, C. H. Townes, D. Goorvitch and F. P. J. Valero : J. Opt. Soc. Am. B5, 593-601 (1988)
Foreign-gas collision broadening of the far-infrared spectrum of water vapor. [E, $h\nu$, H_2O; 25 - 112 cm^{-1}]

O D. M. Gates, R. F. Calfee, D. W. Hansen and W. S. Benedict : Natl. Bur. Stand. Monogr. No. 71, 1-83 (1964a)
Line parameters and computed spectra for water vapor bands at 2.7 μ. I. Line positions, strengths, and half-widths for water vapor bands ν_1, $2\nu_2$, and ν_3 in the interval 2857 to 4444 cm^{-1}. [T, $h\nu$, H_2O]

O D. M. Gates, R. F. Calfee and D. W. Hansen : Natl. Bur. Stand. Monogr. No. 71, 85-126 (1964b)
Line parameters and computed spectra for water vapor bands at 2.7 μ. II. Atlas of computed transmission spectra for 2.7 μ H_2O band. [T, $h\nu$, H_2O]

O A. Gedanken : J. Mol. Spectrosc. 82, 246-252 (1980)
The photodissociation of D_2O by vacuum ultraviolet excitation sources. [E, $h\nu$, D_2O; 1216, 1236 and 1302 A]

S N. Gee and G. R. Freeman : Can. J. Chem. 61, 1664-1670 (1983)
Electron and ion transport in gaseous methanol and water : Density and temperature effects. [E, H_2O, CH_3OH]

O K. R. German : J. Chem. Phys. 63, 5252-5255 (1975)
Radiative and predissociative lifetimes of the v' = 0, 1, and 2 levels of the $A^2\Sigma^+$ state of OH and OD. [E, OH, OD]

O F. A. Gianturco and D. G. Thompson : Chem. Phys. 14, 111-120 (1976)
Computed static potentials for AH_n molecules : A scattering-oriented form. [T, H_2O, NH_3, CH_4]

E F. A. Gianturco and D. G. Thompson : J. Phys. B13, 613-625 (1980)・
The scattering of slow electrons by polyatomic molecules. A model study for CH_4, H_2O and H_2S. [T, H_2O, H_2S, CH_4]

E F. A. Gianturco and A. Jain : Phys. Rep. 143, 347-425 (1986)・
The theory of electron scattering from polyatomic molecules. [review, H_2O, CH_4, SF_6, CO_2, H_2S, NH_3, SiH_4, etc. ; p. 404 - 405 for H_2O]

E F. A. Gianturco and S. Scialla : J. Chem. Phys. 87, 6468-6473 (1987)
Low-energy electron scattering from water molecules : A study of angular distributions. [T, H_2O; 2 - 20 eV]

E F. A. Gianturco and S. Scialla : in Electron-Molecule Scattering and Photoionization, Plenum 169-186 (1988)
Electron scattering by polyatomic molecules : Recent advances in theory and calculations. [review, H_2O, H_2S, CH_4, SiH_4]

E F. A. Gianturco : J. Phys. B24, 3837-3849 (1991)・
V Scattering of low-energy electrons from polyatomic targets : The water molecule example. [T, H_2O; 1 - 20 eV]

E F. A. Gianturco, S. Meloni, P. Paioletti and N. Sanna : 20th ICPEAC, Vienna WE 066 (1997)
The scattering of slow electrons from the water molecule. [T, H_2O]

E F. A. Gianturco, S. Meloni, P. Paioletti, R. R. Lucchese and N. Sanna : J. Chem. Phys.
R 108, 4002-4012 (1998)
Low-energy electron scattering from the water molecule : Angular distributions and rotational excitation. [T, H_2O; DCS, 2.14 - 50 eV]

EX T. J. Gil, T. N. Rescigno, C. W. McCurdy and B. H. Lengsfield Ⅲ : Phys. Rev. A49, 2642-2650 (1994)・
Ab initio complex Kohn calculations of dissociative excitation of water. [T, H_2O; DCS, 8 - 30 eV]

O R. D. Gilbert, M. S. Child and J. W. C. Johns : Mol. Phys. 74, 473-495 (1991)・
Rotational analysis and assignment of the 3d ← $1b_1$ Rydberg complex in H_2O and D_2O. [T, H_2O, D_2O]

O L. P. Giver, B. Gentry, G. Schwemmer and T. D. Wilkerson : J. Quant. Spectrosc. Radiat. Transf. 27, 423-436 (1982)
Water absorption lines, 931 - 961 nm : Selected intensities, N_2-collision-broadening coefficients, self-broadening coefficients, and pressure shifts in air. [E, $h\nu$, H_2O; 97 lines]

O W. A. Goddard Ⅲ and W. J. Hunt : Chem. Phys. Lett. 24, 464-471 (1974)・
The Rydberg nature and assignments of excited states of the water molecule. [T, H_2O]

I J.-C. Gomet : Compt. Rend. Acad. Sci. B281, 627-630 (1975)
Determination experimentale des sections efficaces absolues partielles d'ionisation de l'eau et de l'ammoniac par impact electronique. [E, H_2O, NH_3]

I J.-C. Gomet : Compt. Rend. Hebd. Seances Acad. Sci. B287, 77-79 (1978)
Determination experimentale des sections efficaces absolute partielles d'ionisation de l'hydrogene(H_2) par impact electronique. [E, H_2O, NH_3, H_2]

O D. M. Goodall, R. C. Greenhow, B. Knight, J. F. Holzwarth and W. Frisch : in Laser-Induced Processes in Molecules, Physics and Chemistry, Springer 283-285 (1979)
Single-photon infrared photochemistry : Wavelength and temperature dependence of the quantum yield for the laser-induced ionization of water. [E, $h\nu$, H_2O]

A J. M. Goodings and A. N. Hayhurst : Nature 281, 204-206 (1979)
Kinetics of electron attachment to oxygen and water in flames.
[E, H_2O, O_2]

E B. Gou, X. Yang and Q. Gou : 16th ICPEAC, New York 292-292 (1989)・
Calculations for the cross-sections of the elastic scattering of slow electrons by H_2O. [T, H_2O; 0 - 10 eV]

O W. B. Grant : Appl. Opt. 29, 451-462 (1990), Erratum 29, 3206-3206 (1990)
Water vapor absorption coefficients in the 8 - 13-μm spectral region : a critical review. [review, hν, H_2O]

EX A. E. S. Green, J. J. Olivero and R. W. Stagat : Proc. Biophys. Aspects Radiat. Qual. Symp. 79- (1971)
Microdosimetry of low energy electrons. [, H_2O,]

EX A. E. S. Green, C. H. Jackman and R. H. Garvey : J. Geophys. Res. 82, 5104-5111 (1977)
I Electron impact on atmospheric gases. 2. Yield spectra.
[T, H_2O, H_2, N_2, O_2, CO, He, Ar, O, CO_2, etc. ; 50 eV - 10 keV]

EX A. E. S. Green, Dayashankar, P. F. Schippnick, D. E. Rio and J. M. Schwartz : Radiat. Res. 104, 1-14 (1985)
Yield and concentration microplumes for electron impact on water.
[T, H_2O; energy degradation, 30 - 30000 eV, MCS]

E R. Greer and D. Thompson : J. Phys. B27, 3533-3546 (1994)・
R The scattering of low energy electrons by H_2O and H_2S.
[T, H_2O, H_2S; 2 - 10 eV (from table 1), DCS 6 and 10 eV]

E R. Greer and D. Thompson : J. Phys. B28, 4667-4674 (1995)
Chiral effects in the scattering of electrons by oriented H_2O and H_2S.
[T, H_2O, H_2S]

O J. K. Gregory : Chem. Phys. Lett. 282, 147-151 (1998)
The dipole moment of the water dimer. [T, $(H_2O)_2$]

O B. E. Grossmann and E. V. Browell : J. Mol. Spectrosc. 136, 264-294 (1989a)
Spectroscopy of water vapor in the 720-nm wavelength region : Line strengths, self-induced pressure broadenings and shifts, and temperature dependence of linewidths and shifts. [E, hν, H_2O; 300 - 400 K]

O B. E. Grossmann and E. V. Browell : J. Mol. Spectrosc. 138, 562-595 (1989b)
Water-vapor line broadening and shifting by air, nitrogen, oxygen, and argon in the 720-nm wavelength region. [E, hν, H_2O]

O G. Guelachvili : J. Opt. Soc. Am. 73, 137-150 (1983)
Experimental Doppler-limited spectra of the ν_2 bands of $H_2{}^{16}O$, $H_2{}^{17}O$, $H_2{}^{18}O$, and HDO by Fourier-transform spectroscopy : Secondary wave-number standards between 1066 and 2296 cm^{-1}. [E, hν, H_2O, HOD]

O P. Gurtler, V. Saile and E. E. Koch : Chem. Phys. Lett. 51, 386-391 (1977)
Rydberg series in the absorption spectra of H_2O and D_2O in the vacuum ultraviolet. [E, hν, H_2O, D_2O; 10 - 20 eV]

O G. N. Haddad and J. A. R. Samson : J. Chem. Phys. 84, 6623-6626 (1986)
Total absorption and photoionization cross sections of water vapor between 100 and 1000 A. [E, H_2O]

A R. I. Hall : 8th SPIG, Dubrovnik 59-70 (1976)・
Dissociative electron attachment. [review, H_2O, NO, CO, H_2, O_2]

O R. T. Hall, D. Vrabec and J. M. Dowling : Appl. Opt. 5, 1147-1158 (1966)
A high-resolution, far infrared double-beam Lamellar grating interferrometer. [E, $h\nu$, H_2O, DCl]

O R. T. Hall and J. M. Dowling : J. Chem. Phys. 47, 2454-2461 (1967)
Pure rotational spectrum of water vapor. [E, $h\nu$, H_2O; 5 - 125 cm^{-1}]

O R. T. Hall and J. M. Dowling : J. Chem. Phys. 52, 1161-1165 (1969)
Pure rotational spectrum of water from 108 to 40 μm. [E, $h\nu$, H_2O]

O Y. Harada and J. N. Murrell : Mol. Phys. 14, 153-164 (1968)
The correlation between molecular atomic Rydberg levels. Part I.
An analysis of the Rydberg states of water. [T, H_2O]

O J. W. Harder and J. M. Braut : J. Geophys. Res. 102, 6245-6252 (1997)
Atmospheric measurements of water vapor in the 442-nm region.
[E, $h\nu$, H_2O]

D H. J. Hartfuss and A. Schmillen : 10th ICPEAC, Paris 584-585 (1977)
Excitation cross sections for the H-states 3s, 3p, 3d after the dissociative excitation of some H-containing molecules after e^- impact.
[E, H_2O,

O J. N. Harvey, J. O. Jung and R. B. Gerber : J. Chem. Phys. 109, 8747-8750 (1998)
Ultraviolet spectroscopy of water clusters : Excited electronic states and absorption line shapes of $(H_2O)_n$, n = 2 - 6. [T, $h\nu$, $(H_2O)_n$]

O Ya. Hatano, T. Nomura and K. Tanaka : Int. J. Quant. Chem. 13, 207-220 (1978)
Calculation of excited states of H_2O and NH_3 by the one-center expansion approximation. [T, H_2O, NH_3]

D Yo. Hatano : Symposium on Electron-Molecule Collisions, Tokyo 135-147 (1979)
Translational spectroscopy of electron-impact dissociation of some simple molecules by Doppler profile measurements of Balmer-α emission.
[review, H_2O, H_2S, H_2, CH_4]

EX G. Hayakawa : Proc. Phys. Math. Soc. Jpn. 26, 78-80 (1944)・
Simultaneons dissociation and excitation of H_2O molecules by electron impact. [E, H_2O; emission from OH and H]

E M. Hayashi : in Swarm Studies and Inelastic Electron-Molecule Collisions,
V Springer-Verlag 167-187 (1987)
EX Electron collision cross-sections for molecules determined from beam
I, A and swarm data. [compilation, for H_2O, p. 278]

E M. Hayashi : Atomic and Molecular Data for Radiotherapy. Proceeding of an
V IAEA Advisory Group Meeting, Vienna, Report No. IAEA-TECDOC-506,
EX 193-199 (1989)
I Electron collision cross-sections for atoms and molecules determined from
A beam and swarm data. [compilation, H_2O]

O M. Hayashi and Y. Nakamura : EMS-99, Tokyo 175-176 (1999)・
May we measure the exact values of electron collision cross sections for molecues by beam and swarm experiments ? [general comments; H_2O is the mixture of $H_2O(g)$ + $H_2O(r)$ + $H_2O(v)$ molecules]

O A. Henglein and G. A. Muccini : Z. Naturforsch. 17a, 452-460 (1962)・
Mass spectrometric observation of electron and proton transfer reactions between positive ions and neutral molecules.
[E, H_2O, H_2S, HCl, NH_3, CH_4, etc.]

O H. J. Henning : Ann. Phys. 13, 599-620 (1932)
Die Absorptionsspektren von Kohlendioxyd, Kohlenmonoxyd und Wasserdampf im Gebiet von 600 - 900 AE. [E, $h\nu$, H_2O, CO, CO_2]

O G. Herzberg : Molecular Spectra and Molecular Structure. Ⅱ. Infrared and Raman Spectra of Polyatomic Molecules, Van Nostrand (1945)

O G. Herzberg : Molecular Spectra and Molecular Structure. Ⅲ. Electronic Spectra and Electronic Structures of Polyatomic Molecules, Van Nostrand (1966)

E W. Hilgner, J. Kessler and E. Steel : Z. Phys. 221, 324-332 (1969)
Zur Spinpolarisation langsamer Elektronen nach der Streuung an Molekulen. Ⅱ. Wismuttriphenyl und Benzol, Wasser, Tetrachlorokohlenstoff.
[E, H_2O, C_6H_6, CCl_4; DCS rel., 60 - 300 eV, 30 - 150°]

O P. R. Hilton, S. Nordholm and N. S. Hush : Chem. Phys. 15, 345-361 (1976)
Molecular photoionization cross sections calculated by an effective plane wave method. [T, $h\nu$, H_2O, He - Kr, H_2, CO, C_2H_4; 0 - 1500 eV]

O P. R. Hilton, S. Nordholm and N. S. Hush : Chem. Phys. Lett. 64, 515-518 (1979)
Photoionization cross section of water by an atomic extrapolation method. [T, $h\nu$, H_2O; th. - 50 eV]

O K. Hirao and H. Nakatsuji : Chem. Phys. Lett. 79, 292-298 (1981)
Cluster expansion of the wavefunction. Symmetry-adapted-cluster (SAC) theory for excited states. [T, H_2O, Be, CH_2]

O K. Hirao and Y. Hatano : Chem. Phys. Lett. 111, 533-538 (1984)・
Full CI and SAC CI calculations for ionized states, electron-attached states and triplet excited states of H_2O. [T, H_2O]

O K. Hirao : Chem. Phys. Lett. 201, 59-66 (1993)
State-specific multireference Mϕller-Plesset purturbation treatment for singlet and triplet excited states, ionized states and electron attached states of H_2O. [T, H_2O]

O D.M.Hirst and M.S.Child : Mol.Phy.77,463-476 (1992)
Ab initio bending potential-energy curves for Rydberg states of H_2O.
[T, H_2O]

O A.Hodgson, J.P.Simons, M.N.R.Ashfold, J.M.Bayley and R.N.Dixon : Chem.Phys. Lett.107,1-5 (1984)
Quantum-state-selected photodissociation of $H_2O(C\ ^1B_1)$. [E, $h\nu$, H_2O]

O A.Hodgson, J.P.Simons, M.N.R.Ashfold, J.M.Bayley and R.N.Dixon : Mol.Phys.54, 351-368 (1985)
Quantum state-selected photodissociation dynamics in H_2O and D_2O.
[E, H_2O, D_2O]

E R.E.Hoffmeyer, A.J.Thakkar, H.Wei and T.Carrington, Jr. : Chem.Phys.Lett.207,
O 407-413 (1993)
Vibrational effects on cross sections for elastic scattering of X-rays and fast electrons by H_2O molecules. [T, H_2O; $>$ 25 keV]

O R.E.Hoffmeyer, P.Bundgen and A.J.Thakkar : J.Phys.B31,3675-3692 (1998)・
Cross sections for X-ray and high-energy electron scattering by small molecules. [T, H_2O, NH_3, N_2, O_2, SiH_4, CO_2, B_2H_6]

I K.W.Hollman, G.W.Kerby Ⅲ, M.E.Rudd, J.H.Miller and S.T.Manson : Phys.Rev.A38, 3299-3302 (1988)・
Differential cross sections for secondary electron production by 1.5-keV electrons in water vapor. [E, H_2O]

O S.T.Hood, A.Hamnett and C.E.Brion : J.Elect.Spectrosc.Relat.Phenom.11, 205-224 (1977)・
Molecular orbital momentum distributions and binding energies for H_2O using an electron impact coincidence spectrometer. [E, H_2O, Xe, CH_4]

O T.Horie, T.Nagura and M.Otsuka : Phys.Rev.104,547-548 (1956a)
R Abnormal rotation in radiative collision of electrons with water molecules.
[E, H_2O]

EX T.Horie, T.Nagura and M.Otsuka : J.Phys.Soc.Jpn.11,1157-1170 (1956b)
Radiative collisions between electronic and molecular beams. I. Angular momentum distribution among OH^x radicals resulting from H_2O molecules.
[E, H_2O]

EX T.Horie, T.Nagura and M.Otsuka : Ann.Rep.Sci.Works Fac.Sci.Osaka Univ.4, 11- (1956c)
Radiative collisions of electronic and ionic beams with water molecules.
[E, H_2O]

R T.Horie and T.Kasuga : J.Chem.Phys.40,1683-1686 (1964)
Statistical model including angular momentum conservation for abnormal rotation of OH^x split from water. [T, H_2O]

O J. A. Horsley and W. H. Fink : J. Chem. Phys. 50, 750-758 (1969)
Ab initio calculation of some lower-lying excited states of H_2O.
[T, H_2O]

O J. A. Horsley and F. Flouquet : Chem. Phys. Lett. 5, 165-167 (1970)
The dissociation of NH_3 and H_2O in excited states. [T, H_2O, NH_3]

O W. J. Hunt and W. A. Goddard III : Chem. Phys. Lett. 3, 414-418 (1969)
Excited states of H_2O using improved virtual orbitals. [T, H_2O]

O W. J. Hunt, P. J. Hay and W. A. Goddard III : J. Chem. Phys. 57, 738-748 (1972)
Self-consistent procedures for generalized valence bond wavefunctions.
Applications H_3, BH, H_2O, C_2H_6, and O_2. [T, H_2O, H_3, BH, C_2H_6, O_2]

S G. S. Hurst, L. B. O'Kelly and T. E. Bortner : Phys. Rev. 123, 1715-1718 (1961)
A Dissociative electron capture in water vapor. [E, H_2O]

A G. S. Hurst, L. B. O'Kelly and J. A. Stockdale : Nature 195, 66-67 (1962)
Quasi-trapping of low-energy electrons in water vapour. [E, H_2O]

S G. S. Hurst, J. A. Stockdale and L. B. O'Kelly : J. Chem. Phys. 38, 2572-2578 (1963)·
A Interaction of low-energy electrons with water vapor and with other polar molecules. [E, H_2O + (N_2, CH_4, C_2H_4, CO_2)]

S L. G. H. Huxley and R. W. Crompton : The Diffusion and Drift of Electrons in Gases, Wiley-Interscience (1974) [data for H_2O, p. 648-651]

I W. Hwang, Y.-K. Kim and M. E. Rudd : J. Chem. Phys. 104, 2956-2966 (1996)
New model for electron-impact ionization cross sections of molecules.
[T, H_2O, H_2, N_2, O_2, CO, NO, CH_4, SiF_3, SF_6 and other molecules]

O M. Inokuti : Rev. Mod. Phys. 43, 297-347 (1971)
Inelastic collisions of fast charged particles with atoms and molecules — The Bethe theory revisited. [general theory]

O M. Inokuti, Y. Itikawa and J. E. Turner : Rev. Mod. Phys. 50, 23-35 (1978)
Addenda : Inelastic collisions of fast charged particles with atoms and molecules — The Bethe theory revisited [Rev. Mod. Phys. 43, 297 (1971)].
[general theory]

O M. Inokuti (editor) : Argonne Natl. Lab. Rep. No. 84-28 (1984)
E Proc. of the Workshop on Electronic and Ionic Collision Cross Sections
EX Needed in the Modeling of Radiation Interactions with Matter.
I [27 papers given by]

O M. Inokuti : Photochem. Photobiol. 44, 279-285 (1986)
VUV absorption and its relation to the effects of ionizing corpuscular radiation. [review, $h\nu$, general discussion]

E M. A. Ishii, M. Kimura and M. Inokuti : Phys. Rev. A42, 6486-6496 (1990)·
V Electron degradation and yield of initial products. VII. Subexcitation electrons in gaseous and solid H_2O. [T, H_2O; cross section set]

O E. Ishiguro, M. Sasanuma, H. Masuko, Y. Morioka and M. Nakamura : J. Phys. B11, 993-1010 (1978)
Absorption spectra of H_2O and D_2O molecules in the vacuum-ultraviolet region. [E, $h\nu$, H_2O, D_2O; 500 - 1130 A]

E Y. Itikawa : Planet. Space Sci. 19, 993-1007 (1971a)・
Effective collision frequency of electrons in atmospheric gases.
[T, H_2O, N_2, O_2, H_2, CO_2, O, H, He]

R Y. Itikawa : J. Phys. Soc. Jpn. 31, 1532-1535 (1971b)
Effects of the polarization force on the rotational transition in polyatomic molecules by electron collision.
[T, H_2O, NH_3, H_2CO; th. - 0.1 eV]

R Y. Itikawa : J. Phys. Soc. Jpn. 32, 217-226 (1972)・
Rotational transition in an asymmetric-top molecule by electron collision : Applications to H_2O and H_2CO. [T, H_2O, H_2CO]

V Y. Itikawa : J. Phys. Soc. Jpn. 36, 1127-1132 (1974a)・
Electron-impact vibrational excitation of H_2O. [T, H_2O; th. - 100 eV]

E Y. Itikawa : Atomic Data Nucl. Data Tables 14, 1-10 (1974b)
Momentum-transfer cross sections for electron collisions with atoms and molecules. [compilation, H_2O,

E Y. Itikawa : Atomic Data Nucl. Data Tables 21, 69-75 (1978)
Momentum-transfer cross sections for electron collisions with atoms and molecules. Revision and supplement, 1977. [compilation, H_2O, etc.]

Y. Itikawa, Y. Okamoto, K. Onda and T. Nishimura : Atomic Colli. Res. in Jpn. 19, 1-3 (1993)
Electron scattering from polyatomic molecules.
[T, H_2O, O_3; DCS, 30 eV for H_2O]

V Y. Itikawa : Int. Rev. in Phys. Chem. 16, 155-176 (1997)・
Electron-impact vibrational excitation of polyatomic molecules.
[review, H_2O, H_2S, CH_4]

E Y. Itikawa : EMS-99, Tokyo 42-45 (1999)
V Recent advances in the theory of electron-molecule collisions.
[T, review, H_2O, H_2S, CO_2, etc.]

D K. Ito, N. Oda, N. Kouchi, Y. Hatano and T. Tsuboi : 10th ICPEAC, Paris 572-573 (1977)
Doppler profile measurements of Balmer-α by electron impact on simple molecules. [E, H_2O,]

O S. Iwata and S. Nagakura : Mol. Phys. 27, 425-440 (1974)
Theoretical study of the photoelectron intensities and angular distributions. [T, $h\nu$, H_2O, H_2S, NH_3, HF, Ne, Ar]

O C. F. Jackels : J. Chem. Phys. 72, 4873-4884 (1980)
An ab initio potential-energy surface study of several states of the water cation. [T, H_2O]

O N. Jacquinet-Husson, E. Arie, J. Ballard, A. Barbe, G. Bjoraker, B. Bonnet, L. R. Brown, C. Camy-Peyret, et al. : J. Quant. Spectrosc. Radiat. Transf. 62, 205-254 (1999)・
The 1997 spectroscopic GEISA databank. [compilation, $h\nu$, H_2O, etc.]

E A. Jain and D. G. Thompson : J. Phys. B15, L631-L637 (1982)・
Elastic scattering of slow electrons by CH_4 and H_2O using a local exchange potential and new polarization potential.
[T, H_2O, CH_4; 1 - 10 eV for H_2O]

V A. Jain and D. G. Thompson : J. Phys. B16, L347-L354 (1983a)・
Vibrational excitation of symmetric and bending modes of H_2O by slow electron impact. [T, H_2O; th. - 10 eV]

R A. Jain and D. G. Thompson : J. Phys. B16, 3077-3098 (1983b) K
Rotational excitation of CH_4 and H_2O by slow electron impact.
[T, H_2O, CH_4]

E A. Jain, D. G. Thompson and A. Jain : 15th ICPEAC, Brighton 271-271 (1987)
Elastic scattering of electrons by water molecules at intermediate and high energies. [T, H_2O]

QT A. Jain : J. Phys. B21, 905-924 (1988)・K
Theoretical study of the total (elastic + inelastic) cross sections for electron - H_2O (NH_3) scattering at 10 - 3000 eV. [T, H_2O, NH_3]

E A. Jain, F. A. Gianturco and D. G. Thompson : J. Phys. B24, L255-L261 (1991)・
Exact-exchange treatment in electron-polyatomic molecule collisions in a computationally optimized iterative scheme.
[T, H_2O, 0.5 - 6 eV]

E A. K. Jain, A. N. Tripathi and A. Jain : Phys. Rev. A37, 2893-2899 (1988)・
Elastic scattering of electrons by water molecules at intermediate and high energies. [T, H_2O; 100 - 1000 eV]

I D. K. Jain and S. P. Khare : J. Phys. B9, 1429-1438 (1976)・
Ionizing collisions of electron with CO_2, CO, H_2O, CH_4 and NH_3.
[T, H_2O, CO_2, CO, CH_4, NH_3]

O A. Johannin-Gilles : Compt. Rend. Acad. Sci. 236, 676-678 (1953)
Absorption de la vapeur d'eau dans l'ultraviolet de Schumann.
[E, $h\nu$, H_2O]

O A. Johannin-Gilles : Compt. Rend. Acad. Sci. 240, 1523-1525 (1955a)
Absorption de la vapeur d'eau dans l'ultraviolet de Schumann.
[E, $h\nu$, H_2O]

O A. Johannin-Gilles : J. Rech. Cent. Nat. Rech. Sci. 6, 205-240 (1955b)
Absorption dans l'ultraviolet de Schumann etude de la vapeur d'eau et d'eau lourde. [E, $h\nu$, H_2O, D_2O]

O A. Johannin-Gilles, N. Astoin et B. Vodar : Cahiers Physiq. 71-72, 49-53 (1956)
Discussion des spectres d'absorption de H_2O et D_2O dans l'ultraviolet lointain. [E, $h\nu$, H_2O, D_2O]

O J. W. C. Johns : Can. J. Phys. 41, 209-219 (1963)・
On the absorption spectrum of H_2O and D_2O in the vacuum ultraviolet.
[E, H_2O, D_2O]

O J. W. C. Johns : Can. J. Phys. 49, 944-947 (1971)
Inertial defect and geometry of H_2O in the C $^1B_1$ state. [T, H_2O, D_2O]

O J. W. C. Johns : J. Opt. Soc. Am. B2, 1340-1354 (1985)
High-resolution far-infrared (20 - 350-cm^{-1}) spectra of several isotopic species of H_2O. [E, $h\nu$, $H_2{}^{16}O$, $H_2{}^{18}O$, $HD^{16}O$, $HD^{18}O$, $D_2{}^{16}O$, $D_2{}^{18}O$]

EX C. A. F. Johnson, S. D. Kelly and J. E. Parker : Chem. Phys. Lett. 116, 30-34 (1985)
Triplet states in the dissociative excitation of water by electron impact.
[E, H_2O; 9 - 180 eV]

E W. M. Johnstone and W. R. Newell : J. Phys. B24, 3633-3643 (1991)○
Absolute vibrationally elastic cross sections for electrons scattered from water molecules between 6 eV and 50 eV. [E, H_2O; DCS]

O D. Jonsson, P. Norman and H. Agren : Chem. Phys. 224, 201-214 (1997)
Single determinant calculations of excited state polarizabilities.
[T, H_2O, O_3, H_2CO, C_2H_4, etc.]

O U. G. Jφrgensen and P. Jensen : J. Mol. Spectrosc. 161, 219-242 (1993)
The dipole moment surface and the vibrational transition moments of H_2O.
[T, H_2O]

E K. N. Joshipura, M. Vinodkumar and P. M. Patel : Pramana J. Phys. 43, 495-502 (1994)
Vibrationally elastic e^- - H_2O scattering at intermediate energies.
[T, H_2O; DCS, 10 - 300 eV]

K. N. Joshipura and M. Vinodkumar : Pramana J. Phys. 47, 57-63 (1996)
Cross sections and other parameters of e^- - H_2O scattering ($E_i \geqq 50$ eV).
[T, H_2O, NH_3, CH_4

QT K. N. Joshipura and M. Vinodkumar : Phys. Lett. A224, 361-366 (1997a)
Electron scattering cross sections with HF, OH, NH and CH molecules.
[T, OH, HF, etc.]

I K. N. Joshipura, M. Vinodkumar and D. Garg : 20th ICPEAC, Vienna WE 090 (1997b)
Collisions of electrons with H_2O in vapour and in condensed phases.
[T, H_2O]

I K. N. Joshipura and M. Vinodkumar : Int. J. Mass Spectrom. Ion Process. 177, 137-141 (1998)・
Ionizing collisions of electrons with H_2O molecules in ice and in water.
[T, H_2O; gas and condenced phase]

O K.N.Joshipura and M.Vinodkumar : 21st ICPEAC, Sendai 312 (1999)·
I Ionizing impact of electrons on H_2O(ice) and H_2O(liq.). [T, H_2O]

R K.Jung, Th.Antoni, R.Muller, K.-H.Kochem and H.Ehrhardt : J.Phys.B15, 3535-3555 (1982)○K
Rotational excitation of N_2, CO and H_2O by low-energy electron collisions.
[E, H_2O, N_2, CO; DCS, 2.14 and 6 eV, 15 - 105°]

A M.Jungen, J.Vogt and V.Staemmler : Chem.Phys.37, 49-55 (1979)·K
Feshbach-resonances and dissociative electron attachment of H_2O.
[E, H_2O, D_2O; O^- and HO^-]

EX J.Jureta, S.Cvejanovic, D.Cvejanovic and D.Cubric : 13th ICPEAC, Berlin 268-268 (1983)
Threshold excitation of H_2O, D_2O and H_2S. [E, H_2O, D_2O, H_2S]

O U.Kaldor : J.Chem.Phys.87, 467-471 (1987)·K
The open-shell coupled-cluster method : Excitation energies and ionization potentials of H_2O. [T, H_2O]

O K.Karlsson, L.Mattsson, R.Jadrny, R.G.Albridge, S.Pinchas, T.Bergmark and K.Siegbahn : J.Chem.Phys.62, 4745-4752 (1975)
Isotopic and vibronic coupling effects in the valence electron spectra of $H_2{}^{16}O$, $H_2{}^{18}O$, and $D_2{}^{16}O$.
[E, H_2O, D_2O; $V_1(H_2O)$ = 12.615 eV, $V_1(D_2O)$ = 12.633 eV]]

E A.Katase, K.Ishibashi, Y.Matsumoto, T.Sakae, S.Maezono, E.Murakami, K.Watanabe and H.Maki : J.Phys.B19, 2715-2734 (1986)○K
Elastic scattering of electrons by water molecules over the range 100 - 1000 eV. [E, H_2O; DCS, 5/10 - 130°]

O D.H.Katayama, R.E.Huffman and C.L.O'Bryan : J.Chem.Phys.59, 4309-4319 (1973)
Absorption and photoionization cross sections for H_2O and D_2O in the vacuum ultraviolet.
[E, $h\nu$, H_2O, D_2O; 580 - 1050 A, $V_1(H_2O)$ = 12.619 eV, $V_1(D_2O)$ = 12.636 eV]

O S.Katsumata, Y.Achiba and K.Kimura : J.Elect.Spectrosc.Relat.Phenom.17, 229-236 (1979)
Photoelectron angular distribution of simple molecules at 30.4 nm photons.
[E, $h\nu$, H_2O, CO_2, CS_2, N_2, O_2]

QT W.E.Kauppila and T.S.Stein : in Advances in Atomic, Molecular, and Optical Physics, Vol.26, Academic 1-50 (1990)
Comparisons of positron and electron scattering by gases. [review, H_2O, CO_2, N_2O, H_2, N_2, CO, O_2, NH_3, CH_4, SiH_4, CF_4, SF_6, He - Xe, Na, K, etc.]

D H.Kawazumi and T.Ogawa : Chem.Phys.114, 149-155 (1987)
Dissociation of water by controlled electron impact : Rotational and translational energies of $OH(X^2\Pi_i)$ fragment. [E, H_2O]

D W. Kedzierski, J. Derbyshire, C. Malone and J. W. McConkey : J. Phys. B31, 5361-5368 (1998) K
Isotope effects in the electron impact break-up of water.
[E, H_2O, D_2O; th. - 325 eV]

O C. W. Kern and M. Karplus : in Water, A Comprehensive Treatise, Plenum, ed. by F. Franks 21-91 (1972)
The water molecules.

O G. A. Khachkuruzov : Opt. Spectrosc. 6, 294-300 (1959)
Vibrational constants of the water molecule.
[compilation, H_2O; 40 vib. levels]

I S. P. Khare and W. J. Meath : J. Phys. B20, 2101-2116 (1987) ·K
Cross sections for the direct and dissociative ionization of NH_3, H_2O, and H_2S by electron impact. [T, H_2O, H_2S, NH_3; th. - 10 keV]

I S. P. Khare, S. Prakash and W. J. Meath : Int. J. Mass Spectrom. Ion Phys. 88, 299-308 (1989) ·
Dissociative ionization of NH_3 and H_2O molecules by electron impact.
[T, H_2O, NH_3; th. - 10^4 eV]

O S. V. Khristenko, A. I. Maslov and V. P. Shevelko : Molecules and Their Spectroscopic Properties, Springer (1997)

EX L. J. Kieffer : Proc. of the Workshop on Dissociative Excitation of Simple Molecules, JILA Inform. Center Report, No. 12, Appendix B 1-65 (1972)
Line and band emission cross section data for low energy electron impact.
[, H_2O, NO, H_2, O_2, CO, CO_2, D_2, N_2, CH_4, CD_4, C_2H_4, C_2H_6, NH_3]

O K. Kimura, Y. Achiba, M. Morishita and T. Yamazaki : J. Elect. Spectrosc. Relat. Phenom. 15, 269-274 (1979)
Vacuum UV photoelectron intensity of gaseous compounds. I. He I spectra of simple compounds. [E, H_2O, N_2, O_2, CO, NH_3, CH_4]

E M. Kimura and M. Inokuti : Comments At. Mol. Phys. 24, 269-286 (1990) ·
V Subexcitation electrons in molecular gases.
[comments, H_2O, N_2, CO_2, O_2]

E M. Kimura and H. Sato : Comments At. Mol. Phys. 26, 333-355 (1991)
V Electron-polyatomic molecule collisions : Analysis using the continuum multiple scattering method. [comments]

O D. Kley : J. Atmos. Chem. 2, 203- (1984)
Lyman-α absorption cross-section of H_2O and O_2.
[E, $h\nu$, H_2O, O_2]

A C. E. Klots and R. N. Compton : J. Chem. Phys. 69, 1644-1647 (1978)
Electron attachment to van der Waals polymers of water. [E, $(H_2O)_N$]

EX K. N. Klump and E. N. Lassettre : Can. J. Phys. 53, 1825-1831 (1975)
Excitation energy of $^3B_1$ state of H_2O calculated from generalized oscillator strengths. [E, H_2O; 300 - 600 eV]

O B. Knight, D. M. Goodall and R. C. Greenhow : J. Chem. Soc. Faraday Trans. II, 75, 841-856 (1979)
Single-photon vibrational photochemistry. Part 1. — Wavelength and temperature dependence of the quantum yield for the laser-induced ionization of water. [E, $h\nu$, H_2O]

EX F. W. E. Knoop, H. H. Brongersma and L. J. Oosterhoff : 7th ICPEAC, Amsterdam, 1077-1079 (1971)・
Triplet excitation of water and methanol by low energy electron impact spectroscopy. [E, H_2O, CH_3OH]

EX F. W. E. Knoop, H. H. Brongersma and L. J. Oosterhoff : Chem. Phys. Lett. 13, 20-23 (1972a)
Triplet excitation of water and methanol by low-energy electron-impact spectroscopy. [E, H_2O, CH_3OH]

F. W. E. Knoop : PhD Thesis, Rijks Univ., Leiden (1972b)

A I. V. Kochetov, L. V. Shachkin and V. M. Shashkov : Sov. Phys. Tech. Phys. 29, 731-734 (1984)
Electron attachment in O_2 - CO_2 and O_2 - H_2O mixtures and its dependence on the electron temperature. [E, $H_2O + O_2$, $CO_2 + O_2$]

α M. R. Kodali : PhD Thesis, SRI Venkateswara University (1982)
Studies of electron swarm data in certain gases and vapours.
[E, H_2O, NH_3, O_2, N_2, $N_2 + O_2$]

O A. Korosmezey, T. E. Cravens, T. I. Gombosi, A. F. Nagy, D. A. Mendis, K. Szego, B. E. Gribov, R. Z. Sagdeev, V. D. Shapiro and V. I. Shevchenko : J. Geophys. Res. 92, 7331-7340 (1987)・
A new model of cometary ionospheres. [T, H_2O, H_3O^+]

D N. Kouchi, K. Ito, Y. Hatano, N. Oda and T. Tsuboi : Chem. Phys. 36, 239-245 (1979)
Translational spectroscopy of electron-impact dissociative excitation of H_2O and D_2O by Doppler profile measurements of Balmer-α emission.
[E, H_2O, D_2O]

O K. Kowari and S. Sato : Bull. Chem. Soc. Jpn. 51, 741-747 (1978)
The spatial distribution of secondary electrons produced in the γ-radiolysis of water. [T, H_2O in the liquid phase]

EX K. Kowari and S. Sato : Bull. Chem. Soc. Jpn. 54, 2878-2881 (1981)・
I On the continuous slowing down approximation for the degradation spectra of secondary electrons. [T, H_2O, He]

O H. J. Krautwald, L. Schnieder, K. H. Welge and M. N. R. Ashfold : Faraday Diss. Chem. Soc. 82, 99-110 (1986)
Hydrogen-atom photofragmentation spectroscopy. Photodissociation dynamics of H_2O in the B - X absorption band. [E, $h\nu$, H_2O]
[General discussion, p. 187 - 194, discussed by A. Hodgson, L. J. Dunne, J. N. Murrel, and M. N. R. Ashfold and R. N. Dixon]

A E. Krishnakumar and S. K. Srivastava : Phys. Rev. A41, 2445-2452 (1990)
Dissociative attachment of electrons to N_2O.
[E, H_2O, N_2O; O^-/H_2O, 1.38×10^{-18} cm^2 at 12.0 eV]

O P. L. Kronebusch and J. Berkowitz : Int. J. Mass Spectrom. Ion Phys. 22, 283-306 (1976)·
Photodissociative ionization in the 21 - 41 eV region : O_2, N_2, CO, NO, CO_2, H_2O, NH_3 and CH_4. [E, $h\nu$, H_2O, NO, etc.]

EX A. N. Kuchenev and Yu. M. Smirnov : J. Appl. Spectrosc. 54, 128- (1991)

EX A. N. Kuchenev and Yu. M. Smirnov : Can. J. Phys. 74, 267-278 (1996)·
Excitation of H_2O^+ in e - H_2O collisions.
[E, H_2O; optical emission, th. - 200 eV]

A E. Kuffel : Proc. Phys. Soc. London. 74, 297-308 (1959)
Electron attachment coefficients in oxygen, dry air, humid air, and water vapour. [E, H_2O, O_2, $N_2 + O_2$, $N_2 + O_2 + H_2O$]

E M. Kumar, A. N. Tripathi and V. H. Smith, Jr. : Int. J. Quant. Chem. 29, 1339-1349
EX (1986)
I Scattering of high-energy electrons and X-rays from molecules : The 10-
O electron series Ne, HF, H_2O, NH_3, and CH_4.
[T, H_2O, Ne, HF, NH_3, CH_4]

O M. A. Kurbanov, K. F. Mamedov and V. R. Rustamov : High Energy Chem. 22, 158- (1988)
Effect of temperature on the radiolysis of CH_4 and $CH_4 + H_2O$ mixtures.
[E, $H_2O + CH_4$, CH_4]

I M. Kurepa, S. Madzunkov and I. Cadez : Balk. Phys. Lett. 6, 14-20 (1999)
Energy and angular distribution of positive ions from dissociative ionization processes. [E, H_2O, H_2, CH_4]

O Y. Y. Kwan : J. Mol. Spectrosc. 71, 260-280 (1978)
The interacting states of an asymmetric top molecule XY_2 of the group C_{2v}. Application to five interacting states (101), (021), (120), (200), and (002) of $H_2{}^{16}O$. [T, $h\nu$, H_2O]

I F. W. Lampe, J. L. Franklin and F. H. Field : J. Am. Chem. Soc. 79, 6129-6132 (1957)
Cross sections for ionization by electrons.
[E, H_2O, NH_3, He - Xe, H_2S, HCl, NO, etc.; 75 eV]

E N. F. Lane : Rev. Mod. Phys. 52, 29-119 (1980)
The theory of electron-molecule collisions.
[review, H_2O, H_2, N_2, O_2, CO, CO_2, NO, N_2O, HF, HCl, HBr]

O S. Langlois, T. P. Birbeck and R. K. Hanson : J. Mol. Spectrosc. 163, 27-42 (1994a)
Diode laser measurements of H_2O line intensities and self-broadening coefficients in the 1.4-μm region.
[E, $h\nu$, H_2O; $\nu_1 + \nu_3$, $2\nu_1$ bands]

O S. Langlois, T. P. Birbeck and R. K. Hanson : J. Mol. Spectrosc. 167, 272-281 (1994b)
Temperature-dependent collision-broadening parameters of H_2O lines in the 1.4-μm region using diode laser absorption spectroscopy.
[E, hν, H_2O; 300 - 1200 K]

O S. R. La Paglia : J. Chem. Phys. 41, 1427-1431 (1964)
Theory of Rydberg series in polyatomic molecules : H_2O. [T, H_2O]

O F. P. Larkins : J. Elect. Spectrosc. Relat. Phenom. 67, 159-162 (1994)・
Influence of core hole screening on molecular Auger rates and inner-shell lifetimes. [T, H_2O, CH_4, NH_3, HF, SiH_4, PH_3, H_2S, HCl]

EX E. N. Lassettre and E. R. White : Scientific Rep. 12, Ohio State University Ad-152 643, 1-52 (1958)
Electronic collision cross sections of water vapor. [E, H_2O]

EX E. N. Lassettre : Radiation Res. Suppl. 1, 530-546 (1959)・
Collision cross section studies on molecular gases and the dissociation of oxygen and water. [E, H_2O, O_2]

EX E. N. Lassettre and S. A. Francis : J. Chem. Phys. 40, 1208-1217 (1964)・
Inelastic scattering of 390-v electrons by helium, hydrogen, methane, ethane, cyclohexane, ethylene and water. [E, H_2O, He, H_2, CH_4, etc.]

EX E. N. Lassettre, A. Skerbele, M. A. Dillon and K. J. Ross : J. Chem. Phys. 48, 5066-5096 (1968)
High-resolution study of electron-impact spectra at kinetic energies between 33 and 100 eV and scattering angles to 16°.
[E, H_2O, He, CO, N_2, NH_3, CO_2, O_2, Ar, NO, N_2O, C_2H_4, C_2H_2, C_6H_6]

EX E. N. Lassettre and E. R. White : J. Chem. Phys. 60, 2460-2463 (1974a) K
Generalized oscillator strengths through the water vapor spectrum to 75 eV excitation energy ; electron kinetic energy 500 eV.
[E, H_2O]

EX E. N. Lassettre and A. M. Skerbele : J. Chem. Phys. 60, 2464-6469 (1974b)
Generalized oscillator strengths for 7.4 eV excitation of H_2O at 300, 400, and 500 eV kinetic energy. Singlet-triplet energy differences. [E, H_2O]

EX E. N. Lassettre and W. M. Huo : J. Chem. Phys. 61, 1703-1707 (1974c)
Negative ion contamination of electron impact spectra. [T, H_2O]

O A. H. Laufer and J. R. McNesby : Can. J. Chem. 43, 3487-3490 (1965)
Deuterium isotope effect in vacuum-ultraviolet absorption coefficients of water and methane. [E, hν, H_2O, D_2O, CH_4, CD_4, C_2H_6, C_3H_8, c-C_3H_6, etc.]

O J. A. LaVerne and S. M. Pimblott : J. Phys. Chem. 101, 4504-4510 (1997)
Effect of elastic collisions on energy deposition by electrons in water.
[T, H_2O; MCS, 0.1 - 100 keV]

EX G. M. Lawrence : Phys. Rev. A2, 397-407 (1970)・
Dissociative excitation of some oxygen-containing molecules : Lifetimes and electron impact cross sections.
[E, H_2O, N_2, O_2, CO, NO; 35 - 600 eV for H_2O]

O J. S. Lee : J. Chem. Phys. 106, 4022-4027 (1997)・
Theoretical study of barrier height to linearity of bent triatomic molecules. [T, H_2O, CH_2]

O L. C. Lee, L. Oren, E. Phillips and D. L. Judge : J. Phys. B11, 47-54 (1978)
Cross sections for production of the $OH(A^2\Sigma^+ \rightarrow X^2\Pi)$ fluorescence by photodissociation of H_2O vapour. [E, $h\nu$, H_2O]

O L. C. Lee : J. Chem. Phys. 72, 4334-4340 (1980)
$OH(A^2\Sigma^+ \rightarrow X^2\Pi_i)$ yield from H_2O photodissociation in 1050 - 1370 A.
[E, $h\nu$, H_2O; 1050 - 1370 A]

O L. C. Lee and M. Suto : Chem. Phys. 110, 161-169 (1986)・
Quantitative photoabsorption and fluorescence study of H_2O and D_2O at 50 - 190 nm. [E, $h\nu$, H_2O, D_2O; 500 - 1900 A]

O M. -T. Lee, K. Wang, V. McKoy, R. G. Tonkyn, R. T. Wiedmann, E. R. Grant and M. G. White : J. Chem. Phys. 96, 7848-7851 (1992a)
Ion rotational distributions for near-threshold photoionization of H_2O.
[T, $h\nu$, H_2O]

O M. -T. Lee, K. Wang and V. McKoy : J. Chem. Phys. 97, 3108-3114 (1992b)
Rotationally resolved near-threshold photoionization of the $^1b_1$ valence orbital of H_2O and D_2O. [T, $h\nu$, H_2O, D_2O]

O M. -T. Lee, K. Wang, V. McKoy and L. E. Machado : J. Chem. Phys. 97, 3905-3913 (1992c)
Rotationally resolved photoelectron spectra in resonance enhanced multiphoton ionization of H_2O via the C^1B_1 Rydberg state. [T, $h\nu$, H_2O]

EX M. -T. Lee, S. E. Michelin, L. E. Machado and L. M. Brescansin : J. Phys. B26, L203-L208 (1993)・
Distorted-wave cross section for electronic excitation of H_2O by electron impact. [T, H_2O; th. - 30 eV, $^3A_1$ state]

EX M. -T. Lee, S. E. Michelin, T. Kroin, L. E. Machado and L. M. Brescansin : J. Phys. B28, 1859-1868 (1995)・
Electronic excitation of H_2O by electron impact.
[T, H_2O; distorted wave approx., DCS, 12/14 - 150 eV for 2 levels]

I D. Lefaivre and P. Marmet : Can. J. Phys. 56, 1549-1558 (1978)・
Electroionization of D_2O and H_2O and study of fragments H^+ and OH^+.
[E, H_2O, D_2O]

J. Lehmann, K. Bonhoff, S. Bonhoff and K. Blum : 20th ICPEAC, Vienna WE 091 (1997a)
Angular distribution of molecular Auger electrons. Numerical results for H_2O. [, H_2O]

O J. Lehmann, K. Bonhoff, S. Bonhoff, B. Lohmann and K. Blum : in AIP Conf. Proc. No. 392, Denton 63-66 (1997b)
Angular distribution of molecular Auger electrons. [T, H_2O, HF]

O S. W. Leifson : Astrophys. J. 63, 73-89 (1926)・
Absorption spectra of some gases and vapors in the Schumann region.
[E, H_2O, NH_3, O_2, N_2, NO, CO, CO_2, CCl_4, C_2H_5OH, etc.]

O H. Lew and I. Heiber : J. Chem. Phys. 58, 1246-1247 (1973)
Spectrum of H_2O^+. [E, $h\nu$, H_2O^+]

O H. Lew : Can. J. Phys. 54, 2028-2049 (1976)
Electronic spectrum of H_2O^+. [E, $h\nu$, H_2O^+]

EX D. Lewis and W. H. Hamill : J. Chem. Phys. 51, 456-457 (1969)・
Evidence for the triplet state of water by electron-reflection spectroscopy. [E, H_2O, C_2H_5OH]

O H. J. Liebe and T. A. Dillon : J. Chem. Phys. 50, 727-732 (1969a)
Accurate foreign-gas-broadening parameters of the 22-GHz H_2O line from refraction spectroscopy. [E, $h\nu$, H_2O]

O H. J. Liebe, M. C. Thompson, Jr. and T. A. Dillon : J. Quant. Spectrosc. Radiat. Transf. 9, 31-47 (1969b)
Dispersion studies of the 22 GHz water vapor line shape.
[E, $h\nu$, H_2O; 300 K]

M. Lima, Z. P. Luo, S. Nagano, H. Pritchard, V. McKoy and W. M. Huo : Proc. Conf. VI National Workshop on Atomic and Molecular Phys., Varanasi 108-154 (1987)
Studies of electron-molecule collisions. [T, review, for H_2O, p. 135-138]

E M. A. P. Lima, T. L. Gibson, L. M. Brescansin and V. McKoy : Swarm Studies and
EX Inelastic Electron-Molecule Collisions, Springer-Verlag 239-264 (1987)
Studies of elastic and electronically inelastic electron-molecule collisions. [T, for H_2O, p. 259 - 262, DCS, 2 - 20 eV]

O T. F. Lin and A. B. F. Duncan : J. Chem. Phys. 48, 866-871 (1968)
Calculations on Rydberg terms of the water molecule. [T, H_2O]

I E. Lindemann, R. W. Rozett and W. S. Koski : J. Chem. Phys. 56, 5490-5492 (1972)
Electronic states of H_2O^+ produced by electron bombardment of H_2O.
[E, H_2O; 12 - 70 eV]

O E. Lindholm : Ark. Fys. 40, 97-101 (1968)
Rydberg series in small molecules. I. Quantum defects in Rydberg series.
[T, H_2O, CH_4, CO, N_2, O_2, C_2H_6, etc.]

O E. Lindholm and J. Li : J. Phys. Chem. 92, 1731-1738 (1988)・
Energies of J* orbital from extended Huckel calculations in combination with HAM theory.
[T and review, H_2O, NH_3, C_2H_2, CH_4, C_2H_4, C_3H_4, C_6H_6, $C(CH_3)_4$, CO, CO_2, CH_3CHO, N_2, N_2O, HCN, F_2, CF_4, C_2F_6, NF_3, CH_3F, C_2F_4, C_6F_6, C_2H_6]

O A. Lisini, G. Fronzoni and P. Decleva : J. Phys. B21, 3653-3667 (1988)
An analysis of configuration-interaction model spaces for the study of the core photoelectron spectra of small molecules.
[T, $h\nu$, H_2O, HOF, F_2, F_2O, N_2, CO, O_3]

QT Y. Liu, J. Sun, Z. Li, Y. Jiang and L. Wan : Z. Phys. D42, 45-48 (1997)
Total cross sections for electron scattering from molecules : NH_3 and H_2O.
[T, H_2O, NH_3; 10 - 1000 eV]

O A. J. Lorquet and J. C. Lorquet : Chem. Phys. 4, 353-367 (1974)
Excited states of gaseous ions. V. The predissociation of the H_2O^+ ion. [T, H_2O^+, D_2O^+, HDO^+]

I J. C. Lorquet : J. Chim. Phys. 57, 1078-1084 (1960)
Etude de l'interaction electron-molecule : transitions electroniques induites lors du choc.
(Study of the electron-molecule interaction : Electronic transitions induced by bombardment.) [E, H_2O, NO, CO, N_2, O_2, CO_2]

S J. J. Lowke and J. A. Rees : Aust. J. Phys. 16, 447-453 (1963)
The drift velocities of free and attached electrons in water vapour.
[E, H_2O]

S J. J. Lowke and J. H. Parker : Phys. Rev. 181, 302-311 (1969)
Theory of electron diffusion parallel to electric fields. II. Application to real gases. [T, H_2O, He, Ar, H_2, D_2, N_2, O_2, CO, CO_2, Kr, Xe; W and D_T/μ, E/N = 10 - 200 Td]

A W. W. Lozier : Phys. Rev. 36, 1417-1418 (1930)·
Negative ions in hydrogen and water vapor. [E, H_2O, H_2]

O C. B. Ludwig, C. C. Ferriso and C. N. Abeyta : J. Quant. Spectrosc. Radiat. Transf. 5, 281-290 (1965a)
Spectral emissivities and integrated intensities of the 6.3-μ fundamental band of H_2O. [E, $h\nu$, H_2O; ν_2 band, 550 - 2200 K]

O C. B. Ludwig, C. C. Ferriso, W. Malkmus and F. P. Boynton : J. Quant. Spectrosc. Radiat. Transf. 5, 697-714 (1965b)·
High-temperature spectra of the pure rotational band of H_2O.
[E, $h\nu$, H_2O; 9 - 22 μ, 500 - 2200 K]

O C. B. Ludwig and C. C. Ferriso : J. Quant. Spectrosc. Radiat. Transf. 7, 7-26 (1969)
Prediction of total emissivity of nitrogen-broadened and self-broadened hot water vapor. [T, $h\nu$, H_2O; 600 - 3000 K]

E A. Lun, X. J. Chen, L. J. Allen and K. Amos : Phys. Rev. A49, 3788-3798 (1994)·
Inversion of electron-water elastic-scattering data.
[T, H_2O; DCS, 100 - 1000 eV]

O L. E. Machado, L. M. Brescansin, M. A. P. Lima, M. Braunstein and V. McKoy : J. Chem. Phys. 92, 2362-2366 (1990)·
Cross sections and photoelectron asymetry parameters for photoionization of H_2O. [T, $h\nu$, H_2O]

E L. E. Machado, M. -T. Lee, L. M. Brescansin, M. A. P. Lima and V. McKoy : J. Phys. B28, 467-475 (1995).
Elastic electron scattering by water molecules.
[T, H_2O; 4 - 50 eV]

O M. T. Macpherson and J. P. Simons : Chem. Phys. Lett. 51, 261-264 (1977)
Polarized photofluorescence excitation spectroscopy : H_2O revisited and the vacuum-ultraviolet photodissociation of D_2O. [E, H_2O, D_2O]

O G. Magyar : Opt. Comm. 20, 271-274 (1977)
Absorption of 9.7 μ radiation in D_2O vapour. [E, $h\nu$, D_2O]

O Yu. S. Makushkin, A. I. Petrova and V. N. Stroinova : Opt. Spectrosc. 60, 304-307 (1986)
Method of calculating spectral line halfwidths with the H_2O molecule as an example. [T, $h\nu$, general theory, H_2O]

O J. -Y. Mandin, C. Camy-Peyret, J. -M. Flaud and G. Guelachvili : Can. J. Phys. 60, 94-101 (1982)
Measurements and calculations of self-broadening coefficients of lines belonging to the $2\nu_2$, ν_1, and ν_3 bands of $H_2{}^{16}O$. [E and T, $h\nu$, H_2O]

O J. -Y. Mandin, J. -P. Chevillard, C. Camy-Peyret, J. -M. Flaud and J. W. Brault : J. Mol. Spectrosc. 116, 167-190 (1986a)
The high-resolution spectrum of water vapor between 13200 and 16500 cm^{-1}.
[E, $h\nu$, H_2O]

O J. -Y. Mandin, J. -P. Chevillard, C. Camy-Peyret and J. -M. Flaud : J. Mol. Spectrosc. 118, 96-102 (1986b)
Line intensities in the $\nu_1 + 2\nu_2$, $2\nu_2 + \nu_3$, $2\nu_1$, $\nu_1 + \nu_3$, $2\nu_3$, and $\nu_1 + \nu_2 + \nu_3 - \nu_2$ bands of $H_2{}^{16}O$, between 6300 and 7900 cm^{-1}.
[E, $h\nu$, H_2O]

O J. -Y. Mandin, J. -P. Chevillard, J. -M. Flaud and C. Camy-Peyret : Can. J. Phys. 66, 997-1011 (1988)
$H_2{}^{16}O$: Line positions and intensities between 8000 and 9500 cm^{-1} : the second hexad of interacting vibrational states : {(050), (130), (031), (210), (111), (012)}. [E, $h\nu$, H_2O]

O J. -Y. Mandin, J. -P. Chevillard, C. Camy-Peyret and J. -M. Flaud : J. Mol. Spectrosc. 138, 272-281 (1989b)
N_2-broadening coefficients of $H_2{}^{16}O$ lines between 9500 and 11500 cm^{-1}.
[E, $h\nu$, H_2O]

O J. -Y. Mandin, J. -P. Chevillard, J. -M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 138, 430-439 (1989c)
N_2-broadening coefficients of $H_2{}^{16}O$ lines between 13500 and 19900 cm^{-1}.
[E, $h\nu$, H_2O]

I M. M. Mann, A. Hustrulid and J. T. Tate : Phys. Rev. 58, 340-347 (1940)
D The ionization and dissociation of water vapor and ammonia by electron impact. [E, H_2O, NH_3]

QT N. H. March, A. Zecca and G. P. Karwasz : Z. Phys. D32, 93-100 (1994)・
Phenomenology and scaling of electron scattering cross sections from "almost spherical" molecules over a wide energy range.
[T, H_2O, NH_3, SiH_4, CH_4, H_2S, GeH_4, CF_4]

I D. Margreiter, H. Deutsch, M. Schmidt and T. D. Mark : Int. J. Mass Spectrom. Ion Process. 100, 157-176 (1990)・
Electron impact ionization cross sections of molecules. Part II. Theoretical determination of total (counting) ionization cross sections of molecules : a new approach.
[T, H_2O, H_2, N_2, O_2, CO_2, NH_3, CH_3OH, SF_6, C_2H_2, C_2H_4, C_6H_6, etc.]

I T. D. Mark and F. Egger : Int. J. Mass Spectrom. Ion Phys. 20, 89-99 (1976) K
Cross-section for single ionization of H_2O and D_2O by electron impact from threshold up to 170 eV. [E, H_2O, D_2O]

I T. D. Mark : in Electron Impact Ionization, Springer Verlag 137-197 (1985)
Partial ionization cross sections. [review]

E T. D. Mark, Y. Hatano and F. Linder : IAEA Report, Chapter 3 (1994)
Electron collision cross sections. [compilation]

O V. N. Markov : J. Mol. Spectrosc. 164, 233-238 (1994)
Temperature dependence of self-induced pressure broadening and shift of the 6_{43} - 5_{50} line of the water molecule. [E, $h\nu$, H_2O; 439 GHz]

I R. F. Mathis and D. A. Vroom : J. Chem. Phys. 64, 1146-1149 (1976)
The energy distributions of secondary electrons from Ar, N_2, H_2O, and H_2O with clusters present. [E, H_2O, $(H_2O)_n$, Ar, N_2; 1 keV]

E D. Mathur and J. B. Hasted : Chem. Phys. Lett. 34, 90-91 (1975)
Electron scattering by water and alcohol molecules. [E, H_2O, CH_3OH]

EX D. J. McCaa and D. E. Rothe : AIAA J. 7, 1648-1651 (1969)
Emission spectra of atmospheric gases excited by an electron beam.
[E, H_2O, H_2, O_2, N_2, CO, NO, CO_2; 2800 - 6600 A]

I I. E. McCarthy and E. Weigold : Phys. Rep. 27C, 275-371 (1976)
(e, 2e) spectroscopy.
[review, H_2O, He - Xe, H_2, D_2, N_2, CO, NH_3, CH_4, C_2H_6]

I I. E. McCarthy and E. Weigold : Rep. Prog. Phys. 54, 789-879 (1991)・
Electron momentum spectroscopy of atoms and molecules.
[review, H_2O, N_2, H, He, Ar, Na, H_2, NH_3, C_2H_4; 500 - 1500 eV for N_2]

EX J. W. McConkey : Argonne Natl. Lab. Rep. No. 84-28, 129-141 (1984)
Optical excitation cross-sections for electron collisions with atoms and molecules. [

O K. E. McCulloh : Int. J. Mass Spectrom. Ion Phys. 21, 333-342 (1976)
Energetics and mechanisms of fragment ion formation in the photoionization of normal and deuterated water and ammonia. [E, $h\nu$, H_2O, D_2O, NH_3]

EX C.W.McCurdy : in AIP Conf.Proc.No.295, 18th ICPEAC, Aarhus 360-370 (1993)
Recent theoretical results on electron-polyatomic molecule collisions.
[review, H_2O, C_2H_6, NH_3, CF_4, C_5H_6, CH_4, GeH_4]

O E.W.McDaniel, M.R.Flannery, E.W.Thomas and S.T.Manson : Atomic Data Nucl. Data tables 33, 1-148 (1985)
Selected bibliography on atomic collisions : Data collections, bibliographies, review articles, books, and papers of particular tutorial value. [

EX J.W.McGowan, J.F.Williams and D.A.Vroom : Chem.Phys.Lett. 3, 614-616 (1969)
Lyman-α radiation from electron collisions with simple hydrogen containing molecules. [E, H_2O, D_2O, H_2, NH_3, CH_4, C_6H_6: th.- 200 eV]

O R.Mecke : Z.Phys. 81, 313-331 (1933)
Das Rotationsschwingungsspektrum des Wasserdampfes. I.
[E, $h\nu$, H_2O; Phys.Z. 33, 833 (1932) and Naturwiss. 20, 657 (1932), see W.Baumann (1933)]

A C.E.Melton and G.A.Neece : J.Chem.Phys. 55, 4665-4666 (1971a) K
Cross sections for capture of low energy electrons in H_2O vapor.
[E, H_2O; 4 - 30 eV]

A C.E.Melton and G.A.Neece : J.Am.Chem.Soc. 93, 6757-6759 (1971b)
Rate constant and cross sections for the production of OH^- from O^- and H^- in water. [E, H_2O; H^-, O^- production]

A C.E.Melton : J.Chem.Phys. 57, 4218-4221 (1972) K
Cross sections and interpretation of dissociative attachment reactions producing OH^-, O^- and H^- in H_2O. [E, H_2O]

O J.E.Mentall, G.R.Mohlmann and P.M.Guyon : J.Chem.Phys. 69, 3735-3739 (1978)
H Lyman-α emission from photodissociation of H_2O. [E, $h\nu$, H_2O]

O P.H.Metzger and G.R.Cook : J.Chem.Phys. 41, 642-649 (1964)
On the continuous absorption, photoionization and fluorescence of H_2O, NH_3, CH_4, C_2H_2, C_2H_4, and C_2H_6 in the 600-to-1000-A region.
[E, $h\nu$, H_2O, C_2H_6, etc.]

O W.Meyer : in Modern Theoretical Chemistry, Vol.3, H.F.Schaeffer, III (Ed), Plenum 442- (1997)

[E, dipole moment]

O L.Michalak, A.Adamczyk and E.Marcinkowska : Int.J.Mass Spectrom.Ion Process. 107, 6-19 (1991)
Temperature effect of ion/molecule reactions in a waer molecular beam crossed by an electron beam. [E, H_2O; 100 eV, 343 - 873 K]

O M. Michaud and L. Sanche : Phys. Rev. A36, 4672-4683 (1987a)
Total cross sections for slow-electron (1 - 20 eV) scattering in solid H_2O. [E, solid H_2O]

O M. Michaud and L. Sanche : Phys. Rev. A36, 4684-4699 (1987b)
Absolute vibrational excitation cross sections for slow-electron (1 - 18 eV) scattering in solid H_2O. [E, solid H_2O]

EX S. R. Mielczarek and K. J. Miller : Chem. Phys. Lett. 10, 369-370 (1971)
Dependence of generalized oscillator strengths of H_2O on momentum transfer. [E, H_2O; B←X, C←X]

I J. H. Miller, W. E. Wilson and S. T. Manson : Radiat. Prot. Dosim. 13, 27-30 (1985)
Secondary electron spectra : a semiempirical model. [T, H_2O]

I J. H. Miller, W. E. Wilson, S. T. Manson and M. E. Rudd : J. Chem. Phys. 86, 157-162 (1987)·
Differential cross sections for ionization of water vapor by high-velocity bare ions and electrons. [T, H_2O]

EX K. J. Miller, S. R. Mielczarek and M. Krauss : J. Chem. Phys. 51, 26-32 (1969)
Energy surface and generalized oscillator strength of the $^1A''$ Rydberg state of H_2O. [T, H_2O]

E M. H. Mittleman and R. E. von Holdt : Phys. Rev. 140, A726-A729 (1965)
Theory of low-energy-electron scattering by polar molecules. [T, H_2O, NH_3, HCN; see S. Altshuler (1957)]

O R. Mocca : J. Chem. Phys. 40, 2186-2192 (1964)
One-center basis set SCF MO's. Ⅲ. H_2O, H_2S and HCl. [T, H_2O, H_2S, HCl; grand-state wavefunctions]

O R. Moccia and A. Rizzo : J. Phys. B18, 3319-3337 (1985)
Two-photon transition probability calculations : electronic transitions in the water molecule. [T, H_2O]

O W. E. Moddeman, T. A. Carlson, M. O. Krause, B. P. Pullen, W. E. Bull and G. K. Schweitzer : J. Chem. Phys. 55, 2317-2336 (1971)
Determination of the K-LL Auger spectra of N_2, O_2, CO, NO, H_2O and CO_2. [E, H_2O, NO, CO_2, etc.]

R S. Mohanan and K. N. Joshipura : Z. Phys. D15, 67-70 (1990)·
Slow electron collisions with polar molecules in plasma. [T, H_2O, HCl, HCN; DCS for rot. ex., 0.01 - 1 eV]

O O. C. Mohler and W. S. Benedict : Phys. Rev. 74, 702-703 (1948)
Atmospheric absorption of water vapor between 1.42 μ and 2.50 μ. [E, $h\nu$, H_2O]

EX G. R. Mohlmann, S. Tsurubuchi and F. J. de Heer : Chem. Phys. 18, 145-154 (1976a)
Excitation cross sections for 3s, 3p and 3d sublevels of atomic hydrogen split from simple molecules by high-energy electron impact.
[E, H_2O, H_2, HCl, NH_3, CH_4; 1000 and 2000 eV]

DI G. R. Mohlmann, C. I. M. Beenakker and F. J. de Heer : Chem. Phys. 13, 375-385 (1976b)
The rotational excitation and population distribution of OH($A^2\Sigma^+$) produced by electron impact on water. [E, H_2O]

EX G. R. Mohlmann, K. H. Shima and F. J. de Heer : Chem. Phys. 28, 331-341 (1978)
Production of H, D (2s, 2p) by electorn impact (0 - 2000 eV) on simple hydrogen containing molecules. [E, H_2O, H_2, HD, H_2, HCl, NH_3, CH_4, CD_4]

EX G. R. Mohlmann and F. J. de Heer : Chem. Phys. 40, 157-162 (1979) K
Production of Balmer radiation by electron impact (0 - 2000 eV) on small hydrogen containing molecules.
[E, H_2O, H_2, HCl, HBr, H_2S, NH_3, CH_4; 20 - 2000 eV]

O G. Mollenstedt : Z. Naturforsch. 7a, 465-470 (1952)
Diskrete Energieverluste von 35-keV-Elektronen bei Wechselwirkung mit Atomen und Molekulen. [E, H_2O, N_2, O_2, H_2, He, C_6H_6, CO_2, etc.]

EX H. D. Morgan and J. E. Mentall : J. Chem. Phys. 60, 4734-4739 (1974)
VUV dissociative excitation cross section of H_2O, NH_3 and CH_4 by electron impact. [E, H_2O, NH_3, CH_4]

O L. A. Morgan : J. Phys. B30, 3709-3717 (1997)
Low-energy electron scattering from the $X^2\Pi$ state of the OH molecule.
[T, OH]

EX L. A. Morgan : J. Phys. B31, 5003-5011 (1998) K
Electron impact excitation of water.
[T, H_2O; $^3B_1$, $^1B_1$, $^3A_1$, $^1A_1$, th. - 20 eV]

O W. L. Morgan : J. Chem. Phys. 80, 4564-4565 (1984)
Electron-ion recombination in water vapor. [E, H_2O; 0.005 - 0.13 eV]

O Y. Morioka, K. Maeda, K. Ito and T. Namioka : J. Phys. B21, L121-L123 (1988)
Linear state of H_2O found from a VUV absorption band. [E, $h\nu$, H_2O]

I J. D. Morrison and J. C. Traeger : Int. J. Mass Spectrom. Ion. Phys. 11, 77-88 (1973)
Ionization and dissociation by electron impact. I. H_2O and H_2S.
[E, H_2O, H_2S; 10 - 40 eV, H_2O^+, OH^+, O^+ for H_2O]

O A. Mozumder and J. A. La Verne : J. Phys. Chem. 89, 930-936 (1985)
Range and range straggling of low-energy electrons : General considerations and applications to N_2, O_2, and H_2O. [T, H_2O, N_2, O_2; $\leqq$ 10 keV]

EX U. Muller, Th. Bubel and G. Schulz : Z. Phys. D25, 167-174 (1993)
Electron impact dissociation of H_2O : Emission cross sections for OH^*, OH^{+*}, H^*, and H_2O^{+*} fragments. [E, H_2O]

O L. A. Munoz, Y. Ishikawqa and B. R. Weiner : Int. J. Quant. Chem. : Quant. Chem. Sympo. 25, 359-370 (1991)
Kinematic distribution function to calculate rotational populations of photofragments from photodissociation of triatomic molecules.
[T, H_2O, H_2S]

O W. F. Murphy : J. Chem. Phys. 67, 5877-5882 (1977a)
The Rayleigh depolarization ratio and rotational Raman spectrum of water vapor and the polarizability components of the water molecule.
[E and simulation, H_2O]

O W. F. Murphy : Mol. Phys. 33, 1701-1714 (1977b)
The ro-vibrational Raman spectrum of water vapour ν_2 and $2\nu_2$.
[E, $h\nu$, H_2O]

O W. F. Murphy : Mol. Phys. 36, 727-732 (1978)
The rovibrational Raman spectrum of water vapour ν_1 and ν_3.
[E and T, H_2O]

A E. E. Muschlitz Jr. and T. L. Bailey : J. Phys. Chem. 60, 681-684 (1956)
Negative ion formation in hydrogen peroxide and water vapor. The perhydroxide ion. [E, H_2O,]

O V. Nagali, S. I. Chou, D. S. Baer and R. K. Hanson : J. Quant. Spectrosc. Radiat. Transf. 57, 795-809 (1997)·
Diode-laser measurements of temperature-dependent half-widths of H_2O transitions in the 1.4 μm region. [E, $h\nu$, H_2O]

O K. Nakamo, A. Saito and N. Ohashi : J. Mol. Spectrosc. 131, 405-406 (1988)
0.82-μm diode laser linestrength measurements of the $2\nu_1 + \nu_2 + \nu_3$ band of H_2O. [E, $h\nu$, H_2O]

O H. Nakatsuji : Chem. Phys. Lett. 67, 329-333 (1979a)
Cluster expansion of the wavefunction. Electron correlations in ground and excited states by SAC (symmetry-adapted-cluster) and SAC CI theories. [T, general theory]

O H. Nakatsuji : Chem. Phys. Lett. 67, 334-342 (1979b)
Cluster expansion of the wavefunction. Calculation of electron correlations in ground and excited states by SAC and SAC CI theories.
[T, H_2O, BH_3]

O H. Nakatsuji and K. Hirao : Int. J. Quant. Chem. 20, 1301-1313 (1981)
Cluster expansion of the wave function. Electron correlations in singlet and triplet excited states, ionized states, and electron attached states by SAC and SAC-CI theories. [T, H_2O]

O H. Nakatsuji : Theor. Chim. Acta 71, 201-229 (1987)
Exponentially generated wave functions and excited states of benzene.
[T, H_2O, C_6H_6, F_2, LiF, CO]

O K. Narahari Rao, W. W. Brim, V. L. Sinnett and R. H. Wilson : J. Opt. Soc. Am. 52, 862-865 (1962)
Wavelength calibrations in the infrared. Ⅳ. Use of a 1000-lines-per-inch Bausch and Lomb plane replica grating. [E, $h\nu$, H_2O; 1 - 40 μ]

O K. Narahari Rao, R. V. de Vore and E. K. Plyler : J. Res. Natl. Bur. Stand. 67A, 351-358 (1963)
Wavelength calibrations in the far infrared (30 to 1000 microns).
[E, $h\nu$, H_2O, CO, HCN, N_2O]

R G. A. Natanson : J. Phys. B18, 4481-4489 (1985)
Selection rules for rotational excitation of polyatomic molecules by slow electron impact. [T, H_2O, H_2CO, C_2H_4]

O R. C. Nelson and W. S. Benedict : Phys. Rev. 74, 703-704 (1948)
Absorption of water vapor between 1.34 μ and 1.97 μ. [E, $h\nu$, H_2O]

S K. F. Ness and R. E. Robson : Australian Bicentenary Congress of Physics, Gaseous Electronics, 297-297 (1988)
Transport properties of electrons in water vapour. [T, H_2O]

S K. F. Ness and R. E. Robson : Phys. Rev. A38, 1446-1456 (1988) ○
Transport properties of electrons in water vapor.
[T, H_2O; cross section set]

I H. Neuert and H. Clasen : Z. Naturforsch. 7a, 410-416 (1952)
Massenspektrometrische Untersuchung von SH_2, SeH_2, PH_3, SiH_4 und GeH_4.
[E, H_2O, NH_3, SiH_4, GeH_4, CH_4, PH_3, H_2S, H_2Se]

O A. J. C. Nicholson : J. Chem. Phys. 43, 1171-1177 (1965)
Photoionization-efficiency curves. Ⅱ. False and genuine structure.
[E, $h\nu$, H_2O, Xe, Kr, NO, N_2O, HCl, CH_3Cl, C_2H_4, C_3H_6, C_2H_2, C_6H_6, CH_4, CD_4, C_2H_6, C_3H_8, etc.]

O H. H. Nielsen : Phys. Rev. 59, 565-575 (1941)
The near infra-red spectrum of water vapor. Part Ⅰ. The perpendicular bands ν_2 and $2\nu_2$. [E, $h\nu$, H_2O]

O H. H. Nielsen : Phys. Rev. 62, 422-433 (1942)
The near infra-red spectrum of water vapor. Part Ⅱ. The parallel bands ν_3, $\nu_1 + \nu_3$, $\nu_2 + \nu_3$ and the perpendicular band ν_1. [E, $h\nu$, H_2O]

EX K. Niira : J. Phys. Soc. Jpn. 4, 230-233 (1949)
On the excitation of H_2O molecule by impact of fast electron.
[T, H_2O; th. - 330 eV]

D K. Niira : J. Phys. Soc. Jpn. 7, 193-199 (1952)
On the abnormal rotation of OH radicals. [T, OH]

E H. Nishimura : 11th ICPEAC, Kyoto 314-314 (1979)・
Elastic scattering cross sections of H_2O by low energy electrons.
[E, H_2O, ; DCS, 30 - 90 eV, 10 - 135°]

QT H. Nishimura and K. Yano : J. Phys. Soc. Jpn. 57, 1951-1956 (1988)○K
Total electron scattering cross sections for Ar, N_2, H_2O and D_2O.
[E, H_2O, D_2O, Ar, N_2, 7 - 500 eV, 18 %]

QT H. Nishimura : Electron-Molecule Collisions and Swarms, Engelberg P47 (1997)・
Measurement of the total electron scattering cross sections of H_2O, H_2S, and NH_3. [E, H_2O, NH_3, H_2S]

V T. Nishimura and Y. Itikawa : J. Phys. B28, 1995-2005 (1995)・
Electron-impact vibrational excitation of water molecules.
[T, H_2O; (100), (010), (001) modes, DCS, 6 - 50 eV]

O A.-F. Niu, Y. Zhang, W.-H. Zhang and J.-M. Li : Phys. Rev. A57, 1912-1919 (1997)・
Near-threshold structures in inner-shell photoabsorption processes of CH_4, NH_3, H_2O, and HF. [T, $h\nu$, H_2O, CH_4, NH_3, HF]

D N. Noda, S. Hirokura, Y. Taniguchi and S. Tanahashi : J. Vac. Sci. Tech. A1, 1430-1434 (1983)
Study of the discharge cleaning process in JIPPT-II torus by residual gas analyzer.
[E, H_2O, CH_4; dissociation rate coeff. for H_2O, 1 - 10^3 eV]

O T. Nomura, K. Tanaka and Ya. Hatano : J. Phys. Soc. Jpn. 47, 1647-1650 (1979)
One center expansion SCF calculations on quark affinity to water molecule.
[T, H_2O]

E D. W. Norcross : in Applied Atomic Collision Physics, Vol. 5, Academic Press 69-85 (1982)・
Magnetohydrodynamic electrical power generation.
[T, H_2O; q_m, 0.1 - 10 eV]

O D. Nordfors, A. Nilsson, N. Martensson, S. Svensson, U. Gelius and H. Agren : J. Elect. Spectrosc. Relat. Phenom. 56, 117-164 (1991)・
X-ray excited photoelectron spectra of free molecules containing oxygen.
[E, H_2O, CH_3OH, C_2H_5OH, CH_2O, CO, CO_2, etc.]

I N. Oda : Radiat. Res. 64, 80-95 (1975a)
Energy and angular distributions of electron from atoms and molecules by electron impact. [E, H_2O,

I N. Oda and F. Nishimura : 9th ICPEAC, Seattle 1, 481-482 (1975b)
Double differential cross sections for ionizing collisions of electrons with CH_4, CO, and H_2O. [E, H_2O, CO, CH_4]

E N. Oda and F. Nishimura : Studies of Atomic Collisions and Related Topics in
I Jpn. No. 3, 12-13 (1977)
Energy and angular distributions of electrons from atoms and molecules by electron impact. [E, H_2O; 500 eV]

EX T. Ogawa, M. Taniguchi, K. Nakashima and H. Kawazumi : J. Phys. Soc. Jpn. 59, 893-897 (1990)
Distributions over the 4s, 4p and 4d sublevels and their emission cross sections of the excited hydrogen atom produced in e - CH_4 and H_2O collisions. [E, H_2O, CH_4]

D T. Ogawa, N. Yonekura, T. Tasuda, S. Ihara, T. Yasuda, H. Tomura, K. Nakashima and H. Kawazumi : J. Phys. Chem. 95, 2788-2792 (1991)
Electron-impact dissociation of water as studied by the angular difference Doppler profiles of the excited hydrogen atom.
[E, H_2O]

EX T. Ogawa, S. Ihara, N. Yonekura, T. Yasuda and K. Nakashima : Chem. Phys. 168, 145-150 (1992)
Formation cross sections, emission cross sections and Fano plots of translational-energy-separated excited hydrogen atoms (n = 3, 4) produced in e - H_2O collisions. [E, H_2O; 50 - 1500 eV]

O H. Okabe : Photochemistry of Small Molecules, Wiley (1978)

O H. Okabe : J. Chem. Phys. 72, 6642-6650 (1980)
Photodissociation of nitric acid and water in the vacuum ultraviolet; vibrational and rotational distributions of $OH^2\Sigma^+$.
[E, $h\nu$, H_2O, $HONO_2$; 1100 - 1900 A]

E Y. Okamoto, K. Onda and Y. Itikawa : J. Phys. B26, 745-758 (1993)·K
Vibrationally elastic cross sections for electron scattering from water molecules. [T, H_2O; 6 - 50 eV]

EX J. J. Olivero, R. W. Stagat and A. E. S. Green : J. Geophys. Res. 77, 4797-4811 (1972)
I Electron deposition in water vapor, with atmospheric applications.
[T, H_2O]

O T. N. Olney, N. M. Cann, G. Cooper and C. E. Brion : Chem. Phys. 223, 59-98 (1997)·
Absolute scale determination for photoabsorption spectra and the calculation of molecular properties using dipole sum-rules.
[review, $h\nu$, H_2O, He - Xe, SiH_4, SiF_4, etc.; 52 small molecules]

O Y. Ono, H. T. Lion and J. T. Moseley : 14th ICPEAC, Palo Alto 275-275 (1985)
Dissociative attachment of electrons by excited intermediates of resonant multiphoton ionization process. [E, $h\nu$, H_2O, NO, SO_2]

I C. B. Opal, W. K. Peterson and E. C. Beaty : J. Chem. Phys. 55, 4100-4106 (1971a)·
Measurements of secondary-electron spectra produced by electron impact ionization of a number of simple gases.
[E, H_2O, NH_3, He - Xe, H_2, N_2, O_2, NO, CO, CH_4, C_2H_2, CO_2]

I C. B. Opal, E. C. Beaty and W. K. Peterson : JILA report No. 108, Univ. of Colorado 1-117 (1971b)
Tables of energy and angular distributions of electrons ejected from simple gases by electron impact. [E, H_2O, etc.]

I C. B. Opal, E. C. Beaty and W. K. Peterson : Atomic Data 4, 209-253 (1972)・
Tables of secondary-electron-production cross sections.
[E, H_2O, He - Xe, N_2, O_2, H_2, CH_4, NH_3, CO, NO, C_2H_2, CO_2]

I O. J. Orient and S. K. Srivastava : J. Phys. B20, 3923-3936 (1987)○K
Electron impact ionisation of H_2O, CO, CO_2 and CH_4.
[E, H_2O, CO, CO_2, CH_4]

S J. L. Pack, R. E. Voshall and A. V. Phelps : Westinghouse Res. Labo., Research Report 62-928-113RI, 1-21 (1962a)
Tables of drift velocities of slow electrons in helium, neon, argon, krypton, xenon, hydrogen, deuterium, nitrogen, carbon monoxide, carbon dioxide, water vapor, nitrous oxide, and ammonia.
[E, H_2O, NH_3, He - Xe, H_2, D_2, N_2, CO, CO_2, N_2O]

S J. L. Pack, R. E. Voshall and A. V. Phelps : Phys. Rev. 127, 2084-2089 (1962)○K
Drift velocities of slow electrons in krypton, xenon, deuterium, carbon monoxide, carbon dioxide, water vapor, nitrous oxide, and ammonia.
[E, H_2O, Kr, Xe, D_2, CO, CO_2, N_2O, NH_3]

A J. L. Pack and A. V. Phelps : J. Chem. Phys. 45, 4316-4329 (1966)
Electron attachment and detachment. Ⅱ. Mixtures of O_2 and CO_2 and of O_2 and H_2O. [E, $H_2O + O_2$, $CO_2 + O_2$]

S J. L. Pack, R. E. Voshall, A. V. Phelps and L. E. Kline : 42nd GEC, Palo Alto, E-14 (1989) ; Bull. Am. Phys. Soc. 35, 1809-1809 (1990)
Experimental and theoretical longitudinal electron diffusion coefficients in molecular gases. [E and T, H_2O, NH_3, D_2, N_2, CO, CO_2, N_2O, NO_2]

O R. H. Page, J. G. Frey, Y. -R. Shen and Y. T. Lee : Chem. Phys. Lett. 106, 373-376 (1984)
Infrared predissociation spectra of water dimer in a supersonic molecular beam. [E, $h\nu$, $(H_2O)_2$]

O R. H. Page, R. J. Larkin, Y. R. Shen and Y. T. Lee : J. Chem. Phys. 88, 2249-2263 (1988)
High-resolution photoionization spectrum of water molecules in a supersonic beam. [E, $h\nu$, H_2O, D_2O]

O C. H. Palmer, Jr. : J. Opt. Soc. Am. 47, 1024-1028 (1957a)
Long path water vapor spectra with pressure broadening. Ⅰ. 20 μ to 31.7 μ. [E, $h\nu$, H_2O]

O C. H. Palmer, Jr. : J. Opt. Soc. Am. 47, 1028-1031 (1957b)
Long path water vapor spectra with pressure broadening. Ⅱ. 29 μ to 40 μ. [E, $h\nu$, H_2O]

E H. G. Paretzke : Argonne Natl. Lab. Rep. No. 84-28, 9-16 (1984)
Cross sections needed for investigations into track phenomena and Monte-Carlo calculations. [T, H_2O; 10 - 10^4 eV]

A J. E. Parr and J. L. Moruzzi : J. Phys. D5, 514-524 (1972)
S Electron attachment in water vapour and ammonia. [E, H_2O, NH_3]

O H. Partrige and D. W. Schwenke : J. Chem. Phys. 106, 4618-4639 (1997)
The determination of an accurate isotope dependent potential energy surface for water from extensive ab initio calculations and experimental data. [T, compilation, H_2O]

O R. W. Patch : J. Quant. Spectrosc. Radiat. Transf. 5, 137-164 (1965)
Absolute intensity measurements for the 2.7μ band of water vapor in a shock tube. [E, hν, H_2O]

O J. C. Pearson, T. Anderson, E. Herbst, F. C. De Lucia and P. Helminger : Astrophys. J. 379, L41-L43 (1991)
Millimeter- and submillimeter-wave spectrum of highly excited states of water. [E, hν, H_2O]

O J. E. Pearson, D. T. Llewellyn-Jones and R. J. Knight : Infrared Phys. 9, 53-58 (1969)
Water vapour absorption near a wavelength of 0.79 mm. [E, hν, H_2O]

O S. S. Penner and P. Varanasi : J. Quant. Spectrosc. Radiat. Transf. 5, 391-401 (1965)
Approximate band absorption and total emissivity calculations for H_2O. [T, hν, H_2O]

O S. S. Penner and P. Varanasi : J. Quant. Spectrosc. Radiat. Transf. 7, 687-690 (1967)・
Spectral absorption coefficients in the pure rotation spectrum of water vapor. [E, hν, H_2O; 400 and 500 K]

O A. Perrin, J.-M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 112, 153-162 (1985)
Calculated energy levels and intensities for the ν_1 and $2\nu_2$ bands of HDO. [T, hν, HDO; 2200 - 3300 cm^{-1}]

S Z. Lj. Petrovic : Aust. J. Phys. 39, 237-247 (1986a)
The application of Blanc's law to the determination of the diffusion coefficients for thermal electrons in gases. [T, H_2O + N_2]

S Z. Lj. Petrovic : Aust. J. Phys. 39, 249-252 (1986b)
The determination of the diffusion coefficient for thermal electrons in water vapour by the use of a modified Blanc's law procedure. [E, H_2O]

O I. D. Petsalakis, G. Theodorakopoulos and M. S. Child : J. Phys. B28, 5179-5192 (1995)・
Ab initio multichannel quantum defects for the $^1A_1$ Rydberg states of H_2O. [T, H_2O]

V A. V. Phelps : Ann. Geophys. 28, 611-625 (1972)・
EX Collision cross sections for electrons with atmospheric species.
I [review, H_2O, N_2, O_2, He, N, O, CO, NO, CO_2]

E A. V. Phelps : Compilation of electron cross-sections (1999)
V Internet site : http : //jilawww. colorado. edu/www research/colldata.
A html, up-dated in 1983.

0 E. Phillips, L. C. Lee and D. L. Judge : J. Quant. Spectrosc. Radiat. Transf. 18, 309-313 (1977)
Absolute photoabsorption cross sections for H_2O and D_2O from 1180 - 790 A.
[E, $h\nu$, H_2O, D_2O]

D G. N. Polyakova, B. M. Fizgeer and V. F. Erko : High Energy Chem. (USSR) 11, 214-217 (1977)
Velocity distribution of excited hydrogen atoms formed by the dissociation of H_2O molecules by electron impact. [E, H_2O]

0 O. L. Polyansky : J. Mol. Spectrosc. 112, 79-87 (1985)
One-dimensional approximation of the effective rotational Hamiltonian of the ground state of the water molecule. [T, H_2O]

0 O. L. Polyansky, P. Jensen and J. Tennyson : J. Chem. Phys. 101, 7651-7657 (1994)
A spectroscopically determined potential energy surface for the ground state of $H_2{}^{16}O$: A new level of accuracy. [T, $h\nu$, H_2O]

0 O. L. Polyansky, P. Jensen and J. Tennyson : J. Chem. Phys. 105, 6490-6497 (1996a)
The potential energy surface of $H_2{}^{16}O$. [T, $h\nu$, H_2O]

0 O. L. Polyansky, J. R. Busler, B. Guo, K. Zhang and P. F. Bernath : J. Mol. Spectrosc. 176, 305-315 (1996b)
The emission spectrum of hot water in the region between 370 and 930 cm^{-1}.
[E, $h\nu$, H_2O; 1823 K, 373 - 933 cm^{-1}]

0 O. L. Polyansky, N. F. Zobov, J. Tennyson, J. A. Lotoski and P. F. Bernath : J. Mol. Spectrosc. 184, 35-50 (1997a)
Hot bands of water in the ν_2 manifold up to $5\nu_2 - 4\nu_2$.
[E, $h\nu$, H_2O]

0 O. L. Polyansky, N. F. Zobov, S. Viti, J. Tennyson, P. F. Bernath and L. Wallace : Science 277, 346-348 (1997b)
Water on the sun : Line assignments based on variational calculations.
[T, $h\nu$, H_2O; sunspot at 3200 K; see L. Wallace (1995)]

0 O. L. Polyansky, J. Tennyson and P. F. Bernath : J. Mol. Spectrosc. 186, 213-221 (1997c)
The spectrum of hot water : Rotational transitions and difference bands in the (020), (100), and (001) vibrational states.
[E, $h\nu$, H_2O; ν_1, ν_3 and $2\nu_2$ states, 1823 K]

0 O. L. Polyansky, N. F. Zobov, S. Viti, J. Tennyson, P. F. Bernath and L. Wallace : J. Mol. Spectrosc. 186, 422-447 (1997d)
High-temperature rotational transitions of water in sunspot and laboratory spectra. [E, $h\nu$, H_2O; 3273 and 1823 K]

0 A. W. Potts and W. C. Price : Proc. Roy. Soc. London A326, 181-197 (1972)
Photoelectron spectra and valence shell orbital structures of groups V and VI hydrides. [E, $h\nu$, H_2O, NH_3, ND_3, H_2S, etc.]

EX T. Pradeep and M. S. Hegde : Spectrochim. Acta 44A, 883-887 (1988)
Electron energy loss spectroscopy (EELS) of H_2O, H_2S, H_2Se and H_2Te.
[E, H_2O, H_2S, H_2Se, H_2Te]

α A. N. Prasad and J. D. Craggs : Proc. Phys. Soc. London 76, 223-232 (1960)
A Measurement of ionization and attachment coefficients in humid air in uniform fields and the mechanism of breakdown. [E, $H_2O + N_2 + O_2$]

O S. T. Pratt, J. L. Dehmer and P. M. Dehmer : Chem. Phys. Lett. 196, 469-474 (1992)
Photoelectron spectrocopy of the linear $(A^2A_1)3pb_2\ ^1B_2$ Rydberg state of water. [E, $h\nu$, H_2O, D_2O]

O W. M. Preston : Phys. Rev. 57, 887-894 (1940)
The origin of radio fade-outs and the absorption coefficients of gases for light of wave-length 1215.7 A. [E, $h\nu$, H_2O, O_2, N_2, CO_2]

O W. C. Price : J. Chem. Phys. 3, 256-259 (1935)
The far ultraviolet absorption spectra of formaldehyde and the alkyl derivatives of H_2O and H_2S. [E, $h\nu$, H_2O, H_2S, H_2CO, CH_3OH, etc.]

O W. C. Price : J. Chem. Phys. 4, 147-153 (1936)
The far ultraviolet absorption spectra and ionization potentials of H_2O and H_2S. [E, $h\nu$, H_2O, H_2S]

O W. C. Price and T. M. Sugden : Trans. Faraday Soc. 44, 108-116 (1948)
The ionisation potentials of polyatomic molecules. I. Introduction and the ionisation potentials of H_2O and H_2S. [E, H_2O, H_2S]

EX H. P. Pritchard, V. McKoy and M. A. P. Lima : Phys. Rev. A41, 546-549 (1990)
Electron excitation of H_2O by low-energy electron impact.
[T, H_2O; Schwinger multichannel method, $^3A_1$, 12, 15, 20 eV]

O L. A. Pugh : PhD Thesis, Ohio State University (1972)
A detailed study of the near-infrared spectrum of water vapor.
[E, $h\nu$, H_2O]

O L. A. Pugh and K. Narahari Rao : J. Mol. Spectrosc. 47, 403-408 (1973)
Spectrum of water vapor in the 1.9 and 2.7 μ regions.
[E, $h\nu$, H_2O; ν_1, ν_3, $2\nu_2$, $3\nu_2$, $\nu_1 + \nu_2$, $\nu_2 + \nu_3$ bands]

O J. W. Rabalais, T. P. Debies, J. L. Berkosky, J. J. Huang and F. O. Ellison : J. Chem. Phys. 61, 516-528 (1974a)
Calculated photoionization cross sections and relative experimental photoionization intensities for a selection of small molecules.
[T, $h\nu$, H_2O, H_2S, H_2, N_2, CO, CH_4, H_2CCH_2; th. - 1500 eV]

O J. W. Rabalais and T. P. Debies : J. Elect. Spectrosc. Relat. Phenom. 5, 847-880 (1974b)
Theoretical photoionization cross-sections, relative experimental photoionization intensities, and angular distributions of photoelectrons.
[T and E, $h\nu$, H_2O, H_2, CH_4, N_2, CO, H_2S, C_2H_4]

EX L.M.Raff : Thesis, University of Illinois, Urbana 1-108 (1962)
Determination of electronic energy levels of molecules by low energy electron impact spectroscopy. [,

O L.A.Rahn and D.A.Greenhalgh : J.Mol.Spectrosc.119, 11-21 (1986)
High-resolution inverse Raman spectroscopy of the ν_1 band of water vapor.
[E, $h\nu$, H_2O]

O H.M.Randall, D.M.Dennison, N.Ginsburg and L.R.Weber : Phys.Rev.52, 162-174 (1937)
The far infrared spectrum of water vapor. [E, $h\nu$, H_2O; 18 - 75 μ]

O H.M.Randall : Rev.Mod.Phys.10, 72-85 (1938)
The spectroscopy of the far infra-red. [review, E, $h\nu$, H_2O, HCl, NH_3]

K.N.Rao → K.Narahari Rao

I M.V.V.S.Rao, I.Iga and S.K.Srivastava : J.Geophys.Res.100E, 26421-26425 (1995)○K
Ionization cross-sections for the production of positive ions from H_2O by electron impact. [E, H_2O; th.- 1000 eV]

O A.Rauk and J.B.Barriel : Chem.Phys.25, 409-424 (1977)
The computation of oscillator strengths and optical rotatory strengths from molecular wavefunctions. The electronic states of H_2O, CO, HCN, H_2O_2, CH_2O and C_2H_4. [T, H_2O, CO, CH_2O, C_2H_4, etc.]

I Z.Reljic, M.Kurepa and I.Cadez : SPIG'86, Sibenik 47-50 (1986a)
Electron-water molecule total ionization cross sections.
[E, H_2O; th.- 150 eV]

A Z.Reljic, I.Cadez and M.Kurepa : SPIG'86, Sibenik 59-62 (1986b)
Electron attachment cross sections to water molecules. [E, H_2O]

E T.N.Rescigno and B.N.Lengsfield : Z.Phys.D24, 117-124 (1992)・
A fixed-nuclei, ab initio treatment of low-energy electron-H_2O scattering.
[T, H_2O; DCS, 2 - 20 eV]

EX T.N.Rescigno : Comments At.Mol.Phys.33, 315-324 (1997)・
Dissociative excitation in electron-molecule collisions.
[comments, T, H_2O, F_2, Cl_2, HBr, NF_3, CH_4, C_2H_4, SiH_4, CH_3Cl]

O P.L.Richards : J.Opt.Soc.Am.54, 1474-1484 (1964)
High-resolution Fourier transform spectroscopy in the far-infrared.
[E, $h\nu$, H_2O; 10 - 150 cm^{-1}]

E M.E.Riley, C.J.MacCallum and F.Biggs : Atomic Data Nucl.Data Tables 15, 443-476 (1975), Erratum 28, 379-379 (1983)
Theoretical electron-atom elastic scattering cross sections. Selected elements, 1 keV to 256 keV. [T, O, etc.]

O C. P. Rinsland, A. Goldman, M. A. H. Smith and V. M. Devi : Appl. Opt. 30, 1427-1438 (1991)
Measurements of Lorentz air-broadening coefficients and relative intensities in the $H_2{}^{16}O$ pure rotation and ν_2 bands from long horizontal path atmospheric spectra. [E, $h\nu$, H_2O]

α A. V. Risbud and M. S. Naidu : J. Physique C7, 77-78 (1979)
A Ionization and attachment in water vapour and ammonia.
[E, H_2O, NH_3]

O J. S. Risley and W. B. Westerveld : Appl. Opt. 28, 389-400 (1989)
Electron-atom source as a primary radiometric standard for the EUV spectral region.
[compilation, E, H_2O, Ar, Kr, Xe, O_2, N_2, SO_2, CS_2, CH_4, SF_6, etc.]

O M. B. Robin : Higher Excited States of Polyatomic Molecules, Vol. 1, Academic (1974)

O M. Roche, D. S. Salahub and R. P. Messmer : J. Elect. Spectrosc. Relat. Phenom. 19, 273-284 (1980)
Scattered-wave calculations of photoionization cross-sections and asymmetry parameters for CO, H_2O and H_2S. [T, $h\nu$, H_2O, CO, H_2S]

V K. Rohr : J. Phys. B10, L735-L738 (1977) ○
Characteristics of the threshold structures in the e - H_2O vibrational excitation. [E, H_2O]

O A. Rosen, D. E. Ellis, H. Aachi and F. W. Averill : J. Chem. Phys. 65, 3629-3634 (1976)
Calculations of molecular ionization energies using a self-consistent-charge Hartree-Fock-Stater method. [T, H_2O, H_2S, CO, etc.]

O L. S. Rothman : Appl. Opt. 17, 3517-3518 (1978)
Update of the AFGL atmospheric absorption line parameters compilation.
[E, compilation, $h\nu$, H_2O, CO_2]

O L. S. Rothman, R. R. Gamache, A. Barbe, A. Goldman, J. R. Gillis, L. R. Brown, R. A. Toth, J. -M. Flaud and C. Camy-Peyret : Appl. Opt. 22, 2247-2256 (1983)
AFGL atmospheric absorption line parameters compilation : 1982 edition.
[compilation, H_2O, CO_2, CH_4, O_2, O_3]

O L. S. Rothman, R. R. Gamache, A. Goldman, L. R. Brown, R. A. Toth, M. H. Pickett, R. L. Poynter, J. -M. Flaud, C. Camy-Peyret, A. Barbe, N. Husson, C. P. Rinsland and M. A. H. Smith : Appl. Opt. 26, 4058-4097 (1987)
The HITRAN database : 1986 edition. [compilation, $h\nu$, H_2O, etc.]

O L. S. Rothman, R. R. Gamache, R. H. Tipping, C. P. Rinsland, M. A. H. Smith, D. C. Benner, V. M. Devi, J. -M. Flaud, C. Camy-Peyret, A. Perrin, A. Goldman, S. T. Massie, L. R. Brown and R. A. Toth : J. Quant. Spectrosc. Radiat. Transf. 48, 469-507 (1992)
The HITRAN molecular database : editions of 1991 and 1992.
[compilation, $h\nu$, H_2O, CO_2, O_3, N_2O, CO, CH_4, O_2, NO, SO_2, NO_2, NH_3, HF - HI, SF_6, H_2S, etc.]

O L. S. Rothman, C. P. Rinsland, A. Goldman, S. T. Massie, D. P. Edwards, J. -M. Flaud, A. Perrin, et al. : J. Quant. Spectrosc. Radiat. Transf. 60, 665-710 (1998)・
The HITRAN molecular spectroscopic database and HAWKS (HITRAN atmospheric workstation) : 1996 edition. [compilation, $h\nu$, H_2O, CO_2, O_3, N_2O, CO, CH_4, O_2, NO, SO_2, NO_2, NH_3, etc.]

O H. Rottke, C. Trump and W. Sandner : J. Phys. B31, 1083-1096 (1998)
Multiphoton ionization and dissociation of H_2O. [E, H_2O; 5320 A]

I P. S. Rudolph and C. E. Melton : J. Chem. Phys. 45, 2227-2232 (1966)
Experimental and theoretical consideration for ionization of simple hydrocarbons, H_2, D_2, O_2, H_2O, and the rare gases by 2.2-MeV α particles and by electrons in a mass spectrometer.
[E, H_2O, CH_4, C_2H_2, C_2H_4, C_2H_6; electron energy 75 and 296 eV]

O K. Ruedenberg : Rev. Mod. Phys. 34, 326-376 (1962)
The physical nature of the chemical bond. [review, T, H_2O, H_2, N_2]

O V. D. Rusanov, A. A. Fridman and G. V. Sholin : Sov. Phys. Usp. 24, 447-474 (1981)・
The physics of a chemically active plasma with nonequilibrium vibrational excitation of molecules. [review, H_2O, CO_2, H_2, O_2, N_2, CO, I_2, etc.]

O J. R. Rusk : J. Chem. Phys. 42, 493-500 (1965)
Line-breadth study of the 1.64-mm absorption in water vapor.
[E, $h\nu$, H_2O]

O A. Rutscher and H. E. Wagner : 16th ICPIG, Dusseldorf 550-551 (1984)
Modeling of water vapour dissociation in hollow cathode glow discharges.
[, H_2O]

O V. Ya. Ryadov and N. I. Furashov : Opt. Spectrosc. 24, 93-97 (1968)
Study of the width and intensity of the λij^{-1} = 12.67 cm^{-1} spectral line of atmospheric water vapor. [E, $h\nu$, H_2O]

O V. Ya. Ryadov and N. I. Furashov : Opt. Spectrosc. 35, 255-257 (1973)
Measurement of the parameters of the absorption line λ_{ij} = 398 μm in the rotational spectrum of water vapor. [E, $h\nu$, H_2O]

O R. Rye, T. E. Madey, J. E. Houston and P. H. Hollosay : J. Chem. Phys. 69, 1504-1512 (1978)
Chemical-state effects in Auger electron spectroscopy.
[E, H_2O, CH_4, C_2H_2, C_2H_4, CH_3OH, $(CH_3)_2O$]]

S H. Ryzko : Proc. Phys. Soc. London 85, 1283-1295 (1965)
Drift velocity of electrons and ions in dry and humid air and in water vapour. [E, H_2O, $N_2 + O_2$, $N_2 + O_2 + H_2O$; E/N = 142 - 253 Td]

S H. Ryzko : Ark. Fys. 32, 1-18 (1966)・
α Ionization, attachment and drift velocity of electrons in water vapor
A and dry air. [E, H_2O, $N_2 + O_2$]

E T. Sagara, H. Tanaka and L. Boesten : 20th ICPEAC, Vienna WE 082 (1997)
On the low angle extrapolation of experimental elastic DCS of polar molecules. [E,

QT Z. Saglam and N. Aktekin : J. Phys. B23, 1529-1536 (1990) ○K
Absolute total cross section for electron scattering on water in the energy range 25 - 300 eV. [E, H_2O]

QT Z. Saglam and N. Aktekin : J. Phys. B24, 3491-3496 (1991) ○K
Absolute total cross sections for scattering of electrons by H_2O in the energy range 4 - 20 eV. [E, H_2O]

I V. Saksena, M. S. Kushwaha and S. P. Khare : Physica B233, 201-212 (1997a)
Ionization cross-sections of molecules due to electron impact.
[T, H_2O, H_2, N_2, O_2, CO_2, NH_3]

I V. Saksena, M. S. Kushwaha and S. P. Khare : Int. J. Mass Spectrom. Ion Process, 171, L1-L5 (1997b)
Electron impact ionisation of molecules at high energies.
[T, H_2O, H_2, N_2, O_2; > 1 keV]

O F. Salvat : Radia. Phys. Chem. 53, 247-256 (1998)
Simulation of electron multiple elastic scattering.
[T, H_2O, Hg; 100, 5000 eV]

E S. Salvini and D. G. Thompson : J. Phys. B14, 3797-3803 (1981)・
Exchange approximations in the scattering of slow electrons by polyatomic molecules. [T, H_2O, CH_4; 1 - 7 eV for H_2O]

O M. Sana, G. Leroy, D. Peeters and C. Wilante : J. Mol. Struct. (Theochem.) 164, 249-274 (1988)
The theoretical study of the heats of formation of organic compounds containing the substituents CH_3, CF_3, NH_2, NF_2, NO_2, OH and F.
[T, H_2O, NH_3, CF_3, CF_4, HF, CH_3OH, etc.]

E L. Sanche and G. J. Schulz : J. Chem. Phys. 58, 479-493 (1973)
Electron transmission spectroscopy : Resonances in triatomic molecules and hydrocarbons. [E, H_2O, CO_2, NO_2, SO_2, N_2O, H_2S, C_2H_4, C_6H_6]

O J. H. Sanderson, A. El-Zein, W. A. Bryan, W. R. Newell, A. J. Langley and P. F. Taday : Phys. Rev. A59, R2567-R2570 (1999)
Geometry modifications and alignment of H_2O in an intense femtosecond laser pulse. [E, $h\nu$, H_2O]

O R. B. Sanderson and N. Ginsburg : J. Quant. Spectrosc. Radiat. Transf. 3, 435-444 (1963)
Line widths and line strengths in the rotational spectrum of water vapor.
[E, $h\nu$, H_2O; 92, 170 and 188 cm^{-1} lines]

E H. Sato, M. Kimura and K. Fujima : Chem. Phys. Lett. 145, 21-25 (1988)・
Elastic and momentum transfer cross sections in electron scattering by water molecules. [T, H_2O; DCS, 2 - 200 eV]

0 S. P. A. Sauer, J. R. Sabin and J. Oddershede : Phys. Rev. A47, 1123-1129 (1993)
Directional characteristics of the moments of the dipole-oscillator-strength distribution of molecules : H_2 and H_2O. [T, H_2O, H_2]

0 R. Schinke, V. Engel, P. Andresen, D. Hausler and G. G. Balint-Kurti : Phys. Rev. Lett. 55, 1180-1183 (1985a)
Photodissociation of single H_2O quantum states in the first absorption band : Complete characterization of OH rotational and Λ-doublet state distributions. [T, hν, H_2O]

0 R. Schinke, V. Engel and V. Staemmler : J. Chem. Phys. 83, 4522-4533 (1985b)○
Rotational state distributions in the photolysis of water : Influence of the potential anisotropy. [T, hν, H_2O]

0 R. Schinke and V. Engel : J. Chem. Phys. 83, 5068-5075 (1985c)
Semiclassical analysis of rotational state distributions in the photolysis of triatomic molecules : Mapping of ground state wave function and potential anisotropy. [T, general theory]

0 R. Schinke : J. Chem. Phys. 85, 5049-5060 (1986a)
The rotational reflection principle in the direct photodissociation of triatomic molecules. Close-coupling and classical calculations.
[T, general theory]

0 R. Schinke : J. Phys. Chem. 90, 1742-1751 (1986b)
Semiclassical analysis of rotational distibutions in scattering and photodissociation.
[T, hν, general theory, H_2CO, OCS; no discussion for H_2O]

0 R. Schinke : Ann. Rev. Phys. Chem. 39, 39-68 (1988)
Rotational distributions in direct molecular photodissociation.
[review, H_2O, H_2CO, H_2O_2; 105 references]

0 R. Schinke, V. Engel, S. Hennig, K. Weide and A. Untch : Ber. Bunsenges. Phys. Chem. 92, 295-306 (1988)
Classical and quantum mechanical features in the photodissociation of small polyatomic molecules. [T, H_2O, D_2O, H_2O_2, CH_3ONO]

0 R. Schinke : J. Phys. Chem. 92, 3195-3201 (1988)
Rotational state distributions following photodissociation of triatomic molecules : Test of classical models. [T, general theory]

0 R. Schinke : Comments At. Mol. Phys. 23, 15-44 (1989a)・
Rotational excitation in direct photodissociation and its relation to the anisotropy of the excited state potential energy surface : How realistic is the impulsive model ?
[comments, T, H_2O, H_2O_2, ICN; impulsive model is not realistic]

0 R. Schinke : in Collision Theory for Atoms and Molecules, F. A. Gianturco (Ed), Plenum (1989b)

O R. Schinke, R. L. Vander Wal, J. L. Scott and F. F. Crim : J. Chem. Phys. 94, 283-288 (1991).
The effect of bending vibrations on product rotations in the fully state-resolved photodissociation of the A state of water. [T, $h\nu$, H_2O]

O J. Schirmer, A. B. Trofimov, K. J. Randall, J. Feldhaus, A. M. Bradshaw, Y. Ma, C. T. Chen and F. Sette : Phys. Rev. A47, 1136-1147 (1993)
K-shell excitation of the water, ammonia, and methane molecules using high-resolution photoabsorption spectroscopy. [E, $h\nu$, H_2O, NH_3, CH_4]

QT F. Schmieder-Oppau : Z. Elektrochemie 36, 700-704 (1930)
Neue Wirkungsquerschnittsmessungen and Gasen und Dampfen.
[E, H_2O, CH_3OH, C_2H_5OH, C_2H_6, N_2, C_2H_2, CH_3F, etc.]

O W. Schnell and G. Fischer : Appl. Opt. 14, 2058-2059 (1975)
Carbon dioxide laser absorption coefficients of various air pollutants.
[E, H_2O, C_2H_4, NH_3, O_3, CCl_2F_2, C_2Cl_4, C_2HCl_3]

O K. Schofield : J. Phys. Chem. Ref. Data 8, 723-798 (1979)
Critically evaluated rate constants for gaseous reactions of several electronically excited species.
[review, OH, C, CO, CS, N, O_2, P, S, S_2, Se, Te]

O J. H. Schryber, O. L. Polyansky, P. Jensen and J. Tennyson : J. Mol. Spectrosc. 185, 234-243 (1997)
On the spectroscopically determined potential energy surfaces for the electronic ground states of NO_2 and H_2O. [T, H_2O, NO_2]

E E. Schultes, R. Schumacher und R. N. Schindler : Z. Naturforsch. 29a, 239-244 (1974).
Bestimmung von Streuquerschnitten fur thermische Elektronen aus der Linienform von ECR-Signalen.
[E, H_2O, He, Ar, H_2, O_2, N_2, CO, CO_2, N_2O, etc.]

EX G. J. Schulz : J. Chem. Phys. 33, 1661-1665 (1960)
A Excitation and negative ions in H_2O.
I [E, H_2O; 2 - 18 eV]

V G. J. Schulz : in Principles of Laser Plasmas, Ed. by G. Bekefi, John Wiley & Sons, Chapter 2, 33-88 (1976)
A review of vibrational excitations of molecules by electron impact at low energies. [review, H_2O, NO, N_2, H_2, O_2, CO, CO_2, N_2O]

V G. J. Schulz : in Electron-Molecule Scattering, Ed. by S. C. Brown, John Wiley & Sons, Chapter 1, 1-56 (1979)
A review of vibrational excitations of molecules by electron impact at low energies. [review, H_2O, NO, N_2, H_2, O_2, CO, CO_2, N_2O]

O M. Schurgers und K. H. Welge : Z. Naturforsch. 23a, 1508-1510 (1968)
Absorptionskoeffizient von H_2O_2 und N_2H_4 zwischen 1200 und 2000 A.
[E, $h\nu$, H_2O, H_2O_2, N_2H_4]

I J. Schutten, F. J. de Heer, H. R. Moustafa, A. J. H. Boerboom and J. Kistemaker :
J. Chem. Phys. 44, 3924-3928 (1966) ○K
Gross- and partial-ionization cross sections for electrons on water vapor in the energy range 0.1 - 20 keV. [E, H_2O]

O D. W. Schwenke : J. Mol. Spectrosc. 190, 397-402 (1998)
New H_2O rovibrational line assignments. [E, $h\nu$, H_2O]

O E. Segev and M. Shapiro : J. Chem. Phys. 73, 2001-2002 (1980)
Resonances in the H_2O photodissociation : A converged three-dimensional quantum mechanical study. [T, $h\nu$, H_2O]

O E. Segev and M. Shapiro : J. Chem. Phys. 77, 5604-5623 (1982)
Three-dimentional quantum dynamics of H_2O and HOD photodissociation.
[T, $h\nu$, H_2O, HOD; 1290 - 1360 A]

E G. Seng and F. Linder : J. Phys. B7, L509-L512 (1974) ○
V Scattering mechanisms in low-energy e - H_2O collisions.
[E, H_2O; q_t, q_v, 1 - 10 eV, DCS, 90° only]

V G. Seng and F. Linder : J. Phys. B9, 2539-2551 (1976) ○
Vibrational excitation of polar molecules by electron impact. Ⅱ. Direct and resonant excitation in H_2O. [E, H_2O; th. - 10 eV]

E B. Senger, S. Falk and R. V. Rechenmann : Radiat. Prot. Docim. 31, 37-42 (1990)
Semi-empirical expressions describing the elastic scattering of slow electrons by molecules. [T, H_2O, N_2]

O M. M. Shahin : Advan. Chem. Ser., 58, 315-332 (1966)
Mass spectrometric studies of ion-molecule reactions in gas discharges.
[E, $(H_2O)_nH^+$]

E B. S. Sharma and A. N. Tripathi : J. Phys. B16, 1827-1835 (1983)
EX Elastic and inelastic scattering of high-energy electrons and x-rays by NH_3, CH_4 and H_2O molecules. [T, H_2O, NH_3, CH_4]

O B. Sharma and M. Mohan : Indian J. Pure and Appl. Phys. 23, 447-449 (1985)
Low-lying vibrational transition probability of OH molecule in the presence of IR laser beam using Floquet method. [T, $h\nu$, HO]

R I. Shimamura : Chem. Phys. Lett. 73, 328-333 (1980)
State-to-state rotational transition cross sections from unresolved energy-loss spectra. [general theory]

R I. Shimamura : Phys. Rev. A23, 3350-3353 (1981)
Energy loss by slow electrons and by slow atoms in a molecular gas.
[general theory]

R I. Shimamura : J. Phys. B15, 93-100 (1982a)
Sum rules for the rotational structure in the molecular transitions spectrum. [general theory]

R I. Shimamura : Z. Phys. A309, 107-117 (1982b)
Moments of the spectra for rotational transitions induced by collisions or by external perturbations. [general theory]

R I. Shimamura : Phys. Rev. A28, 1357-1362 (1983)
Partial-sum rules for and asymmetry between rotational transitiona $J \pm \Delta J \leftarrow J$. [general theory]

E I. Shimamura : Sci. Paper Inst. Phys. Chem. Res. 82, 1-51 (1989)
EX Cross sections for collisions of electrons with atoms and molecules.
I [compilation, for H_2O, p. 5, 22 - 23, 28 - 30, 40 - 42]

R I. Shimamura : Phys. Rev. A42, 1318-1323 (1990)
Energy loss by slow electrons in polar gases. [T]

E M. Shimizu : J. Phys. Soc. Jpn. 18, 811-819 (1963)・
Two centre Coulomb potential approximation. [T, H_2O, NH_3; $q_m < 1$ eV]

E T. W. Shyn and S. Y. Cho : Phys. Rev. A36, 5138-5142 (1987)○K
Vibrationally elastic scattering cross section of water vapor by electron impact. [E, H_2O; DCS, 2.2 - 20 eV, 15 - 150°]

V T. W. Shyn, S. Y. Cho and T. E. Cravens : Phys. Rev. A38, 678-682 (1988)○K
Vibrational-excitation cross sections of water molecules by electron impact. [E, H_2O; DCS, 2.1 - 20 eV, 30 - 150°]

E T. W. Shyn and A. Grafe : Phys. Rev. A46, 4406-4409 (1992)○.
Erratum A47, 3456 (1993)
Angular distribution of electrons elastically scattered from water vapor. [E, H_2O; DCS, 30 - 200 eV, 12 - 156°]

O J. P. Simons and A. J. Smith : Chem. Phys. Lett. 97, 1-3 (1983)
Rotationally resolved photofragment alignment and the vacuum ultraviolet photodissociation of H_2O. [E, $h\nu$, H_2O]

O J. P. Simons : J. Phys. Chem. 88, 1287-1293 (1984)
Photodissociation : A critical survey. [review, $h\nu$, H_2O, NO_2, NH_3]

O W. C. Simpson, M. T. Sieger, T. M. Orland, L. Parenteau, K. Nagesha and L. Sanche : J. Chem. Phys. 107, 8668-8677 (1997)
Dissociative electron attachment in nanoscale ice films : Temperature and morphology effects. [E, D_2O]

O A. N. Singh and R. S. Prasad : Chem. Phys. 49, 267-277 (1980)
Molecular Rydberg S ← S and T ← S transitions in water, ammonia, formaldehyde and n-alkanes. [T, H_2O, H_2CO, NH_3, CH_4, C_2H_6]

I H. Sjogren : 6th ICIPG, Paris 49-50 (1963)
A Simultaneous measurement of ionization efficiency curves for positive and negative ions. [E]

I H. Sjogren : in Atomic Collision Processes, North-Holland, ed. by M. R. C. McDowell, 3rd ICPEAC, London 474-477 (1964)・
Higher ionization potentials measured by electron impact.
[E, H_2O, CH_3OH; th. - 16 eV]

I H. Sjogren : Ark. Fys. 33, 597-610 (1967)・
The ionization of water, methylamine, and methyl alcohol, using electron and ion impact. [E, H_2O, CH_3NH_2, CH_3OH]

O A. M. Skerbele : Thesis, Ohio State University 1-123 (1960)
EX The design of an electron source and its application to the study of electron impact spectra at zero scattering angle. [E]

EX A. Skerbele and E. N. Lassettre : J. Chem. Phys. 42, 395-401 (1965a)
Electron-impact spectra. [E, H_2O, N_2, CO, NH_3, C_6H_6]

EX A. Skerbele, V. D. Meyer and E. N. Lassettre : J. Chem. Phys. 43, 817-820 (1965b)・
Relative intensities of two Rydberg transitions in the electron-impact spectrum of water. [E, H_2O; 200 eV]

EX A. M. Skerbele, V. D. Meyer and E. N. Lassettre : J. Chem. Phys. 44, 4066-4069 (1966)・
Intensity variation with scattering angle of electron transitions in H_2O excited by electron impact. [E, H_2O; 400, 500 eV]

V A. Skerbele, M. A. Dillon and E. N. Lassettre : J. Chem. Phys. 49, 5042-5046 (1968)・
Excitation of electron impact of vibrational transitions in water and carbon dioxide at kinetic energies between 30 and 60 eV. [E, H_2O, CO_2]

O T. G. Slanger and G. Black : J. Chem. Phys. 77, 2432-2437 (1982)
Photodissociative channels at 1216 A for H_2O, NH_3, and CH_4.
[E, $h\nu$, H_2O, NH_3, CH_4]

O P. L. Smith and W. H. Parkinson : Astrophys. J. 223, L127-L130 (1978)
Oscillator strengths for lines of the $C^1B_1 - X^1A_1$ band of H_2O and the abundance of H_2O in diffuse interstellar clouds.
[E, $h\nu$, H_2O; 124 nm]

O P. L. Smith, K. Yoshino, H. E. Griesinger and J. H. Black : Astrophys. J. 250, 166-174 (1981)
Oscillator strengths for lines of the F(0, 0, 0) - X(0, 0, 0) band of H_2O at 111.5 nanometers and the abundance of H_2O in diffuse interstellar clouds.
[E, $h\nu$, H_2O]

I H. D. Smyth : Rev. Mod. Phys. 3, 347-391 (1931)
Products and processes of ionization by low speed electrons.
[review, H_2O, He - Ar, Hg, H_2, N_2, O_2, NO, CO, HCl, I_2, K, K_2, CO_2, NO_2, H_2S, N_2O, C_2N_2]

O L. C. Snyder and H. Basch : Molecular Wave Functions and Properties, Wiley (1972)

R A. M. Sobolev and S. V. Makarov : Sov. Astron. 28, 720- (1984)
Stimulation of H_2O rotational transitions by electron impact.
[T, H_2O]

QT V. F. Sokolov and Yu. A. Sokolova : Sov. Tech. Phys. Lett. 7, 268-269 (1981)·
Total cross sections for electron scattering by H_2S, SO_2 and H_2O molecules at electron energies in the range 0 - 10 eV. [E, H_2O, H_2S, SO_2]

E V. F. Sokolov, Yu. A. Sokolova and V. D. Khalimulina : Sov. Phys. J. 26, 869-873 (1983)·
Frequency of collisions between electrons and gas and vapor atoms and molecules. [E, H_2O, H_2S, He, Ar, SO_2, CsCl; 1 - 10 eV]

E F. E. Spencer, Jr. and A. V. Phelps : Proc. 15th Symposium on Engineering Aspects of Magnetohydrodynamics 103-111 (1976)
Momentum transfer cross section. [compilation, H_2O, CO_2, N_2, CO, etc.]

O R. Spohr und E. von Puttkamer : Z. Naturforsch. 22a, 705-710 (1967)
Energiemessung von Photoelektronen und Franck-Condon-Faktoren der Schwingungsubergange einiger Molekulionen. [E, $h\nu$, H_2O^+, etc.]

O V. S. Stankevich : Radio Eng. Electron. Phys. (USSR) 22, NO. 6, 118-121 (1977)
Measurements of the absorption of the radiation of an H_2O laser at a wavelength of λ = 118.6 μm by pure water vapor.
[E, $h\nu$, H_2O; 300 - 373 K]

I H. E. Stanton and J. E. Monahan : J. Chem. Phys. 41, 3694-3702 (1964)
On the kinetic-energy distribution of fragment ions produced by electron impact in a mass spectrometer. [E, H_2O, CH_4, NH_3, CO, C_6H_6]

O V. I. Starikov, V. F. Golovko and Vl. G. Tyuterev : Opt. Spectrosc. 60, 23-26 (1986)·
Small parameter model for calculating and predicting the rotational levels of isotope-substituted nonrigid A_2B molecules. Application to H_2O.
[T, $H_2{}^{17}O$, $H_2{}^{18}O$, D_2O; two vibrational states 000 and 010]

O J. A. Stephens and V. McKoy : J. Chem. Phys. 93, 7863-7873 (1990a)
Orbital evolution and promotion effects in the photoionization dynamics of $^2\Sigma^-$ Rydberg states of OH. [T, $h\nu$, OH]

O J. A. Stephens, M. Braunstein, V. McKoy, H. Rudolph and M. T. Lee : Phys. Scr. 41, 482-486 (1990b)
Non-Franck-Condon effects induced by shape resonances and orbital evolution in resonance enhanced multiphoton ionization of small molecules. [T, $h\nu$, OH, O_2, CH]

O L. J. Stief, W. A. Payne and R. B. Klemm : J. Chem. Phys. 62, 4000-4008 (1975)
A flash photolysis-resonance fluorescence study of the formation of $O(^1D)$ in the photolysis of water and the reaction of $O(^1D)$ with H_2, Ar, and He.
[E, $h\nu$, H_2O]

S J. A. Stockdale and G. S. Hurst : J. Chem. Phys. 41, 255-261 (1964)
A Swarm measurement of cross sections for dissociative electron capture in heavy water, chlorobenzene and bromo-benzene. [E, D_2O, C_6Cl_6, C_6Br_6]

I H. C. Straub, B. G. Lindsay, K. A. Smith and R. F. Stebbing : J. Chem. Phys. 108, 109-116 (1998)○
Absolute partial cross sections for electron-impact ionization of H_2O and D_2O from threshold to 1000 eV.
[E, H_2O, D_2O; error 4.5 % for H_2O^+]

QT O. Sueoka, S. Mori and Y. Katayama : J. Phys. B19, L373-L378 (1986)○K
Total cross sections for electrons and positrons colliding with H_2O molecules. [E, H_2O; 1 - 400 eV]

QT O. Sueoka, S. Mori and Y. Katayama : J. Phys. B20, 3237-3246 (1987)
Total cross sections for positrons and electrons with NH_3 and H_2O molecules. [E, H_2O, NH_3; 1 - 400 eV]

I L. V. Sumin and M. V. Gur'ev : Sov. Phys. JETP 35, 1057-1061 (1972)・
Ionization of atoms and molecules by electron impact. Energy loss and momentum transfer. [E, H_2O, He - Kr, H_2, N_2, CO_2; 30 - 300 eV]

EX I. V. Sushanin and S. M. Kishko : Opt. Spectrosc. 30, 315-315 (1971)
Excitation of the radiation of the OH radical and determination of the excitation cross section of its bands in the ultraviolet region.
[E, H_2O: OH bands, th. - 75 eV]

E A. Szabo and N. S. Osthlund : J. Chem. Phys. 60, 946-950 (1974)・
Calculation of high energy elastic electron-molecule scattering cross sections with CNDO wavefunctions. [T, H_2O, NH_3, CH_4, H_2, CO, N_2]

QT C. Szmytkowshi : Chem. Phys. Lett. 136, 363-367 (1987a)○K
Absolute total cross sections for electron-water vapour scattering.
[E, H_2O; 0.5 - 80 eV, error 9 - 20 %]

QT C. Szmytkowski : 15th ICPEAC, Brighton 269-269 (1987b)
Electron total cross sections on H_2O and CS_2. [E, H_2O, CS_2; 0.5 - 80 eV]

QT C. Szmytkowski, A. Zecca, G. Karwasz, S. Oss, K. Maciag, B. Marinkovic, R. Brusa and R. Grisenti : 15th ICPEAC, Brighton 270-270 (1987c)
Total absolute cross sections measurements for electron scattering on CO_2 and H_2O molecules. [E, H_2O, CO_2; 0.5 - 3000 eV]

QT C. Szmytkowski, K. Maciag, P. Koenig, A. Zecca, S. Oss and R. Grisenti : Chem. Phys. Lett. 179, 114-118 (1991) K
D_2O absolute total electron-scattering cross sections.
[E, D_2O; 0.4 - 2707 eV]

O K. Takatsuka and V. McKoy : Phys. Rev. A24, 2473-2480 (1981)
Excitation of the Schwinger variational principle beyond the static-exchange approximation. [T, general theory]

O K. Takatsuka and V. McKoy : Phys. Rev. A30, 1734-1740 (1984)
Theory of electronically inelastic scattering of electrons by molecules.
[T, general theory]

E K. Takayanagi and S. Geltman : Phys. Rev. 138, A1003-A1010 (1965)・
R Excitation of molecular rotation by slow electrons.
[T, H_2O, NO, H_2, N_2, O_2, C_6H_6]

R K. Takayanagi : J. Phys. Soc. Jpn. 21, 507-514 (1966)
V Rotational and vibrational excitation of polar molecules by slow electrons. [general theory]

E K. Takayanagi : Prog. Theore. Phys. Suppl. No. 40, 216-248 (1967)
R Scattering of slow electrons by molecules.
[review, H_2O, NO, H_2, N_2, O_2, C_6H_6]

E S. Takeda and A. A. Dougal : J. Appl. Phys. 31, 412-416 (1960)・
Microwave study of afterglow discharge in water vapor.
[E, H_2O; q_m, 0.03 - 0.5 eV]

I K. H. Tan, C. E. Brion, Ph. E. van der Leeuw and M. J. van der Wiel : Chem. Phys. 29, 299-309 (1978)
Absolute oscillator strengths (10 - 60 eV) for the photoabsorption, photoionisation and fragmentation of H_2O. [E, $h\nu$, H_2O]

I V. Tarnovsky and K. Becker : 20th ICPEAC, Vienna MO 132 (1997)
Electron impact ionization of D_2O and OD. [E, D_2O, OD]

I V. Tarnovsky, H. Deutsch and K. Becker : J. Chem. Phys. 109, 932-936 (1998)・
Electron impact ionization of the hydroxyl radical.
[E, OD; th. - 200 eV]

I J. T. Tate and P. T. Smith : Phys. Rev. 39, 270-277 (1932)
The efficiencies of ionization and ionization potentials of various gases under electron impact. [E, H_2O,

E H. Tawara : NIFS-DATA-19, National Inst. Fusion Sci. 1-74 (1992)
V Atomic and molecular data for H_2O, CO and CO_2 relevant to edge plasma
EX impurities. [compilation , H_2O, CO, CO_2]

O J. H. Taylor, W. S. Benedict and J. Strong : J. Chem. Phys. 20, 528-529 (1952)
Atmospheric transmission at high temperatures.
[E, $h\nu$, H_2O, CO_2; 298 - 773 K, 410 - 650 cm^{-1} for H_2O]

A D. Teillet-Billy and J. P. Gauyacq : J. Phys. B17, 3329-3340 (1984)
Angular dependence of dissociative attachment to polar molecules.
[T, H_2O, HF, HCl, H_2S, NaCl]

A D. Teillet-Billy : J. Chim. Phys. 90, 1239-1265 (1993)
Attachment and electron bombardment. [review]

O G. D. T. Tejwani and P. Varanasi : J. Quant. Spectrosc. Radiat. Transf. 10, 373-388 (1970)・
Approximate mean absorption coefficients in the spectrum of water vapor between 10 and 22 microns at elevated temperatures.
[T, $h\nu$, H_2O; 400 - 1200 K]

E J. Tennyson and L. A. Morgan : Phil. Trans. Roy. Soc. London A357, 1161-1173 (1999)
Electron collisions with polyatomic molecules using the R-matrix method.
[review, H_2O, N_2O, O_3, CO_2]

O G. Theodorakopoulos, C. A. Nicolaides, R. J. Buenker and S. D. Peyerimhoff : Chem. Phys. Lett. 89, 164-170 (1982)
Potential energy surfaces for the photodissociation. — $H_2O \rightarrow O(^1D_g) + H_2(^1\Sigma_g^+)$. [T, $h\nu$, H_2O]

O G. Theodorakopoulos, I. D. Petsalakis, R. J. Buenker and S. D. Peyerimhoff : Chem. Phys. Lett. 105, 253-257 (1984)
Bending potentials for H_2O in the ground and the first six singlet excited states. [T, H_2O,

O G. Theodorakopoulos, I. D. Petsalakis, C. A. Nicolaides and R. J. Buenker : J. Chem. Phys. 82, 912-916 (1985a)
The $X\ ^1A_1 \rightarrow A\ ^1B_1$ transition moment of H_2O using state-specific configuration-interaction wave functions. [T, H_2O]

O G. Theodorakopoulos, I. D. Petsalakis and R. J. Buenker : Chem. Phys. 96, 217-225 (1985b)
MRD CI calculations on the asymmetric stretch potentials of H_2O in the ground and the first seven singlet excited states. [T, H_2O]

O G. Theodorakopoulos, I. D. Petsalakis, C. A. Nicolaides and R. J. Buenker : Chem. Phys. 100, 331-337 (1985c)
Configuration interaction study of the oscillator strengths for the $B\ ^1A_1 - X\ ^1A_1$ and $D\ ^1A_1 - X\ ^1A_1$ transitions of the water molecule.
[T, H_2O]

O G. Theodorakopoulos, I. D. Petsalakis, C. A. Nicolaides and R. J. Buenker : Int. J. Quant. Chem. 29, 399- (1986) 1986 mistake

O G. Theodorakopoulos, I. D. Petsalakis and R. J. Buenker : Chem. Phys. Lett. 138, 71-75 (1987)
Theoretical investigation of the character of the electronic states of H_2O along a linear dissociation path leading to OH + H. [T, H_2O, OH]

O A. Terenin and H. Neujmin : J. Chem. Phys. 3, 436-437 (1935)
Photodissociation of polyatomic molecules in the Schumann ultraviolet.
[E, $h\nu$, H_2O, CH_3OH, C_2H_5OH, NH_3, I_2, etc.]

O M. E. Thomas and R. J. Nordstrom : Appl. Opt. 24, 3526-3530 (1985)
Line shape model for describing infrared absorption by water vapor.
[T, $h\nu$, H_2O]

O B. A. Thompson, P. Harteck and R. R. Reeves, Jr. : J. Geophys. Res. 68, 6431-6436 (1963)
Ultraviolet absorption coefficients of CO_2, CO, O_2, H_2O, N_2O, NH_3, NO, SO_2 and CH_4 between 1850 and 4000 A. [E, $h\nu$, H_2O, NH_3, SO_2, CH_4, etc.]

V D. G. Thompson : in Advances in Atomic and Molecular Physics, Vol. 19, Academic Press 309-343 (1983)
The vibrational excitation of molecules by electron impact.
[review, H_2O, H_2, N_2, CO, NO, CO_2, HCl, etc.]

E D. G. Thompson and F. A. Gianturco : Comments At. Mol. Phys. 16, 307-316 (1985)·
Theoretical considerations in the scattering of slow electrons by polyatomic molecules. [comments, H_2O, H_2S, CH_4, NH_3, SiF_4, SF_6, etc.]

E R. Tice and D. Kivelson : J. Chem. Phys. 46, 4748-4754 (1967) K
Cyclotron resonance in gases. Ⅱ. Cross sections for dipolar gases and for CO_2. [E, H_2O, D_2O, NH_3, N_2O, SO_2, HCN, CO_2]

D I. Tokue, M. Kobayashi, S. Suzuki and Y. Ito : Chem. Phys. 179, 503-511 (1994)
Rotational distributions of $OH(A^2\Sigma^+)$ produced by electron-impact dissociation of jet-cooled H_2O and CH_3OH. [E, H_2O, CH_3OH]

O R. A. Toth : J. Quant. Spectrosc. Radiat. Transf. 13, 1127-1142 (1973)
Strengths and air-broadened widths of H_2O lines in the 2950 - 3400 cm^{-1} region. [E, $h\nu$, H_2O]

O R. A. Toth and C. B. Farmer : J. Mol. Spectrosc. 55, 182-191 (1975a)
Line strengths of H_2O and N_2O in the 1900 cm^{-1} region.
[E, $h\nu$, H_2O, N_2O]

O R. A. Toth and J. S. Margolis : J. Mol. Spectrosc. 55, 229-251 (1975b)
Line positions of H_2O in the 1.33 to 1.45 micron region. [E, $h\nu$, H_2O]

O R. A. Toth and J. S. Margolis : J. Mol. Spectrosc. 57, 236-245 (1975c)
Spectrum of $H_2{}^{18}O$ in the 2900 to 3400 cm^{-1} region. [E, $h\nu$, H_2O]

O R. A. Toth, J.-M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 67, 185-205 (1977a)
Spectrum of $H_2{}^{18}O$ and $H_2{}^{17}O$ in the 5030 to 5640 cm^{-1} region.
[E, $h\nu$, H_2O]

O R. A. Toth, J.-M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 67, 206-218 (1977b)
Spectrum of $H_2{}^{18}O$ and $H_2{}^{17}O$ in the 6974 - 7387 cm^{-1} region.
[E, $h\nu$, H_2O]

O R. A. Toth, C. Camy-Peyret and J. M. Flaud : J. Quant. Spectrosc. Radiat. Transf. 18, 515-523 (1977c)
Strengths of H_2O lines in the 5000 - 5750 cm^{-1} region.
[E, $h\nu$, H_2O; 311 lines]

O R. A. Toth : Water Vapour Line Parameters from Microwave to Medium Infrared, Pergamon (1981)

O R. A. Toth : J. Opt. Soc. Am. B8, 2236-2255 (1991)
ν_2 band of $H_2{}^{16}O$; Line strengths and transition frequencies.
[E, $h\nu$, H_2O]

O R. A. Toth : J. Opt. Soc. Am. B9, 462-482 (1992)
Transition frequencies and absolute strengths of $H_2{}^{17}O$ and $H_2{}^{18}O$ in the 6.2-μm region. [E, hν, H_2O]

O R. A. Toth : J. Opt. Soc. Am. B10, 1526-1544 (1993a)・
$2\nu_2 - \nu_2$ and $2\nu_2$ bands of $H_2{}^{16}O$, $H_2{}^{17}O$, and $H_2{}^{18}O$: line positions and strengths. [E, hν, H_2O]

O R. A. Toth : J. Opt. Soc. Am. B10, 2006-2029 (1993b)
$\nu_1-\nu_2$, $\nu_3-\nu_2$, ν_1 and ν_3 bands of $H_2{}^{16}O$: line positions and strengths. [E, hν, H_2O]

O R. A. Toth : J. Mol. Spectrosc. 162, 20-40 (1993c)
$HD^{16}O$, $HD^{18}O$, and $HD^{17}O$ transition frequencies and strengths in the ν_2 bands. [E, hν, H_2O]

O R. A. Toth : Appl. Opt. 33, 4851-4867 (1994a)
Extensive measurements of $H_2{}^{16}O$ line frequencies and strengths : 5750 to 7965 cm^{-1}. [E, hν, H_2O]

O R. A. Toth : Appl. Opt. 33, 4868-4879 (1994b)
Transition frequencies and strengths of $H_2{}^{17}O$ and $H_2{}^{18}O$: 6600 to 7640 cm^{-1}. [E, hν, H_2O]

O R. A. Toth : J. Mol. Spectrosc. 186, 66-89 (1997a)
Line positions and strengths of HDO between 6000 and 7700 cm^{-1}.
[E, hν, HDO, D_2O, H_2O]

O R. A. Toth : J. Mol. Spectrosc. 186, 276-292 (1997b)
Measurements of HDO between 4719 and 5843 cm^{-1}. [E, hν, HDO]

O R. A. Toth : J. Mol. Spectrosc. 190, 379-396 (1998a)
Water vapor measurements between 590 and 2582 cm^{-1} : Line positions and strengths. [E, hν, $H_2{}^{16}O$, $H_2{}^{17}O$, $H_2{}^{18}O$]

O R. A. Toth, L. R. Brown and C. Plymate : J. Quant. Spectrosc. Radiat. Transf. 59, 529-562 (1998b)
Self-broadened withs and frequency shifts of water vapor lines between 590 and 2400 cm^{-1}. [E, hν, H_2O]

O R. A. Toth : J. Mol. Spectrosc. 194, 28-42 (1999)
Analysis of line positions and strengths of $H_2{}^{16}O$ ground and hot bands connecting to interacting upper states : (020), (100), and (001).
[E, hν, H_2O]

α J. S. Townsend : Electricity in Gases. Oxford 281- (1915)

EX S. Trajmar, W. Williams and A. Kuppermann : J. Chem. Phys. 54, 2274-2275 (1971)○
Detection and identification of triplet states of H_2O by electron impact.
[E, H_2O]

E S. Trajmar, W. Williams and A. Kuppermann : J. Chem. Phys. 58, 2521-2531 (1973)○K
V Electron impact excitation of H_2O. [E, H_2O; DCS, 15 - 53 eV, 0 - 90°]

A S. Trajmar and R. I. Hall : J. Phys. B7, L458-L461 (1974) ○
Dissociative electron attachment in H_2O and D_2O. Energy and angular distribution of H^- and D^- fragments. [E, H_2O, D_2O]

E S. Trajmar, D. F. Register and A. Chutjian : Phys. Rep. 97, 219-356 (1983)
V Electron scattering by molecules. II. Experimental methods and data.
EX [compilation, many molecules; for H_2O, p. 313 - 318]

A M. Tronc, S. Goursaud, R. Azria et F. Fiquet-Fayard : J. de Physique 34, 381-388 (1973) ·
Effets isotopiques dans la formation de H^- et D^- par attachment dissociatif sur H_2S, HDS, et H_2O, HDO, D_2O.
[E, H_2O, HDO, D_2O, H_2S, HDS]

A M. Tronc : in Swarm Studies and Inelastic Electron-Molecule Collisions, Lake Tahoe, Springer 287-302 (1987)
Fragmentation dynamics and energy partitioning in dissociative attahcment on triatomic molecules. [review, H_2O, NH_3, CO_2, CS_2, SO_2, $HgCl_2$]

O C. M. Truesdale, S. Southworth, P. H. Kobrin, D. W. Lindle, G. Thornton and D. A. Shirley : J. Chem. Phys. 76, 860-865 (1982)
Photoelectron angular distribution of H_2O. [E, $h\nu$, H_2O]

O H. Tsubomura, K. Kimura, K. Kaya, J. Tanaka and S. Nagakura : Bull. Chem. Soc. Jpn. 37, 417-423 (1964)
Vacuum ultraviolet absorption spectra of saturated organic compounds with non-bonding electrons.
[E, $h\nu$, H_2O, CH_3OH, C_2H_5OH, CH_3Cl, CH_2Cl_2, $CHCl_3$, CCl_4]

EX S. Tsurubuchi, T. Iwai and T. Horie : J. Phys. Soc. Jpn. 34, 166-171 (1973a)
Comparison between crossed-beam and target-gas methods for study of optical excitation functions in electron-impact of H_2O. [E, H_2O]

EX S. Tsurubuchi, T. Iwai and T. Horie : 8th ICPEAC, Beograd 368-369 (1973b) ·
Absolute measurements of emission cross-sections for dissociative excitations of H_2O by electron impact. [E, H_2O; th. - 400 eV]

EX S. Tsurubuchi, T. Iwai and T. Horie : J. Phys. Soc. Jpn. 36, 537-541 (1974)
Absolute measurements of emission cross-sections for dissociative excitations of H_2O by electron-impact with crossed-beam apparatus and high sensitive quartz spring balance. [E, H_2O]

D S. Tsurubuchi : Chem. Phys. 10, 335-344 (1975a) ·
Correlation diagrams for electronic states of H_2O and fragment species.
[E, H_2O]

EX S. Tsurubuchi and S. Isaka : J. Phys. Soc. Jpn. 38, 1224-1224 (1975b) ·
Excitation function for Lyman-α emission in electron-impact of H_2O.
[E, H_2O]

EX S. Tsurubuchi, G. R. Mohlmann and F. J. de Heer : Chem. Phys. Lett. 48, 477-480 (1977)
Excitation cross sections for the H 3s state for electron impact on hydrogen containing molecules. [E, H_2O, H_2, HCl, NH_3, CH_4]

0 M. Urban, J. Noga, S. J. Cole and R. J. Bartlett : J. Chem. Phys. 83, 4041-4046 (1985)
Towards a full CCSDT model for electron correlation.
[T, H_2O, HF, CO, NH_3, C_2H_2]

0 M. Urban and A. J. Sadlej : Theor. Chim. Acta 78, 189-201 (1990)
Molecular electric properties in electronic excited states : Multipole moments and polarizabilities of H_2O in the lowest $^1B_1$ and $^3B_1$ excited states. [T, H_2O]

I C. Vallance, P. W. Harland and R. G. A. R. Maclagan : J. Phys. Chem. 100, 15021-15026 (1996)・
Quantum mechanical calculation of maximum electron impact single ionization cross sections for the inert gases and small molecules.
[T, H_2O, He - Xe, H_2, N_2, O_2, CO, NO, CO_2, NH_3, CH_4, CH_3Cl]

EX P. J. M. van der Burgt, W. B. Westerveld and J. S. Risley : J. Phys. Chem. Ref. Data 18, 1757-1805 (1989)・
Photoemission cross sections for atomic transitions in the extreme ultraviolet due to electron collisions with atoms and molecules.
[review, H_2O, He - Xe, H_2, O_2, N_2, CO, NO, CO_2, NH_3, CH_4, etc.]

0 E. F. van Dishoeck, M. C. van Hemert, A. C. Allison and A. Dalgarno : J. Chem. Phys. 81, 5709-5724 (1984)
Resonances in the photodissociation of OH by absorption into coupled $^2\Pi$ states : Adiabatic and diabatic formulations. [T, $h\nu$, HO]

0 P. Varanasi, S. Chou and S. S. Penner : J. Quant. Spectrosc. Radiat. Transf. 8, 1537-1541 (1968)・
Absorption coefficients for water vapor in the 600 - 1000 cm^{-1} region.
[E, $h\nu$, H_2O; 400 - 500 K]

E M. T. do N. Varella, M. H. F. Bettega, M. A. P. Lima and L. G. Ferreira : J. Chem. Phys. 111, 6396-6406 (1999a)・
Low-energy electron scattering by H_2O, H_2S, H_2Se, and H_2Te.
[T, H_2O, H_2S, H_2Se, H_2Te; 2 - 30 eV for H_2O]

E M. T. do N. Varella, D. L. Azevedo, R. B. Diniz, A. P. P. Natalense, M. H. F. Bettega,
EX L. G. Ferreira and M. A. P. Lima : 21st ICPEAC, Sendai 321 (1999b)
Cross sections for electron scattering by polyatomic molecules using the Schwinger multichannel method with pseudopotentials (SMCPP).
[T, H_2O]

0 H. F. A. Verhaart : J. Appl. Phys. 55, 3286-3292 (1984)
The influence of water vapor on avalanches in air. [E, $H_2O + N_2 + O_2$]

0 L. Veseth and H. P. Kelly : Phys. Rev. A45, 4621-4630 (1992)
Polarizabilities and photoionization cross sections of OH and HF.
[T, $h\nu$, OH, HF]

0 F. I. Vilesov and S. N. Lopatin : Vestn. Lenigr. Univ. Ser. Fiz. Khim. 4, 64-69 (1970)
Angular distribution of fast electrons released during the photoionization of atoms and molecules. [, H_2O,

O I. P. Vinogradov and F. I. Vilesov : Opt. Spectrosc. 40, 32-34 (1976)
Luminescence of the $OH(A^2\Sigma^+)$ radical during photolysis of water vapour by vacuum UV radiation. [E, $h\nu$, H_2O; 850 - 1370 A]

O I. P. Vinogradov and F. I. Vilesov : Opt. Spectrosc. 44, 653-655 (1978)
Effect of temperature on the process of photodisociation of water with formation of the $OH(A^2\Sigma^+)$ radical. [E, $h\nu$, H_2O]

O E. von Puttkamer : Z. Naturforsch. 25a, 1062-1071 (1970)
Koinzidenzmessungen von Photoionen und Photoelektronen.
[E, $h\nu$, H_2O, NH_3, CH_4, CD_4, C_2H_2, C_2H_4, C_2H_6, CH_3OH, HCOOH]

O A. A. Vostrikov, D. Yu. Dubov and M. R. Predtechenshii : Sov. Phys. Tech. Phys. 32, 459-466 (1987)·
Water clusters : Electron attachment, ionization, and electrification upon dissociation. [E, $(H_2O)_n$, n = 1 - 10^3]

O M. J. J. Vrakking, Y. T. Lee, R. D. Gilbert and M. S. Child : J. Chem. Phys. 98, 1902-1915 (1993)
Resonance-enhanced one- and two-photon ionization of water molecule : Preliminary analysis by multichannel quantum defect theory.
[E, $h\nu$, H_2O]

EX D. A. Vroom and F. J. de Heer : J. Chem. Phys. 50, 1883-1887 (1969)
Production of excited hydrogen atoms by impact of fast electrons in water vapor. [E, H_2O; 50 - 6000 eV]

O N. Wainfan, W. C. Walker and G. L. Weissler : Phys. Rev. 99, 542-549 (1955)
Photoionization efficiencies and cross sections in O_2, N_2, CO_2, A, H_2O, H_2, and CH_4. [E, $h\nu$, H_2O, Ar, CH_4, etc.]

O L. Wallace : Astrophys. J. Suppl. Ser. 7, 6, 165- (1962)
Band-head wavelengths of C_2, CH, CO, NH, NO, O_2, OH and their ions.
[, OH, etc.]

O L. Wallace, P. Bernath, W. Livingston, K. Hinkle, J. Busler, B. Guo and K. Zhang : Science 268, 1155-1158 (1995)
Water on the sun. [E, $h\nu$, H_2O; see O. L. Polyansky (1997b)]

O A. D. Walsh : J. Chem. Soc. 2260-2266 (1953)
The electronic orbitals, shapes, and spectra of polyatomic molecules. Part I. AH_2 molecules. [compilation, H_2O, H_2N, H_2C]

O A. D. Walsh : in Advances in Molecular Spectroscopy, Vol. I, A. Mangini (Ed), Pergamon 148-159 (1962)
The electronic spectra of simple molecules. [review, H_2O, NH_2, CH_2]

O C. C. Wang and L. I. Davis, Jr. : J. Chem. Phys. 62, 53-55 (1975)
Two-photon dissociation of water : A new OH source for spectroscopic studies. [E, $h\nu$, H_2O; tunable UV laser beam]

0 H.-t. Wang, W. S. Felps and S. P. McGlynn : J. Chem. Phys. 67, 2614-2628 (1977)
Molecular Rydberg states. VII. Water.
[E, hν, H_2O, D_2O; 950 - 2000 A]

0 K. Wang, M.-T. Lee, V. McKoy, R. T. Wiedmann and M. G. White : Chem. Phys. Lett. 219, 397-404 (1994).
Rotationally resolved threshold photoelectron spectroscopy of H_2O and H_2S. [T, hν, H_2O, H_2S]

0 Y. Wang and J. R. Gunn : Can. J. Chem. 77, 367-377 (1999)
Computational study on small water clusters using a semiempirical valence bond approach. [T, $(H_2O)_n$, n = 3 - 8]

0 J. M. Warman, M. Zhou-lei and D. van Lith : J. Chem. Phys. 81, 3908-3914 (1984)
Electron thermalization in nanosecond pulse-ionized dry and humid air.
[E, H_2O + N_2 + O_2]

0 K. Watanabe and M. Zelikoff : J. Opt. Soc. Am. 43, 753-755 (1953a)
Absorption coefficients of water vapor in the vacuum ultraviolet.
[E, hν, H_2O]

0 K. Watanabe, M. Zelikoff and E. C. Y. Inn : AFCRC Tech. Rep. 53-23, Air Force Cambridge Res. Center 1-79 (1953b)
Absorption coefficients of several atmospheric gases.
[E, hν, H_2O, etc.]

0 K. Watanabe and A. S. Jursa : J. Chem. Phys. 41, 1650-1653 (1964)
Absorption and photoionization cross sections of H_2O and H_2S.
[E, hν, H_2O, H_2S]

0 P. Wehinger and S. Wyckoff : Astrophys. J. 192, L41-L42 (1974)
H_2O^+ in spectra of comet Bradfield (1974b). [E, hν, H_2O]

0 K. Weide and R. Schinke : J. Chem. Phys. 87, 4627-4633 (1987)
Photodissociation dynamics of water in the second absorption band. I. Rotational state distributions of $OH(^2\Sigma)$ and $OH(^2\Pi)$. [T, hν, H_2O]

0 K. Weide and R. Schinke : J. Chem. Phys. 90, 7150-7163 (1989a)
Photodissociation dynamics of water in the second absorption band. II. Ab initio calculation of the absorption spectra for H_2O and D_2O and dynamical interpretation of "diffuse vibrational" structures.
[T, hν, H_2O, D_2O]

0 K. Weide and R. Schinke : J. Chem. Phys. 91, 3999-4008 (1989b)
Unstable periodic orbits, recurrences and diffuse vibrational structures in the photodissociation of water near 128 nm. [T, hν, H_2O]

0 K. Weide, S. Hennig and R. Schinke : J. Chem. Phys. 91, 7630-7637 (1989c)
Photodissociation of vibrationally excited water in the first absorption band. [T, hν, $H_2O(v)$]

O K. H. Welge and F. Stuhl : J. Chem. Phys. 46, 2440-2441 (1967)
Energy distribution in the photodissociation $H_2O \rightarrow H(1^2S) + OH(X^2\Pi)$.
[E, $h\nu$, H_2O]

O K. H. Welge : Can. J. Chem. 52, 1424-1435 (1974)
Photolysis of O_x, HO_x, CO_x, and SO_x compounds.
[review, $h\nu$, H_2O, O_3, O_2, CO_2, SO_2, SO_3, etc.]

O H.-J. Werner and W. Meyer : Mol. Phys. 31, 855-872 (1976)・
PNO-CI and PNO-CEPA studies of electron correlation effects. V. Static dipole polarizabilities of small molecules.
[T, H_2O, Ne, CO, HF, NH_3, CH_4]

E. R. White : Dissertation, Ohio State University (1957)
Electronic collision cross sections of water vapor. [E, H_2O]

O R. T. Wiedmann, M. G. White, K. Wang and V. McKoy : J. Chem. Phys. 100, 4738-4746 (1994)・
Rotationally resolved photoionization of polyatomic hydrides : CH_3, H_2O, H_2S, H_2CO. [E and T, H_2O, H_2S, H_2CO, CH_3]

EX G. R. Wight and C. E. Brion : J. Elect. Spectrosc. Relat. Phenom. 4, 25-42 (1974)
K-shell excitation of CH_4, NH_3, H_2O, CH_3OH, CH_3OCH_3 and CH_3NH_2 by 2.5 keV electron impact. [E, H_2O, CH_4, NH_3, CH_3OH, etc.]

O T. D. Wilkerson, G. Schwemmer, B. Gentry and L. P. Giver : J. Quant. Spectrosc. Radiat. Transf. 22, 315-331 (1979)
Intensities and N_2 collision-broadening coefficients measured for selected H_2O absorption lines between 715 and 732 nm.
[E, $h\nu$, H_2O; 62 lines]

O P. G. Wilkinson and H. L. Johnston : J. Chem. Phys. 18, 190-193 (1950)
The absorption spectra of methane, carbon dioxide, water vapor, and etylene in the vacuum ultraviolet. [E, $h\nu$, H_2O, CH_4, CO_2, C_2H_4]

O G. R. J. Williams and P. W. Langhoff : Chem. Phys. Lett. 60, 201-207 (1979)
Photoabsorption in H_2O : Stieltjes-Tchebycheff calculations in the time-dependent Hartree-Fock approximation. [T, H_2O]

O J. G. Williamson, K. Narahari Rao and L. H. Jones : J. Mol. Spectrosc. 40, 372-387 (1971)
High-resolution infrared spectra of water vapor ν_2 band of $H_2{}^{18}O$.
[E, $h\nu$, H_2O]

S J. F. Wilson, F. J. Davis, D. R. Nelson, R. N. Compton and O. H. Crawford : J. Chem. Phys. 62, 4204-4212 (1975)
Electron transport and ion clustering reactions in water vapor and deuterated water vapor. [E, H_2O]

E C. Winstead and V. McKoy : in Advances in Chemical Physics, Vol. 98, John
EX Wiley & Sons 103-190 (1996)
Electron scattering by small molecules.
[review, H_2O, CH_4, SiH_4, GeH_4, NH_3, PH_3, AsH_3, H_2S, C_2H_4, C_3H_6, C_2H_6, Si_2H_6, CF_4]

0 N. W. Winter, A. W. Goddard Ⅲ and F. W. Bobrowicz : J. Chem. Phys. 62, 4325-4331 (1975)
Configuration interaction studies of the excited states of water.
[T, H_2O]

V S. F. Wong and G. J. Schulz : 9th ICPEAC, Seattle 283-284 (1975)
Vibrational excitation of H_2O by electon impact at low energies.
[E, H_2O]

0 M. H. Wood : Chem. Phys. Lett. 28, 477-481 (1974)
On the calculation of the excited states of small molecules.
[T, H_2O, CO, NH_3]

0 N. Wright and H. M. Randall : Phys. Rev. 44, 391-398 (1933)
The far infrared absorption spectra of ammonia and phosphine gases under high resolving power. [E, $h\nu$, H_2O, NH_3, PH_3]

0 C. Y. R. Wu, E. Phillips, L. C. Lee and D. L. Judge : J. Chem. Phys. 70, 601-608 (1979)
Lyman-α and Balmer-series fluorescence from hydrogen photofragments of H_2O vapor. [E, $h\nu$, H_2O]

0 C. Y. R. Wu and D. L. Judge : J. Chem. Phys. 75, 172-178 (1981)
Lyman-α fluorescence from hydrogen photofragments of CH_4 and H_2O.
[E, $h\nu$, H_2O, CH_4; 175 - 780 A]

0 C. Y. R. Wu and D. L. Judge : J. Chem. Phys. 86, 498-499 (1987)
The excitation function of OH ($A^2\Sigma^+ \rightarrow X^2\Pi$) fluorescence produced through photodissociation of H_2O. [E, $h\nu$, H_2O]

0 C. Y. R. Wu and D. L. Judge : J. Chem. Phys. 89, 6275-6282 (1988)
Multichannel processes of H_2O in the 18 eV region. [E, $h\nu$, H_2O]

0 I. Yamashita : J. Phys. Soc. Jpn. 39, 205-212 (1975)
Crossed-beam experiment on rotational population distribution of OH($A^2\Sigma^+$) split from H_2O by Lyman alpha photon impact. [E, H_2O]

0 N. G. Yaroslavsky and A. E. Stanevich : Opt. Spectrosc. 7, 380-382 (1959)
The long wavelength infrared spectrum of H_2O vapor and the absorption spectrum of atmospheric air in the region 20 - 2500 μ (500 - 4 cm^{-1}).
[E, $h\nu$, H_2O, $N_2 + O_2$]

0 K. Yasmin and R. L. Armstrong : Appl. Opt. 29, 1979-1983 (1990)
Theoretical modeling of microwave absorption by water vapor.
[T, H_2O]

0 D. Yeager, V. McKoy and G. A. Segal : J. Chem. Phys. 61, 755-758 (1974)
Assignments in the electronic spectrum of water. [T, H_2O]

0 K. Yoshiki Franzen, P. Erman, A. Karawajczyk, U. Koble and E. Rachlew-Kallne : J. Elect. Spectrosc. Relat. Phenom. 79, 479-482 (1996)
Studies of decay processes following valence and core shell excitation of small molecules. [E, $h\nu$, H_2O, N_2, O_2, CO_2, CS_2]

E M. Yousfi, N. Azzi, P. Segur, I. Gallimberti and S. Stangherlin : Informal Report,
V Toulouse 1-69 (1987)
EX Electron-molecule collision cross sections and electron swarm parameters
I in some atmospheric gases (N_2, O_2, CO_2 and H_2O).
S [compilation, H_2O, N_2, O_2, CO_2]

S M. Yousfi, A. Hennad and A. Alkaa : Phys. Rev. E49, 3264-3273 (1994)・
Monte Carlo simulation of electron swarms at low reduced electric fields.
[T, H_2O, He, SF_6]

S M. Yousfi and M. D. Benabdessadok : J. Appl. Phys. 80, 6619-6630 (1996)
Boltzmann equation analysis of electron-molecule collision cross sections in water vapor and ammonia. [T, H_2O, NH_3; cross section sets]

E J. Yuan and Z. Zhang : Phys. Rev. A45, 4565-4571 (1992)・K
Low-energy electron scattering with H_2O and NH_3 molecules.
[T, H_2O, NH_3; 0.5 - 20 eV]

O M. Zaider, D. J. Brenner and W. E. Wilson : Radiat. Res. 95, 231-247 (1983)・
The applications of track calculations to radiobiology. I. Monte Carlo simulation of proton tracks. [T, ; cross section sets of proton]

QT A. Zecca, G. Karwasz, S. Oss, R. Grisenti and R. S. Brusa : J. Phys. B20, L133-L136 (1987)○K
Total absolute cross sections for electron scattering on H_2O at intermediate energies. [E, H_2O; 81.3 - 3000 eV, 3 %]

QT A. Zecca, G. Karwasz and R. S. Brusa : 17th ICPEAC, Brisbane 208-208 (1991)
Absolute total cross sections for intermediate energy electron-hydrides and freons scattering.
[E, H_2O, CH_4, SiH_4, H_2S, CF_4, $CClF_3$, CCl_2F_2, CCl_3F, CCl_4; 100 - 4000 eV]

QT A. Zecca, G. P. Karwasz and R. S. Brusa : Phys. Rev. A45, 2777-2783 (1992)・K
Total-cross-section measurements for electron scattering by NH_3, SiH_4, and H_2S in the intermediate-energy range.
[fit, H_2O, CH_4; E, NH_3, SiH_4, H_2S]

O G. D. Zeiss, W. J. Meath, C. J. F. MacDonald and D. J. Dawson : Can. J. Phys. 55, 2080-2100 (1977)
Dipole oscillator strength distributions, sums, and some related properties for Li, N, O, H_2, N_2, O_2, NH_3, H_2O, NO, and N_2O.
[, H_2O, NO, Li, N, O, H_2, etc.]

O J. Zhang and D. G. Imre : Chem. Phys. Lett. 149, 233-238 (1988)
OH/OD bond breaking selectivity in HOD photodissociation. [T, $h\nu$, HOD]

O J. Zhang and D. J. Imre : J. Chem. Phys. 90, 1666-1676 (1989a)
Spectroscopy and photodissociation dynamics of H_2O : Time-dependent view. [T, $h\nu$, H_2O]

O J. Zhang, D. J. Imre and J. H. Frederick : J. Phys. Chem. 93, 1840-1851 (1989b)
HOD spectroscopy and photodissociation dynamics : Selectivity in OH/OD bond breaking. [T, $h\nu$, H_2O, HOD, D_2O]

○ Y. Zheng, C. E. Brion, G. Cooper, J. Roeke, Z. Shi, S. Woefe and E. R. Davidson : 21st ICPEAC, Sendai 314 (1999)・
Investigation of different molecular orbital models (LMOs, CMOs and KSOs) by electron momentum spectroscopy. [E, H_2O, CH_3OH, etc.]

○ A. P. Zuev and A. Yu. Starikovskii : J. Appl. Spectrosc. 52, 304-313 (1990)・
UV absorption cross section of the molecules O_2, NO, N_2O, CO_2, H_2O, and NO_2. [E, H_2O, O_2, NO, NO_2, etc. ; 1000 - 3700 K, 190 - 241 nm for H_2O]

Addenda of References for H_2O (1)

(published in 2000, plus some old papers)

2000 (4 pages)

V M. Allan and O. Moreira : J. Phys. B35, L37-L42 (2002) ○
Excitation of the symmetric and antisymmetric stretch vibrations of H_2O by electron impact. [E, H_2O; 0.05 - 3 eV, 135°]

O J. Brandao and C. M. A. Rio : Chem. Phys. Lett. 372, 866-872 (2003)
Long-range interactions within the H_2O molecule. [T, H_2O]

O C. E. Brion, G. Cooper, Y. Zheng, I. V. Litvinyuk and I. E. McCarthy : Chem. Phys. 270, 13-30 (2001)
Imaging of orbital electron densities by electron momentum spectroscopy — a chemical interpretation of the binary (e, 2e) reaction.
[T, H_2O, HF, NH_3, CH_4, H_2S]

I C. Champion, J. Hanssen and P. A. Hervieux : Phys. Rev. A63, 052720/1-9 (2001)
Influence of molecular orientation on the multiple differential cross sections for the (e, 2e) process on a water molecule. [T, H_2O]

I C. Champion, J. Hanssen and P. A. Hervieux : J. Chem. Phys. 117, 197-204 (2002)·
Electron impact ionization of water molecule.
[T, H_2O; differential and total c. s., distorted wave Born approximation]

E R. Curik, F. A. Gianturco and N. Sanna : J. Phys. B33, 2705-2720 (2000)
The separable representation of exchange in electron scattering from polyatomic targets.
[T, general theory, H_2O, O_3; DCS, 1 - 20 eV for H_2O]

O W. Demtroder, M. Keil and H. Wenz : in Advances in Atomic, Molecular, and Optical Physics, Vol. 45, Academic Press 149-201 (2001)
Laser spectroscopy of small molecules.
[review, $h\nu$, H_2O, O_3, C_2H_2, CS_2, NO_2, etc.]

I H. Deutsch, K. Becker, S. Matt and T. D. Mark : Int. J. Mass Spectrom. 197, 37-69 (2000)·
Theoretical determination of absolute electron-impact ionization cross sections of molecules. [T, H_2O, etc.; 31 molecules and free radicals]

O F. Edery and A. Kanaev : Eur. Phys. J. D23, 257-264 (2002)
Two-photon laser induced fluorescence of H_2O and D_2O molecules at ambient pressure. [E, $h\nu$, H_2O, D_2O]

V A. El-Zein, M. J. Brunger and W. R. Newell : Chem. Phys. Lett. 319, 701-707 (2000a) ○
Resonance phenomena in electron impact excitation of the fundamental vibrational modes of water.
[E, H_2O; DCS, 7.5 eV, (010) and (100) + (001) modes]

V A. A. A. El-Zein, M. J. Brunger and W. R. Newell : J. Phys. B33, 5033-5044 (2000b)○
Excitation of vibrational quanta in water by electron impact.
[E, H_2O; DCS, 6 - 20 eV, (010) and (100 + 001) modes]

EX J. D. Gorfinkiel, L. A. Morgan and J. Tennyson : J. Phys. B35, 543-555 (2002)
Electron impact dissociative excitation of water within the adiabatic nuclei approximation. [T, H_2O; R-matrix method, 5 - 15 eV]

D T. Harb, W. Kedzierski and J. W. McConkey : J. Chem. Phys. 115, 5507-5512 (2001)○
Production of ground state OH following electron impact on H_2O.
[E, H_2O; th. - 300 eV, laser-induced fluorescence]

O S. A. Harich, D. W. H. Hwang, X. Yang, J. J. Lin, X. Yang and R. N. Dixon : J. Chem. Phys. 113, 10073-10090 (2000)
Photodissociation of H_2O at 121.6 nm : A state-to-state dynamical picture. [E and T, $h\nu$, H_2O]

E M. Ingr, M. Polasek, P. Carsky and J. Horacek : Phys. Rev. A62, 032703/1-7 (2000)
Discrete momentum representation method for polar molecules : Calculation of the elastic electron scattering on the H_2O molecule.
[T, H_2O; 2 - 20 eV, DCS]

O K. Kameta, N. Kouchi and Y. Hatano : in Landort-Bornstein, New series Vol. I/17C, Photon and Electron Interactions with Atoms, Molecules and Ions, Springer 1-121 (2003)
Cross sections for photoabsorption, photoionization, and neutral dissociation of molecules. [compilation, $h\nu$, H_2O, SO_2, Si_2H_6, etc.]

E G. P. Karwasz, R. S. Bursa and A. Zecca : Rivista Nouvo Cimento 24, No. 1, 1-118
V (2001)
EX One century of experiments on electron-atoms and molecule scattering :
I A critical review of integral cross-sections. Ⅱ. — Polyatomic molecules.
A [compilation, H_2O, N_2O, CH_4, NH_3, CO_2, NO_2, O_3, CS_2, etc.]

E J. L. S. Lino and M. A. P. Lima : Braz. J. Phys. 30, 432-437 (2000)
Studies of electron-molecule collisions using the Schwinger variational principle with plane waves as a trial basis set.
[T, H_2O, H_2, CH_4, C_2H_4, SiH_4; 5 - 20 eV]

V O. Moreira, D. G. Thompson and B. M. McLaughlin : J. Phys. B34, 3737-3750 (2001)
Vibrational excitation of H_2O by electron impact. [T, H_2O]

E T. Ono, K. Umemoto, S. Furuya, K. Soejima and A. Danjo : Atomic Collision Res. in Jpn. No. 28, 8-9 (2002)
Low energy electron scattering from water molecules.
[E, H_2O; DCS, 4 eV]

O L. R. Peebles and P. Marshall : J. Chem. Phys. 117, 3132-3138 (2002)
High-accuracy coupled-cluster computation of bond dissociation energies in SH, H_2S, and H_2O. [T, H_2O, SH, H_2S; D_0(H-OH) = 492.6 $kJmol^{-1}$]

O P. Pyykko, K. G. Dyall, A. G. Csaszar, G. Tarczay, O. L. Polyansky and J. Tennyson ; Phys. Rev. A63, 024502/1- (2001)
Estimation of Lamb-shift effects for molecules : Application to the rotation-vibration spectra of water. [T, $h\nu$, H_2O]

E E. M. S. Ribeiro, L. E. Machado, M. -T. Lee and K. M. Brescansin : Comput. Phys. Commun. 136, 117-125 (2001)
Application of the method of continued fractions to electron scattering by polyatomic molecules. [T, H_2O, H_2, CH_4, NH_3; DCS]

O B. Ruscic, D. Feller, D. A. Dixon, K. A. Peterson, L. B. Harding, R. L. Asher and A. F. Wagner : J. Phys. Chem. A105, 1-4 (2001)
Evidence for a lower enthalpy of formation of hydroxyl radical and a lower gas-phase bond dissociation energy of water. [T, H_2O]

E T. Shirai, T. Tabata and H. Tawara : Atomic Data Nucl. Data Tables 79, 143-184 (2001)
Analytic cross sections for electron collisions with CO, CO_2, and H_2O relevant to edge plasma impurities. [compilation, H_2O, CO, CO_2]

O K. J. Siemsen, J. E. Bernard, A. A. Madej and L. Marmet : J. Mol. Spectrosc. 199, 144-145 (2000)
Absolute frequency measurement of an HDO absorption line near 1480 cm^{-1} [E, $h\nu$, HDO; ν = 1480.09403803 cm^{-1}]

O M. Stener, G. Fronzoni, D. Toffoli and P. Decleva : Chem. Phys. 282, 337-351 (2002)
Time dependent density functional photoionization of CH_4, NH_3, H_2O and HF. [T, $h\nu$, H_2O, CH_4, NH_3, HF]

O M. Takahasi, N. Watanabe, Y. Wada, S. Tsuchizawa, T. Hirosue, H. Hayashi and Y. Udagawa : J. Elect. Spectrosc. Relat. Phenom. 112, 107-114 (2000)
Bethe surfaces and X-ray incoherent scattering factor for H_2O studied by electron impact loss spectroscopy. [E, H_2O; GOS]

O J. Tennyson, N. F. Zobov, R. Williamson, O. L. Polyansky and P. F. Bernath : J. Phys. Chem. Ref. Data 30, 735-831 (2001)
Experimental energy levels of the water molecule.
[compilation, $H_2{}^{16}O$; 12248 vibration-rotation states]

O R. A. Toth : J. Mol. Spectrosc. 201, 218-243 (2000)
Air- and N_2-broadening parameters of water vapor : 604 to 2271 cm^{-1}.
[E, $h\nu$, H_2O]

O R. van Harrevelt and M. C. van Hemert : J. Chem. Phys. 112, 5777-5786 (2000a)
Photodissociation of water. I. Electronic structure calculations for the excited states. [T, H_2O]

O R. van Harrevelt and M. C. van Hemert : J. Chem. Phys. 112, 5787-5808 (2000b)
Photodissociation of water. II. Wave packet calculations for the photofragmentation of H_2O and D_2O in the B band. [T, H_2O, D_2O]

0 O. K. Voltsekhovskaya, A. A. Peshkov, M. M. Tarasenko and T. Yu. Sheludyakov : Russ. J. Phys. 43, 652-659 (2000)
Information system for calculating the spectral characteristics of hot CO, CO_2 and H_2O gases (HOTGAS 2.0).
[T, $h\nu$, H_2O, CO, CO_2; 0 - 10^4 cm^{-1}, 250 - 3000 K]

0 X. F. Yang, D. W. Hwang, J. J. Lin and X. Ying : J. Chem. Phys. 113, 10597-10604 (2000)
Dissociation dynamics of the water molecules on the A $^1B_1$ electronic surface. [E, $h\nu$, H_2O, D_2O, HOD; 157.6 nm]

0 A. H. Zanganeth, J. H. Fillion, J. Ruiz, M. Castillejo, J. L. Lemaire, N. Shafizadeh and F. Rostas : J. Chem. Phys. 112, 5660-5671 (2000)
Photodissociation of H_2O and D_2O below 132 nm. [E, $h\nu$, H_2O, D_2O]

0 Y. Zheng and S. Ding : J. Mol. Spectrosc. 201, 109-115 (2000)
Algebraic description of stretching and bending vibrational spectra of H_2O and H_2S. [T, $h\nu$, H_2O, H_2S]

Addenda (1901 - 1999)

0 L. Asbrink and J. W. Rabalais : Chem. Phys. Lett. 12, 182-184 (1971)
Comments on the high resolution photoelectron spectrum of H_2O and D_2O.
[E, $h\nu$, H_2O, D_2O]

0 M. N. R. Ashfold and J. E. Baggott (Ed) : Molecular Photodissociation Dynamics, Roy. Soc. Chem., London (1987)

0 R. Atkinson, D. L. Baulch, R. A. Cox, R. F. Hampson, Jr., J. A. Kerr, M. J. Rossi and J. Troe : J. Phys. Chem. Ref. Data 26, 1329-1499 (1997)
Evaluated kinetic and photochemical data for atmospheric chemistry : Supplement VI. IUPAC subcommittee on gas kinetic data evaluation for atmospheric chemistry.
[compilation, $H_2O + h\nu$, etc.; see D. L. Baulch (1980)]

0 D. S. Baer, V. Nagali, E. R. Furlong, R. K. Hanson and M. E. Newfield : AIAA J. 34, 489-493 (1996)
Scanned- and fixed-wavelength absorption diagnostics for combustion measurements using multiplexed diode lasers. [T and E, $h\nu$, H_2O]

0 I. Bar, Y. Cohen, D. David, S. Rosenwaks and J. J. Valentini : J. Chem. Phys. 93, 2146-2148 (1990)
Direct observation of preferential bond fission by excitation of vibrational fundamental : Photodissociation of HOD(0, 0, 1). [E, $h\nu$, HOD(v)]

0 I. Bar, Y. Cohen, D. David, T. Arusi-Parpar, S. Rosenwaks and J. J. Valentini : J. Chem. Phys. 95, 3341-3346 (1991)
Mode-selective bond fission : Comparison between the photodissociation of HOD(0, 0, 1) and HOD(1, 0, 0). [E, $h\nu$, HOD(v); 193 nm]

0 A. M. Bass and D. Garvin : J. Mol. Spectrosc. 9, 114-123 (1962)
Analysis of hydroxyl radical vibration rotation spectrum between 3900 A and 11500 A. [E, hν, HO]

0 D. L. Baulch, R. A. Cox, R. F. Hampson, Jr., J. A. Kerr, J. Troe and R. T. Watson : J. Phys. Chem. Ref. Data 9, 295-471 (1980)
Evaluated kinetic and photochemical data for atmospheric chemistry. [compilation, H_2O + hν, etc.; see R. Atkinson (1997)]

0 Y. Ben Aryeh : J. Quant. Spectrosc. Radiat. Transf. 7, 211-224 (1967)
Line widths and intensities in the wings of the ν_2 water vapor band at 400 and 540 K. [E, hν, H_2O, H_2O + N_2 + O_2]

0 R. M. Bentwood, A. J. Barnes and W. J. Orville-Thomas : J. Mol. Spectrosc. 84, 391-404 (1980)
Studies of intermolecular interactions by matrix isolation vibrational spectroscopy. Self-association of water.
[E, hν, H_2O in (Ar, N_2); low temperature matrices]

0 A. Bernas and T. B. Truong : Chem. Phys. Lett. 29, 585-588 (1974)
On the low-lying triplet of the water molecule and its luminescent decay. [E, hν, H_2O, D_2O; 250 - 550 nm, 77 K]

0 R. Bersohn : J. Phys. Chem. 88, 5145-5149 (1984)
Final state distributions in the photodissociation of triatomic molecules. [review, H_2O, H_2S, CS_2, SO_2, NO_2, O_3, etc.]

0 L. Bertrand, J.-P. Monchalin and R. Corriveau : Appl. Opt. 22, 3148-3149 (1983)
Photoacoustic measurement of water vapor and CO_2 absorption coefficients at HF laser wavelengths. [E, hν, H_2O, CO_2; 2.67 - 2.91 μm]

0 J. A. Beswick and W. M. Gelbart : J. Phys. Chem. 84, 3148-3151 (1980)
Bending contribution to rotational distributions in the photodissociation of polyatomic molecules. [T, hν, H_2O, HCN, ICN]

0 J. R. Birch, W. J. Burroughs and R. J. Emergy : Infrared Phys. 9, 75-83 (1969)
Observation of atmospheric absorption using submillimeter maser sources. [E, hν, H_2O, N_2 + O_2; 118 - 337 μm]

0 M. J. Bramley and T. Carrington, Jr. : J. Chem. Phys. 99, 8519-8541 (1993)
A general discrete variable method to calculate vibrational energy levels of three- and four-atom molecules. [T, H_2O, CH_2O, H_2O_2, etc.]

0 J. W. Brault, J. S. Fender and D. N. B. Hall : J. Quant. Spectrosc. Radiat. Transf. 15, 549-552 (1975)
Absorption coefficients of selected atmospheric water lines.
[E, hν, H_2O]

0 M. Braunstein and R. T. Pack : J. Chem. Phys. 96, 891-897 (1992)
Simple theory of diffuse structure in continuous UV spectra of polyatomic molecules. II. Photodissociation of bent symmetric triatomics.
[T, hν, H_2O]

0 M. Brouard, S. R. Langford and D. E. Manolopoulos : J. Chem. Phys. 101, 7458-7467 (1994)
New trends in the state-to-state photodissociation dynamics of $H_2O(A)$. [E, $h\nu$, H_2O; 282 nm]

0 P. J. Bruna and S. D. Peyerimhoff : in Advances in Chemical Physics, Vol. 67, John Wiley & Sons, 1-97 (1987)
Excited-state potentials. [T, H_2O, HF, HCl, CO_2, CF_2Cl_2, C_2H_2, N_2, O_2]

0 G. A. Chamberlain and J. P. Simons : Chem. Phys. Lett. 32, 355-358 (1975)
Polarised photofluorescence excitation spectroscopy : A new technique for the study of molecular photodissociation. Photolysis of H_2O in the vacuum ultraviolet. [E, $h\nu$, H_2O]

0 M. S. Child : Acc. Chem. Res. 18, 45-50 (1985)
Local mode overtone spectra. [T, $h\nu$, H_2O, C_2H_2, CH_4, SiH_4]

0 C. C. Chou, J. G. Lo and F. S. Rowland : J. Chem. Phys. 60, 1208-1210 (1974)
Primary processes in the photolysis of water vapor at 174 nm. [E, $h\nu$, H_2O]

0 D. F. Coker, J. R. Reimers and R. O. Watts : Aust. J. Phys. 35, 623-638 (1983)
The infrared absorption spectrum of water.
[T, $h\nu$, H_2O, $(H_2O)_2$ and liquid; MCS, see J. R. Reimers (1981), (1984)]

0 D. F. Coker, R. E. Miller and R. O. Watts : J. Chem. Phys. 82, 3554-3562 (1985)
The infrared predissociation spectra of water clusters.
[E, $h\nu$, $(H_2O)_2$, $(H_2O)_3$]

0 D. F. Coker and R. O. Watts : J. Phys. Chem. 91, 2513-2518 (1987)
Structure and vibrational spectroscopy of the water dimer using quantum simulation. [T, $h\nu$, $(H_2O)_2$]

0 J.-M. Colmont, D. Priem, G. Wlodarczak and R. R. Gamache : J. Mol. Spectrosc. 193, 233-243 (1999)
Measurements and calculations of the halfwidth of two rotational transitions of water vapor perturbed by N_2, O_2, and air.
[E and T, $h\nu$, H_2O + (N_2, O_2)]

0 E. R. Comben and J. M. Brown : Chem. Phys. 119, 443-454 (1988)
The high-lying rotational energy levels of the OH radical in the v = 0 level of the $X^2\Pi$ state. [T, OH]

0 R. L. Cook, F. C. DeLucia and P. Helminger : J. Mol. Spectrosc. 53, 62-76 (1974)
Molecular force field and structure of water : Recent microwave results.
[compilation, E, $h\nu$, H_2O, D_2O, T_2O]

0 J. A. Coxon : Can. J. Phys. 58, 933 (1980) see p. 15

0 J. A. Coxon and S. C. Foster : J. Mol. Spectrosc. 91, 243-254 (1982a)
Radial dependence of spin-orbit and Λ-doubling parameters in the $X^2\Pi$ ground state of hydroxyl. [T, OH]

0 J. A. Coxon and S. C. Foster : Can. J. Phys. 60, 41 (1982b) see p. 15

0 D. R. Crosley and R. K. Lengel : J. Quant. Spectrosc. Radiat. Transf. 15, 579-592 (1975)
Relative transition probabilities and the electronic transition moment in the A - X system of OH. [, hν, OH]

0 D. R. Crosley and R. K. Lengel : J. Quant. Spectrosc. Radiat. Transf. 17, 59-72 (1977)
Relative transition probabilities in the A - X system of OD.
[, hν, OD]

0 A. G. Csaszar, W. D. Allen and H. F. SchaeferⅢ : J. Chem. Phys. 108, 9751-9764 (1998)
In pursuit of the ab initio limit for conformation energy prototypes.
[T, H_2O, NH_3, C_2H_6, etc.]

0 D. M. Dennison and K. T. Hecht : in Quantum Theory. Ⅱ. Aggregates of Particles, D. R. Bates (Ed), Academic 247-322 (1962)
Molecular spectra.
[review, T, hν, H_2O, NH_3, CH_3Cl, diatomic molecules, etc.]

0 G. H. Dieke and H. M. Crosswhite : J. Quant. Spectrosc. Radiat. Transf. 2, 97-199 (1962)
The ultraviolet bands of OH. Fundamental data.
[E, hν, OH; one hundred pages' paper]

0 R. Ditchfield, W. J. Hehre and J. A. Pople : J. Chem. Phys. 54, 724-728 (1971)
Self-consistent molecular-orbital methods. Ⅸ. An extended Gaussian-type basis for molecular-orbital studies of organic molecules.
[T, H_2O, NH_3, CH_4, C_2H_2, C_2H_4, C_2H_6, H_2CO, etc.]

0 R. N. Dixon, G. Duxbury, J. W. Rabalais and L. Asbrink : Mol. Phys. 31, 423-435 (1976)
Ro-vibronic structure in the photoelectron spectra of H_2O, D_2O and HDO.
[E, hν, H_2O, D_2O, HDO; He 584 A]

0 R. N. Dixon : Mol. Phys. 54, 333-350 (1985)
The role of inter-state Renner-Teller coupling in the dissociation of triatomic molecules. A time-dependent approach. [T, hν, H_2O, HCO]

0 R. N. Dixon : J. Chem. Phys. 102, 301-309 (1995)
Λ-doublet and spin-doublet population distributions in the products of photofragmentation via coupled electronic channels : $H_2O(B^1A_1) \rightarrow H + OH(X^2\Pi)$. [T, hν, H_2O]

0 R. N. Dixon, D. W. H. Hwang, X. F. Yang, S. Harich, J. J. Lin and X. Yang : Science 285, 1249-1253 (1999)
Chemical "double slits" : Dynamical interference of photodissociation pathways in water. [E, hν, H_2O]

0 A. J. Dobbyn and P. J. Knowles : Mol. Phys. 91, 1107-1123 (1997)
A comparative study of methods for describing non-adiabatic coupling : Diabatic representation of the $^1\Sigma^+/^1\Pi$ HOH and HHO conical intersections. [T, H_2O]

0 M. P. Docker, A. Hodgson and J. P. Simons : in Molecular Photodissociation Dynamics, M. N. R. Ashfold and J. E. Baggott (Ed), Royal Society of Chemistry, Chap. 4, (1987)

0 T. R. Dyke, K. M. Mack and J. S. Muenter : J. Chem. Phys. 66, 498-510 (1977)
The structure of water dimer from molecular beam electric resonance spectroscopy. [E, hν, $(H_2O)_2$, $(D_2O)_2$]

0 J. B. Elgin : J. Quant. Spectrosc. Radiat. Transf. 17, 205-220 (1977)
Classical radiative damping of symmetric top and asymmetric rotor molecules (H_2O). [, H_2O]

0 R. S. Eng and A. W. Mantz : J. Mol. Spectrosc. 74, 388-399 (1979)
Tunable diode laser measurement of water vapor line parameters in the 10- to 15-μm spectral region. [E, hν, H_2O, $H_2O + N_2$; 17 lines]

0 J. A. Fernley, S. Miller and J. Tennyson : J. Mol. Spectrosc. 150, 597-609 (1991)
Band origins for water up to 22000 cm^{-1} : A comparison of spectroscopically determined potential energy surfaces. [T, H_2O]

0 C. C. Ferriso and C. B. Ludwig : J. Quant. Spectrosc. Radiat. Transf. 4, 215-227 (1964)・
Spectral emissivities and integrated intensities of the 2.7 μ H_2O band between 530 and 2200 K. [E, hν, H_2O]

0 C. C. Ferriso, C. B. Ludwig and A. L. Thomson : J. Quant. Spectrosc. Radiat. Transf. 6, 241-275 (1966)
Empirically determined infrared absorption coefficients of H_2O from 300 to 3000 K. [compilation, hν, H_2O; 1 - 22 μm]

0 L. Fredin, B. Nelander and G. Ribbegard : Chem. Phys. Lett. 36, 375-376 (1975)
On the structure of the water dimer.
[E, hν, $H_2O \cdot D_2O$ dimer; 20 K in a N_2 matrix]

0 L. Fredin, B. Nelander and G. Ribbegard : J. Chem. Phys. 66, 4065-4072 (1977a)
Infrared spectrum of the water dimer in solid nitrogen. I. Assignment and force constant calculations. [E, hν, H_2O]

0 L. Fredin, B. Nelander and G. Ribbegard : J. Chem. Phys. 66, 4073-4077 (1977b)
Infrared spectrum of the water dimer in solid nitrogen. II. Temperature and irradiation effects. [E, hν, D_2O, HDO; 10 - 20 K]

0 R. Goldstein : J. Quant. Spectrosc. Radiat. Transf. 3, 91-93 (1963)
Preliminary absolute intensity measurements for the 1.38, 1.87 and 2.7 μ bands of water vapor between 125 and 200 ° C.
[E, hν, H_2O; 398 - 473 K]

0 R. Goldstein : J. Quant. Spectrosc. Radiat. Transf. 4, 343-352 (1964a)・
Measurements of infrared absorption by water vapor at temperatures to 1000 K. [E, hν, H_2O; 1.38, 1.87, 2.7 and 6.3 μm]

C R. Goldstein : PhD Thesis, California Inst. Tech., Pasadena (June, 1964b)
Quantitative spectroscopic studies on the infrared absorption by water vapor and liquid water. [E, hν, H_2O]

O S. Goursaud, M. Sizun and F. Fiquet-Fayard : J. Chem. Phys. 65, 5453-5461 (1976)
Energy partitioning and isotope effects in the fragmentation of triatomic negative ions : Monte Carlo scheme for a classical trajectory study. [T, H_2O, H_2S]

O L. A. Gribov and G. V. Khovrin : Opt. Spectrosc. 36, 274-276 (1974)
Determination of the potential surface and analysis of the anharmonic vibrations of the water molecule. [T, H_2O, D_2O]

O A. U. Grunewald, K. -H. Gerick and F. J. Comes : Chem. Phys. Lett. 133, 501-506 (1987)
Photodissociation of room-temperature and jet-cooled water at 193 nm.
[E, hν, H_2O]

O H. Guo and J. N. Murrell : Mol. Phys. 65, 821-827 (1988a)
Dynamics of the A-state photodissociation of H_2O at 193 nm.
[T, hν, H_2O]

O H. Guo and J. N. Murrell : J. Chem. Soc. Faraday Trans. II 84, 949-959 (1988b)
A classical trajectory study of the A-state photodissociation of the water molecule. [T, hν, H_2O]

O P. C. Hariharan and J. A. Pople : Theor. Chim. Acta 28, 213-222 (1973)
The influence of polarization functions on molecular orbital.
[T, H_2O, NH_3, CH_4, N_2, C_2H_2, etc.]

O A. J. Harrison, B. J. Cederholm and M. A. Terwilliger : J. Chem. Phys. 30, 355-356 (1959)
Absorption of acyclic oxygen compounds in the vacuum ultraviolet. I. Alcohols. [E, hν, H_2O, CH_3OH, C_2H_5OH, etc.; 295 K]

O K. B. Harvey and H. F. Schurvell : J. Mol. Spectrosc. 25, 120-121 (1970)
Infrared absorption of D_2O in solid nitrogen. [E, hν, D_2O; 5 K]

O D. Hausler, P. Andresen and R. Schinke : J. Chem. Phys. 87, 3949-3965 (1987)○
State to state photodissociation of H_2O in the first absorption band.
[E, hν, H_2O(v); 193 nm, 193 - 457 K]

O T. Helgaker, W. Klopper, H. Koch and J. Noga : J. Chem. Phys. 106, 9639-9646 (1997)
Basis-set convergence of correlated calculations on water. [T, H_2O]

O E. J. Heller : J. Chem. Phys. 68, 2066-2075 (1978a)
Quantum corrections to classical photodissociation models.
[T, general theory]

O E. J. Heller : J. Chem. Phys. 68, 3891-3896 (1978b)
Photofragmentation of symmetric triatomic molecules : Time dependent picture. [T, general theory]

0 E. J. Heller : Acc. Chem. Res. 14, 368-375 (1981)
The semiclassical way to molecular spectroscopy. [T, general theory]

0 E. J. Heller, R. L. Sundberg and D. Tannor : J. Phys. Chem. 86, 1822-1833 (1982)
Simple aspects of Raman scattering. [T, general theory]

0 S. Hennig, V. Engel, R. Schinke and V. Staemmler : Chem. Phys. Lett. 149, 455-462 (1988)
Emission spectroscopy of photodissociating water molecules : A time-independent ab initio study. [T, $h\nu$, H_2O]

0 N. E. Henriksen, J. Zhang and D. G. Imre : J. Chem. Phys. 89, 5607-5613 (1988)
The first absorption band for H_2O : Interpretation of the absorption spectrum using time dependent pictures. [T, $h\nu$, H_2O]

0 R. C. Herman and G. A. Hornbeck : Astrophys. J. 118, 214-227 (1953)
Vibration-rotation bands of OH. [E, $h\nu$, HO]

0 B. Heumann, K. Kuhl, K. Weide, R. Duren, B. Hess, U. Meier, S. D. Peyermhoff and R. Schinke : Chem. Phys. Lett. 166, 385-390 (1990)
Photodissociation dynamics of water in the second absorption band : Vibrational excitation of OH($A\ ^2\Sigma$). [T, $h\nu$, H_2O]

0 H. Hirose and S. Kon : Jpn. J. Appl. Phys. 19, 1131-1133 (1980)
Intracavity pumped far-infrared lasers by TE CO_2 laser.
[E, $h\nu$, D_2O, CH_3OH]

0 M. A. Hirshfeld, J. H. Jaffe and G. Ross : J. Quant. Spectrosc. Radiat. Transf. 6, 311-315 (1966)
New determination of the strength of the ν_3 band of water vapor from dispersion measurements. [E, $h\nu$, H_2O]

0 T. -S. Ho, T. Hollebeek, H. Rabitz, L. B. Harding and G. C. Schatz : J. Chem. Phys. 105, 10472-10486 (1996)
A global H_2O potential energy surface for the reaction $O(^1D) + H_2 \rightarrow OH + H$. [T, H_2O]

0 R. P. Hosteny, R. R. Gilman, T. H. Dunning, Jr., A. Pipano and I. Shavitt : Chem. Phys. Lett. 7, 325-328 (1970)
Comparison of Slater and contracted Gaussian basis sets in SCF and CI calculations on H_2O. [T, H_2O]

0 J. T. Hougen, P. R. Bunker and J. W. C. Johns : J. Mol. Spectrosc. 34, 136-172 (1970)
The vibration-rotation problem in triatomic molecules allowing for a large-amplitude bending vibration. [T, H_2O, HDO, D_2O, HCN, CsOH]

0 J. N. Howard, D. E. Burch and D. Williams : J. Opt. Soc. Am. 46, 186-190 (1956)
Infrared transmission of synthetic atmospheres. I. Instrumentation.
[E, $h\nu$, H_2O, CO_2]

0 A. R. Hoy, I. M. Mills and G. Strey : Mol. Phys. 24, 1265-1290 (1972)
Anharmonic force constant calculations. [T, H_2O, NH_3]

0 D. W. Hwang, X. Yang and X. Yang : J. Chem. Phys. 110, 4119-4122 (1999a)
The vibrational distribution of the OH product from H_2O photodissociation at 157 nm : Discrepancies between theory and experiment.
[E and T, $h\nu$, H_2O]

0 D. W. Hwang, X. Yang, S. Harich, J. J. Lin and X. Yang : J. Chem. Phys. 110, 4123-4126 (1999b)
Photodissociation dynamics of H_2O at 121.6 nm : Effect of parent rotational excitation on reaction pathways. [E, $h\nu$, H_2O]

0 D. G. Imre and J. Zhang : Chem. Phys. 139, 89-121 (1989)
Dynamics and selective bond breaking in photodissociation.
[T, $h\nu$, H_2O]

0 J. R. Izatt, H. Sakai and W. S. Benedict : J. Opt. Soc. Am. 59, 19-27 (1969)
Position, intensities, and widths of water-vapor lines between 475 and 692 cm^{-1}. [E, $h\nu$, H_2O + (H_2O, N_2, CO_2, He) ; 353 K]

0 P. Jensen : J. Mol. Spectrosc. 133, 438-460 (1989)
The potential energy surface for the electronic ground state of the water molecule determined from experimental data using a variational approach. [T, H_2O, D_2O, T_2O]

0 J. Kauppinen, T. Karkkainen and E. Kyro : J. Mol. Spectrosc. 71, 15-45 (1978)
High resolution spectrum of water vapor between 30 and 720 cm^{-1}.
[E, $h\nu$, H_2O]

0 J. Kauppinen and E. Kyro : J. Mol. Spectrosc. 84, 405-423 (1980)
High resolution pure rotational spectrum of water vapor enriched by $H_2{}^{17}O$ and $H_2{}^{18}O$. [E, $h\nu$, H_2O; 50 - 730 cm^{-1}]

0 B. J. Kerridge and E. E. Remsberg : J. Geophys. Res. 94, 16323-16342 (1989)
Evidence from the limb infrared monitor of the stratosphere for non local thermodynamic equilibrium in the ν_2 mode of mesospheric water vapour and the ν_3 mode of stratospheric nitrogen dioxide. [, $h\nu$, H_2O, NO_2]

0 D. A. L. Kilcoyne, S. Nordholm and N. S. Hush : Chem. Phys. 107, 213-223 (1986)
Diffraction analysis of the photoionisation cross sections of water, ammonia and methane. [T, $h\nu$, H_2O, NH_3, CH_4]

0 D. B. Knowles, J. R. Alvarez-Collado, G. Hirsch and R. J. Buenker : J. Chem. Phys. 92, 585-596 (1990)
Comparison of perturbatively corrected energy results from multiple reference double-excitation configuration-interaction method calculations with exact full configuration-interaction benchmark values.
[T, H_2O, Ne, F, HF, NH_2, N_2, NO, O_2, CH_2, SiH_2]

0 P. A. Kollman and L. C. Allen : J. Chem. Phys. 51, 3286-3293 (1969)
Theory of the hydrogen bond : Electronic structure and properties of the water dimer. [T, H_2O, $(H_2O)_2$]

O K. Kuhl and R. Schinke : Chem. Phys. Lett. 158, 81-86 (1989)
Time-dependent rotational state distributions in direct photodissociation. [T, $h\nu$, H_2O, H_2O_2]

O J. Kurawaki, K. Ueki, M. Higo and T. Ogawa : J. Chem. Phys. 78, 3071-3077 (1983)
D Translational energy distribution and production mechanism of H^* and D^* produced by controlled electron impact on water and heavy water. [E, H_2O, D_2O; 25 - 100 eV]

O K. S. Lam : J. Quant. Spectrosc. Radiat. Transf. 17, 351-384 (1977)
Application of pressure broadening theory to the calculation of atmospheric oxygen and water vapor microwave absorption. [T, $h\nu$, H_2O, O_2]

O S.-Y. Lee and E. J. Heller : J. Chem. Phys. 71, 4777-4788 (1979)
Time-dependent theory of Raman scattering. [T, $h\nu$, general theory]

O Y. T. Lee and Y. R. Shen : Phys. Today 33 (11), 52-59 (1980)
Studies with crossed laser and molecular beams. [E, $h\nu$, $(H_2O)_n$, n = 3 - 6, etc.]

O S. R. Leone : in Advances in Chemical Physics, Vol. 50, 255-324 (1982)
Photofragment dynamics. [review, H_2O, H_2S, CO_2, SO_2, NH_3, PH_3, etc.]

O H. B. Levene and J. J. Valentini : J. Chem. Phys. 87, 2594-2610 (1987)
The effect of parent internal motion on photofragment rotational distributions : Vector correlation of angular momenta and C_{2v} symmetry breaking in dissociation of AB_2 molecules. [T, $h\nu$, H_2O, O_3]

O B. R. Lewis, I. M. Vardavas and J. H. Carver : J. Geophys. Res. 88A, 4935-4940 (1983)
The aeronomic dissociation of water vapor by solar H Lyman α radiation. [E, $h\nu$, H_2O; 1214 - 1219 A, temperature dependence]

I K. A. Long, H. G. Paretzke, F. Muller-Plathe and G. H. F. Diercksen : J. Chem. Phys. 91, 1569-1578 (1989)
Calculation of double differential cross sections for the interaction of electrons with a water molecule, clusters of water molecules, and liquid water. [T, H_2O, $(H_2O)_n$; 200 and 500 eV]

O G. L. Loper, M. A. O'Neill and J. A. Gelbwachs : Appl. Opt. 22, 3701-3710 (1983)
Water-vapor continuum CO_2 laser absorption spectra between 27 °C and -10 °C. [E, $h\nu$, H_2O; 263 - 300 K]

O F. J. Lovas : J. Phys. Chem. Ref. Data 7, 1445-1749 (1978)
Microwave spectral tables. II. Triatomic molecules. [compilation, $h\nu$, H_2O, OCS, H_2S, SO_2, O_3, NO_2, N_2O, etc., 54 triatomic molecules]

O J. E. Lowder : J. Quant. Spectrosc. Radiat. Transf. 11, 153-159 (1971)
Increase of integrated intensities of H_2O infrared bands produced by hydrogen bonding. [compilation, $h\nu$, H_2O]

0 K. Mikulecky, K. -H. Gericke and F. J. Comes : Chem. Phys. Lett. 182, 290-296 (1991a)
Decay dynamics of H_2O ($^1B_1$) : full characterization of OH product state distribution. [E, hν, H_2O]

0 K. Mikulecky, K. -H. Gericke and F. J. Comes : Ber. Bunsenges. Phys. Chem. 95, 927-929 (1991b)
Decay dynamics of H_2O (A $^1B_1$) : Excitation by two photon absorption at 354.6 nm. [E, hν, H_2O]

0 E. A. Moore and W. G. Richards : Phys. Scr. 3, 223-230 (1970)
A reanalysis of the A $^2\Sigma^+$ - X $^2\Pi$ system of OH. [E, hν, OH]

0 D. H. Mordaunt, M. N. R. Ashfold and R. N. Dixon : J. Chem. Phys. 100, 7360-7375 (1994)
Dissociation dynamics of H_2O (D_2O) following photoexcitation at the Lyman-α wavelength (121.6 nm). [E, hν, H_2O, D_2O]

0 M. D. Morse and K. F. Freed : Chem. Phys. Lett. 74, 49-55 (1980)
Rotational distributions in photodissociation : The bent triatomic molecule. [T, general theory; examples are HCN and HOCl]

0 R. S. Mulliken : J. Chem. Phys. 3, 506-514 (1935)
Electronic structures of polyatomic molecules. VII. Ammonia and water type molecules and their derivatives.
[T, H_2O, NH_3, PH_3, H_2S, CH_3OH, etc.]

0 J. S. Murphy and J. E. Boggs : J. Chem. Phys. 51, 3891-3901 (1969)
Collision broadening of rotational absorption lines. V. Pressure broadening of microwave absorption spectra involving asymmetric-top molecules. [T, hν, H_2O, SO_2, H_2CO, N_2, CO_2, etc.]

0 J. N. Murrell, S. Carter, I. M. Mills and M. F. Guest : Mol. Phys. 42, 605-627 (1981)
Analytical potentials for triatomic molecules. VIII. A two-valued surface for the lowest $^1A'$ states of H_2O. [T, H_2O]

0 C. A. Nicolaides and G. Theodorakopoulos : Int. J. Quant. Chem. : Quant. Chem. Sympo. 14, 315-322 (1980)
FOTOS applied to molecules : Oscillator strengths in H_2O.
[T, hν, H_2O; first-order theory of oscillator strengths]

0 H. Nikjoo, S. Uehara, W. E. Wilson, M. Hoshi and D. T. Goodhead : Int. J. Radiat. Biol. 73, 355-364 (1998)
Track structure in radiation biology : Theory and applications.
[review, MCS, etc.]

0 J. Oddershede : in Advances in Chemical Physics, Vol. 69, K. P. Lawley (Ed), 201-239 (1987)
Propagater methods. [T, H_2O, H_2, N_2, CO_2, CH_4, SiH_4, C_2H_6, etc.]

0 R. T. Pack : J. Chem. Phys. 65, 4765-4770 (1976)
Simple theory of diffuse vibrational structure in continuous UV spectra of polyatomic molecules. I. Collinear photodissociation of symmetric triatomics. [T, hν, general theory]

0 N. Papineau, C. Camy-Peyret, J.-M. Flaud and G. Guelachvili : J. Mol. Spectrosc. 92, 451-468 (1982)
The $2\nu_2$ and ν_1 bands of $HD^{16}O$. [E, $h\nu$, HDO]

A J. F. Paulson : Advan. Chem. Ser. 58, 28-43 (1966)・
Some negative ion reactions in simple gases. [E, D_2O, NO_2, N_2O, O_2]

0 F. R. Petersen, K. M. Evenson, D. A. Jennings, J. S. Wells, K. Goto and J. J. Jimenez : IEEE J. QE-11, 838-843 (1975)
Far infrared frequency synthesis with stabilized CO_2 lasers : Accurate measurements of the water vapor and methyl alcohol laser frequencies.
[E, $h\nu$, H_2O, CH_3OH]

0 R. A. Phillips and R. J. Buenker : Chem. Phys. Lett. 137, 157-161 (1987)
Factors involved in the accurate calculation of oscillator strengths : The A $^1B_1$ - X $^1A_1$ transition of H_2O. [T, $h\nu$, H_2O; MRD CI calculations]

0 D. E. Plusquellic, O. Votava and D. J. Nesbitt : J. Chem. Phys. 107, 6123-6135 (1997)
Photodissociation dynamics of jet-cooled H_2O and D_2O in the non-Franck-Condon regime : Relative absorption cross sections and product state distributions at 193 nm. [E, $h\nu$, H_2O, D_2O]

0 L. A. Pugh and K. Narahari Rao : in Molecular Spectroscopy, Molecular Research, Vol. II, K. Narahari Rao (Ed), Academic 165-227 (1976)
Intensities from infrared spectra.
[review, $h\nu$, H_2O, CO_2, CS_2, N_2O, O_3, OCS, SO_2, etc.]

0 G. D. Purvis and R. J. Bartlett : J. Chem. Phys. 76, 1910-1918 (1982)
A full coupled-cluster singles and doubles model : The inclusion of disconnected triples. [T, H_2O, BeH_2]

0 G. Rathenau : Z. Phys. 87, 32-56 (1933)
Untersuchung am Absorptionsspektrum von Wasserdampf und Kohlendioxyd im Gebiet unter 2000 A. [E, $h\nu$, H_2O, CO_2]

0 J. R. Reimers, R. O. Watts and M. L. Klein : Chem. Phys. 64, 95-114 (1981)
Intermolecular potential functions and the properties of water.
[T, H_2O; gas, liquid and solid state properties]

0 J. R. Reimers and R. O. Watts : Chem. Phys. 85, 83-112 (1984a)
The structure and vibrational spectra of small clusters of water molecules. [T, $(H_2O)_2$]

0 J. R. Reimers and R. O. Watts : Mol. Phys. 52, 357-381 (1984b)
A local mode potential function for the water molecule.
[T, H_2O, D_2O, HOD]

0 C. D. Ritchie and H. F. King : J. Chem. Phys. 47, 564-570 (1967)
Gaussian basis SCF calculations for OH^-, H_2O, NH_3, and CH_4.
[T, H_2O, NH_3, CH_4, OH^-]

0 C. W. Robertson and D. Williams : J. Opt. Soc. Am. 61, 1316-1320 (1971)
Lambert absorption coefficients of water in the infrared.
[E, hν, H_2O; 4300 - 288 cm^{-1}]

0 R. Schroder, R. Schinke, M. Ehara and K. Yamashita : J. Chem. Phys. 109, 6641-6646 (1998)
New aspects of the photodissociation of water in the first absorption band : How strong is excitation of the first triplet states ?
[T, hν, H_2O, D_2O]

0 R. J. Sension, R. J. Brudzynski and B. S. Hudson : Phys. Rev. Lett. 61, 694-697 (1988)
Resonance Raman studies of the low-lying dissociative Rydberg-valence states of H_2O, D_2O, and HDO.
[E, hν, H_2O, D_2O, HDO; 141 - 200 nm, 6.2 - 8.8 eV]

0 R. J. Sension, R. J. Brudzynski, B. S. Hudson, J. Zhang and D. G. Imre : Chem. Phys. 141, 393-400 (1990)
Resonance emission studies of the photodissociating water molecule.
[E, hν, H_2O, D_2O, HOD]

0 N. Shafer, S. Satyapal and R. Bersohn : J. Chem. Phys. 90, 6807-6808 (1989)
Isotope effect in the photodissociation of HDO at 157.5 nm.
[E, hν, HDO]

0 M. Shapiro and R. Bersohn : Annu. Rev. Phys. Chem. 33, 409-442 (1982)
Theories of the dynamics of photodissociation.
[review, T, hν, H_2O, CO_2, OCS, CH_3I, etc.]

0 R. B. Shirts : J. Chem. Phys. 85, 4949-4957 (1986)
Decoupling of the local mode stretching vibrations of water through rotational excitation. I. Quantum mechanics. [T, H_2O]

0 K. S. Sorbie and J. N. Murrell : Mol. Phys. 29, 1387-1407 (1975)
Analytical potentials for triatomic molecules from spectroscopic data.
[T, hν, H_2O]

0 K. S. Sorbie and J. N. Murrell : Mol. Phys. 31, 905-920 (1976)
Theoretical study of the $O(^1D)$ + $H_2(^1\Sigma^+)$ reactive quenching process.
[T, H_2O]

0 V. Staemmler and A. Palma : Chem. Phys. 93, 63-69 (1985)
CEPA calculations of potential energy surfaces for open-shell system. Ⅳ. Photodissociation of H_2O in the A $^1B_1$ state. [T, hν, H_2O]

0 D. P. Strommen, D. M. Gruen and R. L. McBeth : J. Chem. Phys. 58, 4028-4029 (1973)
Vibrational spectra of water isolated in deuterium matrices.
[E, hν, H_2O; D_2 matrices at 4 K]

0 I. Tanaka, T. Carrington and H. P. Broida : J. Chem. Phys. 35, 750-751 (1961)
Photo-dissociation of water : Initial nonequilibrium populations of rotational states of $OH(^2\Sigma^+)$. [E, hν, H_2O; 10 eV]

O D. J. Tannor and E. J. Heller : J. Chem. Phys. 77, 202-218 (1982)
Polyatomic Raman scattering for general harmonic potential.
[T, general theory]

O J. E. Turner, H. G. Paretzke, R. N. Hamm, H. A. Wright and R. H. Ritchie : Radiat. Res. 92, 47-60 (1982)
Comparative study of electron energy deposition and yields in water in the liquid and vapor phases. [T, H_2O; MCS]

O A. J. Tursi and E. R. Nixon : J. Chem. Phys. 52, 1521-1528 (1970)
Matrix-isolation study of the water dimer in solid nitrogen.
[E, $h\nu$, H_2O, D_2O, HDO; N_2 matrices at 4 - 20 K]

O S. Uehara, H. Nikjoo and D. T. Goodhead : Phys. Med. Biol. 37, 1841-1858 (1992)
S Cross-sections for water vapour for the Monte Carlo electron track structure code from 10 eV to the MeV region. [compilation, H_2O; c. s. set]

O O. N. Ulenikov and A. S. Zhilyakov : J. Mol. Spectrosc. 133, 1-9 (1989a)
Calculation of the $H_2{}^{18}O$ rotational energy levels for the first hexad of interacting vibrational states. [analysis, H_2O]

O O. N. Ulenikov and A. S. Zhilyakov : J. Mol. Spectrosc. 133, 239-243 (1989b)
The line intensities of the $H_2{}^{18}O$ molecule first hexad interacting vibrational states. [analysis, H_2O]

O R. L. Vander Wal and F. F. Crim : J. Phys. Chem. 93, 5331-5333 (1989)
Controlling the pathways in molecular decomposition : The vibrationally mediated photodissociation of water. [E, $h\nu$, H_2O]

O R. L. Vander Wal, J. L. Scott and F. F. Crim : J. Chem. Phys. 92, 803-805 (1990)
Selectively breaking the O-H bond in HOD. [E, $h\nu$, HOD]

O R. L. Vander Wal, J. L. Scott and F. F. Crim : J. Chem. Phys. 94, 1859-1867 (1991a) ○
State resolved photodissociation of vibrationally excited water : Rotations, stretching vibrations, and relative cross sections.
[E, $h\nu$, $H_2O(v)$]

O R. L. Vander Wal, J. L. Scott, F. F. Crim, K. Weide and R. Schinke : J. Chem. Phys. 94, 3548-3555 (1991b)
An experimental and theoretical study of the bond selected photo-dissociation of HOD. [E and T, $h\nu$, H_2O, HOD]

O M. van Thiel, E. D. Becker and G. C. Pimentel : J. Chem. Phys. 27, 486-490 (1957)
Infrared studies of hydrogen bonding of water by the matrix isolation technique. [E, $h\nu$, H_2O; N_2 at 20 K]

O P. Varanasi, et al. : J. Quant. Spectrosc. Radiat. Transf. 8, 1537 (1968) see p. 71

O P. Varanasi and C. R. Prasad : J. Quant. Spectrosc. Radiat. Transf. 10, 65-69 (1970)
Line widths and intensities in H_2O - CO_2 mixtures. I. An experimental study on the 6.3 μ band of water vapor. [E, $h\nu$, H_2O + CO_2]

0 P. Varanasi : J. Quant. Spectrosc. Radiat. Transf. 11, 223-230 (1971a)
Line widths and intensities in H_2O - CO_2 mixtures. II. High resolution measurements on the ν_2-fundamental of water vapor.
[E, $h\nu$, H_2O, H_2O + CO_2; 295 K]

0 P. Varanasi, G. D. T. Tejwani and C. R. Prasad : J. Quant. Spectrosc. Radiat. Transf. 11, 231-236 (1971b)
Line widths and intensities in H_2O - CO_2 mixtures. III. Half-width calculations in the ν_2 -fundamental of water vapor.
[T, $h\nu$, H_2O; 63 lines]

0 A. C. Varandas : J. Chem. Phys. 105, 3524-3531 (1996)
Energy switching approach to potential surfaces : An accurate single-valued function for the water molecule. [T, H_2O]

0 A. C. Varandas : J. Chem. Phys. 107, 867-878 (1997)
Energy switching approach to potential surfaces. II. Two-valued function for the water molecule. [T, H_2O]

0 M. S. Vardya : J. Quant. Spectrosc. Radiat. Transf. 5, 867-868 (1965)
A method for estimating H_2O absorption.
[T, H_2O; vibration-rotation bands]

0 M. F. Vernon, D. J. Krajnovich, H. S. Kwok, J. M. Lisy, Y. R. Shen and Y. T. Lee : J. Chem. Phys. 77, 47-57 (1982)
Infrared vibrational predissociation spectroscopy of water clusters by the crossed laser-molecular beam technique. [E, $h\nu$, $(H_2O)_n$, n = 1-5]

0 F. I. Vilesov : Sov. Phys. Usp. 6, 888-929 (1964)
Photoionization of gaseous and vapours by vacuum ultraviolet radiation.
[review, E, $h\nu$, H_2O, He - Ar, Li - Cs, O_2, N_2, O_2, CO, N_2O, CH_4, etc.]

0 R. O. Watts : Chem. Phys. 26, 367-377 (1977)
An accurate potential for deformable water molecules. [T, $(H_2O)_2$]

0 R. B. Wattson and L. S. Rothman : J. Quant. Spectrosc. Radiat. Transf. 48, 763-780 (1992)
Direct numerical diagonalization : Wave of the future.
[T, H_2O, NO_2, CO_2, etc.]

0 K. Weide and R. Schinke : J. Chem. Phys. 87, 4627-4633 (1987)
Photodissociation dynamics of water in the second absorption band. I. Rotational state distributions of $OH(^2\Sigma)$ and $OH(^2\Pi)$. [T, $h\nu$, H_2O]

0 K. Weide and R. Schinke : J. Chem. Phys. 90, 7150-7163 (1989)
Photodissociation dynamics of water in the second absorption band. II. Ab initio calculation of the absorption spectra of H_2O and D_2O and dynamical interpretation of "diffuse vibrational" structures.
[T, $h\nu$, H_2O, D_2O]

0 R. J. Whitehead and N. C. Handy : J. Mol. Spectrosc. 55, 356-373 (1975)
Variational calculation of vibration-rotation energy levels for triatomic molecules. [T, H_2O, SO_2, OCS]

0 R. J. Whitehead and N. C. Handy : J. Mol. Spectrosc. 59, 459-469 (1976)
Variational calculation of low-lying and excited vibrational levels of the water molecule. [T, H_2O]

0 T. A. Wiggins : Appl. Opt. 20, 3481-3483 (1981)
Water vapor absorption at the atomic iodine laser line.
[E, $h\nu$, H_2O; 1.3152 μm]

0 S. O. Williams and D. G. Imre : J. Phys. Chem. 92, 3363-3374 (1988)
Raman spectroscopy : Time-dependent pictures.
[T, general theory; two-photon processes]

0 N. C. Wong and J. L. Hall : J. Opt. Soc. Am. B6, 2300-2308 (1989)
High-resolution measurements of water-vapor overtone absorption in the visible by frequency modulation spectroscopy. [E, $h\nu$, H_2O]

0 D. Xie and G. Yan : Chem. Phys. Lett. 248, 409-412 (1996)
The potential energy surface and the highly excited vibrational band origins of the water molecule. [T, H_2O]

Addenda of References for H_2O (2)

(No author index for these addenda (2) references)

2000 (2 pages)

0 C. Claveau, A. Henry, D. Hurtmans and A. Valentin : J. Quant. Spectrosc. Radiat. Transf. 68, 273-298 (2001)
Narrowing and broadening parameters of H_2O line perturbed by He, Ne, Ar, Kr and nitrogen in the spectral range 1850 - 2140 cm^{-1}.
[E, $h\nu$, H_2O + (He - Kr, N_2)]

0 C. Claveau, A. Henry, M. Lepere, A. Valentin and D. Hurtmans : J. Mol. Spectrosc. 212, 171-185 (2002)
Narrowing and broadening parameters for H_2O lines in the ν_2 band pertubed by nitrogen from Fourier transform and tunable diode laser spectroscopy. [E, $h\nu$, H_2O + N_2]

0 P. F. Coheur, S. Fally, M. Carleer, C. Clerbaux, R. Colin, A. Jenouvrier, M. F. Merienne, C. Hermans and A. C. Vandaele : J. Quant. Spectrosc. Radiat. Transf. 74, 493-510 (2002)
New water vapor line parameters in the 26000 - 13000 cm^{-1} region.
[E, $h\nu$, H_2O]

0 R. R. Gamache and R. Lynch : J. Quant. Spectrosc. Radiat. Transf. 64, 439-456 (2000)
Argon-induced halfwidths and line shifts of water vapor transitions.
[E, $h\nu$, H_2O + Ar]

0 R. R. Gamache and J.-M. Hartmann : J. Quant. Spectrosc. Radiat. Transf. 83, 119-147 (2003)
Collisional parameters of H_2O lines : effects of vibration.
[T, $h\nu$, H_2O]

0 T. K. Ghanty and S. K. Ghosh : J. Chem. Phys. 118, 8547-8550 (2003)
Polarizability of water clusters : An ab initio investigation.
[T, $(H_2O)_N$]

0 S. A. Harich, D. W. H. Hwang, X. F. Yang, J. J. Lin, X. M. Yang and R. N. Dixon : J. Chem. Phys. 113, 10073-10090 (2000)
Photodissociation of H_2O at 121.6 nm : A state-to-state dynamical picture. [E, $h\nu$, H_2O]

0 C. P. Lawrence and J. L. Skinner : J. Chem. Phys. 118, 264-272 (2003)
Vibrational spectroscopy of HOD in liquid D_2O. III. Spectral diffusion, and hydrogen-bonding and rotational dynamics.
[T, $h\nu$, HOD; IV see A. Piryatinski (2003a)]

0 M. Lepere, A. Henry, A. Valentin and C. Camy-Peyret : J. Mol. Spectrosc. 208, 25-31 (2001)
Diode-laser spectroscopy : line profiles of H_2O in the region of 1.39 μm. [E, hν, H_2O]

0 A. Lucchesini, S. Gozzini and C. Gabbanini : Eur. Phys. J. D8, 223-226 (2000)
Water vapor overtones pressure broadening and shifting measurements. [E, hν, H_2O]

0 L. Moretti, A. Sasso, L. Gianfrani and R. Ciurylo : J. Mol. Spectrosc. 205, 20-27 (2001)
Collisional-broadened and Dicke-narrowed lineshapes of $H_2{}^{16}O$ and $H_2{}^{18}O$ transitions at 1.39 μm. [E, hν, H_2O]

0 S. A. Nizkorodov, M. Ziemkiewicz, T. L. Myers and D. J. Nesbitt : J. Chem. Phys. 119, 10158-10168 (2003)
Vibrationally mediated dissociation dynamics of H_2O in the V_{OH} = 2 polyad. [E, hν, H_2O]

0 A. Piryatinski, C. P. Lawrence and J. L. Skinner : J. Chem. Phys. 118, 9664-9671 (2003a)
Vibrational spectroscopy of HOD in liquid D_2O. Ⅳ. Infrared two-pulse photon echoes. [T, hν, HOD; Ⅲ see C. P. Lawrence (2003)]

0 A. Piryatinski, C. P. Lawrence and J. L. Skinner : J. Chem. Phys. 118, 9672-9679 (2003b)
Vibrational spectroscopy of HOD in liquid D_2O. Ⅴ. Infrared three-pulse photon echoes. [T, hν, HOD]

0 R. Schermaul, R. C. M. Learner, D. A. Newnham, R. G. Williams, J. Ballard, N. F. Zobov, D. Belmiloud and J. Tennyson : J. Mol. Spectrosc. 208, 32-42 (2001)
The water vapor spectrum in the region 8600 - 15000 cm^{-1}. Experimental and theoretical studies to a new spectral line database. [E, hν; H_2O]

0 D. W. Schwenke : J. Chem. Phys. 118, 6898-6904 (2003)
First principles prediction of isotopic shifts in H_2O. [T, hν, H_2O]

0 D. W. Steyert, W. F. Wang, J. M. Sirota, N. M. Donahue and D. C. Reuter : J. Quant. Spectrosc. Radiat. Transf. 72, 775-782 (2002)
Pressure broadening coefficients for rotational transitions of water in the 380 - 600 cm^{-1} range. [E, hν, H_2O]

0 D. W. Steyert, W. F. Wang, J. M. Sirota, N. M. Donahue and D. C. Reuter : J. Quant. Spectrosc. Radiat. Transf. 83, 183-191 (2003)
Hydrogen and helium pressure broadening of water transitions in the 380 - 600 cm^{-1} region. [E, hν, H_2O + (H_2, He)]

Addenda (1961 - 1989)

0 T. G. Adiks, A. A. Vinogradova and I. P. Malkov : J. Appl. Spectrosc. 45, 778-781 (1986)
Measurement of the absorption line parameters of water vapor in the 5.8 μm region using a tunable laser diode spectrometer. [E, hν, H_2O]

0 S. Adler-Golden, J. Lee and N. Goldstein : J. Quant. Spectrosc. Radiat. Transf. 48, 527-535 (1992)
Diode laser measurements of temperature dependent line parameters for water vapor near 820 nm. [E, hν, H_2O]

0 M. N. R. Ashfold and R. N. Dixon : Faraday discuss. Chem. Soc. 82, 193-194 (1986)
Discussion of photodissociation. [discussion, hν, H_2O]

0 A. F. Aushev, N. F. Borisova, E. S. Bykova, V. M. Osipov and V. V. Tsukanov : Opt. Spectrosc. 68, 700-701 (1990)
On the temperature dependence of the half-widths of the spectral lines of CO_2 and H_2O. [E, hν, H_2O, CO_2; 295 and 2100 K]

0 V. G. Avetisov, A. I. Nadezhdinskii, A. N. Khusnutdinov, P. M. Omarova and M. V. Zyrianov : J. Mol. Spectrosc. 160, 326-334 (1993)
Diode laser spectroscopy of water vapor in 1.8 μm : line profile measurements. [E, hν, H_2O]

0 R. J. Barnes, A. F. Gross and A. Sinha : J. Chem. Phys. 106, 1284-1287 (1997)
Accessing highly vibrationally excited states of water using double resonance vibrationally mediated photodissociation. [E, hν, H_2O]

0 A. Bauer, et al. : J. Quant. Spectrosc. Radiat. Transf. 36, 307 (1986) see p. 4

0 A. Bauer, M. Godon, M. Kheddar, J. M. Hartmann, J. Bonamy and D. Robert : J. Quant. Spectrosc. Radiat. Transf. 37, 531-539 (1987)
Temperature and perturber dependences of water vapor 380 GHz-line broadening. [E, hν, H_2O]

0 A. Bauer, M. Godon, M. Kheddar and J. M. Hartmann : J. Quant. Spectrosc. Radiat. Transf. 41, 49-54 (1989)
Temperature and perturber dependences of water-vapor line-broadening — experiments at 183 GHz — calculations below 1000 GHz. [E, hν, H_2O]

0 A. Bauer, et al. : J. Quant. Spectrosc. Radiat. Transf. 50, 463 (1993) see p. 4

0 F. A. Blum, K. W. Nill, P. L. Kelley, A. R. Calawa and T. C. Harman : Science 177, 694-695 (1972)
Tunable infrared laser spectroscopy of atmospheric water vapour. [E, hν, H_2O]

0 M. Brouard, S. R. Langford and D. E. Manolopoulos : J. Chem. Phys. 101, 7458-7467 (1994)
New trends in the state-to-state photodissociation dynamics of $H_2O(A)$. [E, hν, H_2O; 282 nm]

0 M. Brouard and S. R. Langford : J. Chem. Phys. 106, 6354-6364 (1997)
The state-to-state photodissociation dynamics of HOD(A).
[E, hν, HOD; 288 nm]

0 C. A. Cantrell, A. Zimmer and G. S. Tyndall : Geophys. Res. Lett. 24, 2195-2198 (1997)
Absorption cross sections for water vapor from 183 to 193 nm.
[E, hν, H_2O, N_2O, etc.; 273 - 353 K for H_2O]

0 P. Cardinet, F. Severin, A. Valentin, M. L. Claude and A. Henri : Compt. Rend. Acad. Sci. B284, 37-39 (1977)
Wavenumber, intensity and width of water vapour lines in the region of 5.3 μm. [E, hν, H_2O]

0 K. V. Chance, K. Park and K. M. Evenson : J. Quant. Spectrosc. Radiat. Transf. 59, 687-688 (1998)
Pressure broadening of far infrared rotational transitions : 88.65 cm^{-1} H_2O and 114.47 cm^{-1} O_3. [E, hν, H_2O, O_3]

0 M. S. Child and L. Halonen : in Advances in Chemical Physics, 57, John Wiley & Sons 1-58 (1984)
Overtone frequencies and intensities in the local mode picture.
[review, T, hν, H_2O, C_2H_2, SO_2, NH_3, CH_4, SiH_4, SF_6, etc.]

0 Z. Chu, T. D. Wilkerson and U. N. Singh : Appl. Opt. 32, 992-998 (1993)
Water-vapor absorption line measurements in the 940-nm band by using a Raman-shifted dye laser. [E, hν, H_2O]

0 F. F. Crim, M. C. Hsiao, J. L. Scott, A. Sinha and R. L. Van der Wal : Phil. Trans. Roy. Soc. London A332, 259-272 (1990)
State- and bond-selected photodissociation and bimolecular reaction of water. [T, hν, H_2O, HOD]

0 S. J. Davis, W. J. Kessler and M. Bachmann : Proc. SPIE, The Int. Soc. Opt. Eng. 3612, 157-166 (1999)
Collisional broadening of absorption lines in water vapor and atomic iodine relevant to COIL diagnostics. [E, hν, H_2O]

0 L. J. Dunne : Faraday discuss. Chem. Soc. 82, 190-191 (1986)
Discussion of photodissociation. [discussion, hν, H_2O]

0 R. S. Eng, A. R. Calawa, T. C. Harman, P. L. Kelley and A. Javan : Appl. Phys. Lett. 21, 303-305 (1972)
Collisional narrowing of infrared water-vapor transitions.
[E, hν, H_2O; ν_2 band]

0 R. S. Eng, P. L. Kelley, A. Mooradian, A. R. Calawa and T. C. Harman : Chem. Phys. Lett. 19, 524-528 (1973)
Tunable laser measurements of water vapor transitions in the vicinity of 5 μm. [E, hν, H_2O]

0 R. S. Eng, P. L. Kelley, A. R. Calawa, T. C. Harman and K. W. Nill : Mol. Phys. 28, 653-664 (1974)
Tunable diode laser measurements of water vapour absorption line parameters. [E, hν, H_2O]

0 R. S. Eng and A. W. Mantz : J. Mol. Spectrosc. 74, 388 (1979) see p. 86

0 R. R. Gamache, et al. (1983), (1988), (1992), (1994) see p. 24

0 R. R. Gamache, R. Lynch and L. R. Brown : J. Quant. Spectrosc. Radiat. Transf. 56, 471-487 (1996)
Theoretical calculations of pressure broadening coefficients for H_2O perturbed by hydrogen or helium gas. [T, hν, H_2O + (H_2, He)]

0 R. R. Gamache, R. Lynch and S. P. Neshyba : J. Quant. Spectrosc. Radiat. Transf. 59, 319-335 (1998)
New developments in the theory of pressure-broadening and pressure-shifting of spectral lines of H_2O : the complex Robert-Bonamy formalism. [T, hν, H_2O]

0 T. Giesen, R. Schieder, G. Winnewisser and K. M. T. Yamada : J. Mol. Spectrosc. 153, 406-418 (1992)
Precise measurements of pressure broadening and shift for several H_2O lines in the ν_2 band by argon, nitrogen, oxygen, and air. [E, hν, H_2O + (Ar, N_2, O_2, N_2 + O_2)]

0 A. P. Godlevskii and V. A. Kapitanov : J. Appl. Spectrosc. 28, 142-146 (1978)
Changes in the line shapes of water vapor due to broadening by foreign gases. [E, hν, H_2O]

0 T. M. Goyette and F. C. De Lucia : J. Mol. Spectrosc. 143, 346-358 (1990)
The pressure broadening of the 3, 1, 3 - 2, 2, 0 transition of water between 80 and 600 K. [E, hν, H_2O]

0 T. M. Goyette, F. C. De Lucia, J. M. Dutta and C. R. Jones : J. Quant. Spectrosc. Radiat. Transf. 49, 485-489 (1993)
Variable temperature pressure broadening of the $4_{1,4}$ - $3_{2,1}$ transition of H_2O by O_2, and N_2. [E, hν, H_2O + (O_2, N_2)]

0 B. E. Grossmann, E. V. Browell, A. D. Bykov, V. A. Kapitanov, V. V. Lazarev, Y. N. Ponomarev, L. N. Sinitsa, Ea. Korotchenko, V. N. Stroinova and B. A. Tikhomirov : Atm. Opt. 3, 617-629 (1990)
Investigation of H_2O absorption line shifts caused by air pressure in the visible. [E, hν, H_2O + (N_2 + O_2)]

0 M. A. Guerra, M. Ketabi, A. Sanchez, M. S. Feld and A. Javan : J. Chem. Phys. 63, 1317-1319 (1975)
Water vapor spectroscopy at 5 μm using a tunable SFR laser. [E, hν, H_2O; spin-flip Raman laser]

0 J.-M. Hartmann, J. Taine, J. Bonamy, B. Labani and D. Robert : J. Chem. Phys. 86, 144-156 (1987)
Collisional broadening of rotation-vibration lines for asymmetric-top molecules. II. H_2O diode laser measurements in the 400 - 900 K range; calculations in the 300 - 2000 K range.
[T, $h\nu$, H_2O + (N_2, O_2, Ar); I see B. Labani (1986)]

0 A. Hodgson, et al. : Mol. Phys. 54, 351 (1985) see p. 29

0 A. Hodgson : Faraday discuss. Chem. Soc. 82, 190-190 (1986)
Discussion of photodissociation. [discussion, $h\nu$, H_2O]

0 J. R. Izatt, H. Sakai and W. S. Benedict : J. Opt. Soc. Am. 59, 19-27 (1969)
Positions, intensities, and widths of water-vapor lines between 475 and 692 cm^{-1}. [E, $h\nu$, H_2O + (H_2O, N_2, CO_2, He); 353 K]

0 T. Kasuga, H. Kuze and T. Shimizu : J. Chem. Phys. 69, 5195-5198 (1978)
Determinations of relaxation rate constants on the 22 GHz rotational transition of H_2O by coherent transient spectroscopy. [E, $h\nu$, H_2O]

0 B. Labani, J. Bonamy, D. Robert, J.-M. Hartmann and J. Taine : J. Chem. Phys. 84, 4256-4267 (1986)
Collisional broadening of rotation-vibration lines for asymmetric top molecules. I. Theoretical model for both distant and close collisions.
[T, $h\nu$, H_2O + (N_2, O_2, Ar); II see J.-M. Hartmann (1987)

0 R. T. Lawton and M. S. Child : Mol. Phys. 40, 773-792 (1980)
Excited stretching vibrations of water : the quantum mechanical picture.
[T, H_2O]

0 Y. Luo, H. Agren, O. Vahtras, P. Jorgensen, V. Spirko and H. Hettema : J. Chem. Phys. 98, 7159-7164 (1993)
Frequency-dependent polarizabilities and first hyperpolarizabilities of H_2O. [T, $h\nu$, H_2O]

0 R. Lynch, R. R. Gamache and S. P. Neshyba : J. Chem. Phys. 105, 5711-5721 (1996)
Fully complex implementation of the Robert-Bonamy formalism : Half widths and line shifts of H_2O broadened by N_2. [T, $h\nu$, H_2O + N_2]

0 R. Lynch, R. R. Gamache and S. P. Neshyba : J. Quant. Spectrosc. Radiat. Transf. 59, 595-613 (1998)
N_2 and O_2 induced halfwidths and line shifts of water vapor transitions in the (301) ← (000) and (221) ← (000) bands. [E, $h\nu$, H_2O + (N_2, O_2)]

0 V. Malathy Devi, B. Fridovich, G. D. Jones and D. G. S. Snyder : J. Mol. Spectrosc. 111, 114-118 (1985)
Intensities and half-widths for several H_2O ν_2 lines in the region 1500 - 1523 cm^{-1}. [E, $h\nu$, H_2O]

0 V. Malathy Devi, D. C. Benner, C. P. Rinsland, M. A. H. Smith and B. D. Sidney : J. Mol. Spectrosc. 117, 403-407 (1986)
Diode laser measurements of air and nitrogen broadening in the ν_2 bands of HDO, $H_2{}^{16}O$, and $H_2{}^{18}O$. [E, $h\nu$, (H_2O, HDO) + (N_2 + O_2, N_2)]

0 V. Malathy Devi, D. C. Benner, M. A. H. Smith and C. P. Rinsland : J. Mol. Spectrosc. 155, 333-342 (1992)
Measurements of pressure broadening and pressure shifting by nitrogen in the ν_1 and ν_3 bands of $H_2{}^{16}O$. [E, hν, $H_2O + N_2$]

0 J.-Y. Mandin, J.-M. Flaud and C. Camy-Peyret : J. Quant. Spectrosc. Radiat. Transf. 23, 351-370 (1980)
Measurements and calculations of self-broadening coefficients of lines belonging to the ν_2 band of $H_2{}^{16}O$. [E, hν, H_2O]

0 J.-Y. Mandin, J.-P. Chevillard, J.-M. Flaud and C. Camy-Peyret : J. Mol. Spectrosc. 132, 352-360 (1989a)
N_2-broadening coefficients of $H_2{}^{16}O$ lines between 8500 and 9300 cm^{-1}. [E, hν, $H_2O + N_2$]

0 J.-Y. Mandin, et al. : J. Mol. Spectrosc. 138, 272 (1989b) see p. 43

0 J.-Y. Mandin, et al. : J. Mol. Spectrosc. 138, 430 (1989c) see p. 43

0 J.-Y. Mandin, V. Dana, M. Badaoui, A. Barbe, A. Hamdouni and J.-J. Plateaux : J. Mol. Spectrosc. 164, 328-337 (1994)
Measurements of pressure-broadening and pressure-shifting coefficients from FT spectra. [T, hν, H_2O, CO, CO_2]

0 F. Matsushima, H. Odashima, T. Iwasaki and S. Tsunekawa : J. Mol. Struct. 352/353, 371-378 (1995)
Frequency measurement of pure rotational transitions of H_2O from 0.5 to 5 THz. [E, hν, H_2O]

0 J. A. Mucha : Appl. Spectrosc. 36, 141-147 (1982)
Tunable diode laser measurements of water vapor line parameters in the 6-μm spectral region. [E, hν, H_2O]

0 J. N. Murrell : Faraday discuss. Chem. Soc. 82, 191-191 (1986)
Discussion of photodissociation. [discussion, hν, H_2O]

0 D. F. Plusquellic, O. Votava and D. J. Nesbitt : J. Chem. Phys. 109, 6631-6640 (1998)
Bond-selective photofragment of jet-cooled HOD at 193 nm : Vibrationally mediated photochemistry with zero-point excitation.
[E, hν, H_2O, D_2O, HOD]

0 P. L. Ponsardin and E. V. Browell : J. Mol. Spectrosc. 185, 58-70 (1997)
Measurements of $H_2{}^{16}O$ linestrengths and air-induced broadenings and shifts in the 815-nm spectral region. [E, hν, $H_2O + (N_2 + O_2)$]

0 V. Ya. Ryadov and N. I. Furashov : Opt. Spectrosc. 35, 255 (1973) see p. 58

0 V. Ya. Ryadov and N. I. Furashov : Radiophys. Quant. Electron. 18, 256-266 (1975)
On widths and intensities of submillimetre absorption lines of water vapour rotating spectrum. [E, hν, H_2O]

0 S. Salimian and R. K. Hanson : J. Quant. Spectrosc. Radiat. Transf. 30, 1-7 (1983)
Absorption measurements of H_2O at high temperatures using a CO laser.
[E, $h\nu$, H_2O + Ar; 1901.760 cm^{-1}, 1300 - 2300 K]

0 N. Schmucker, Ch. Trojan, T. Giesen, R. Schieder, K. M. T. Yamada and G. Winnewisser : J. Mol. Spectrosc. 184, 250-256 (1997)
Pressure broadening and shift of some H_2O lines in the ν_2 band : revisited. [E, $h\nu$, H_2O]

0 S. L. Shostak, W. L. Ebenstein and J. S. Muenter : J. Chem. Phys. 94, 5875-5882 (1991a)○
The dipole moment of water. Ⅰ. Dipole moments and hyperfine properties of H_2O and HDO in the ground and excited vibrational states.
[E, H_2O, HDO]

0 S. L. Shostak and J. S. Muenter : J. Chem. Phys. 94, 5883-5890 (1991b)
The dipole moment of water. Ⅱ. Analysis of the vibrational dependence of the dipole moment in terms of a dipole moment function. [T, H_2O]

0 A. Valentin, C. Rachet, A. D. Bykov, N. N. Lavrentieva, V. N. Saveliev and L. N. Sinitsa : J. Quant. Spectrosc. Radiat. Transf. 59, 165-170 (1998)
J dependence of the lineshift coefficients in the ν_2 water vapor band.
[E, $h\nu$, H_2O]

0 A. Valentin, C. Claveau, A. D. Bykov, N. N. Lavrentieva, V. N. Saveliev and L. N. Sinitsa : J. Mol. Spectrosc. 198, 218-229 (1999)
The water-vapor ν_2 band lineshift coefficients induced by nitrogen pressure. [E, $h\nu$, H_2O + N_2]

0 O. Votava, D. F. Plusquellic and D. J. Nesbitt : J. Chem. Phys. 110, 8564-8576 (1999)
Vibrationally mediated photolysis of H_2O in the V_{OH} = 3 manifold : Far off resonance photodissociation cross sections and OH product state distributions. [E, $h\nu$, H_2O]

0 K. M. T. Yamada, M. Harter and T. Giesen : J. Mol. Spectrosc. 157, 84-94 (1993)
Survey study of air-broadened water vapour lines in the ν_2 band by high-resolution FTIR spectroscopy. [E, $h\nu$, H_2O + (N_2 + O_2)]

Author Index for H_2O References

Some Comments on Electron Collision Cross Sections and Photodissociation Processes for H_2O

The pioneer work on electron collision cross section set for H_2O is given by J. J. Lowke in 1969. I have compiled the same set for H_2O including new data two times. An example was shown in M. Hayashi (1989). This cross section set is shown in Figure 1. The other cross section sets for H_2O were presented by many authors, N. Gee (1983), M. Yousfi (1987), K. F. Ness (1988), S. F. Biagi (1989), T. J. Dolan (1993), M. Yousfi (1994, 1996) and so on.

Now I do not like these cross section sets. Reasonable and correct cross section set have to calculate the temperature dependence of electron drift velocities at high E/N by B. Eq. and MCS method. We have solved this problem in the case of CO_2 and reported at the 51th GEC Conference, Maui, as shown in this report.

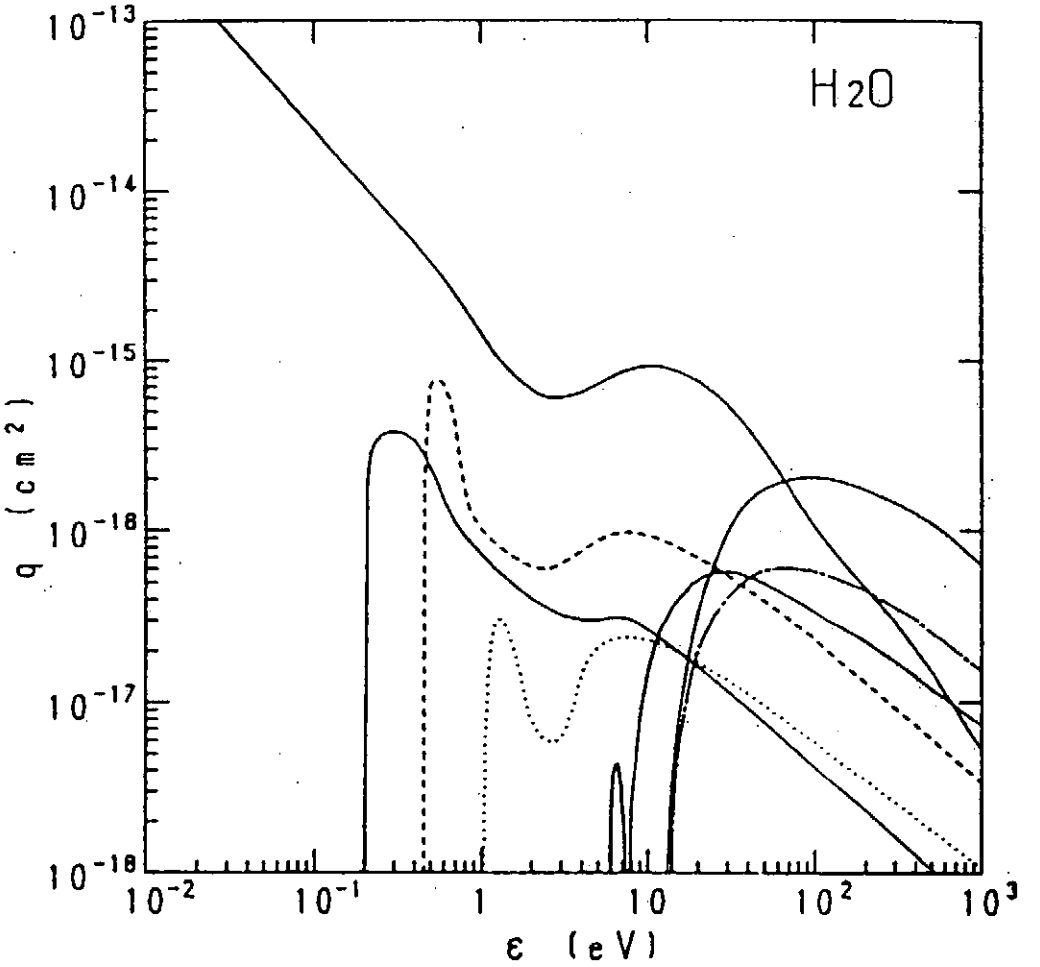

Figure 1. Electron collision cross section set for H_2O, assuming all H_2O molecules are in $H_2O(g)$ state (M. Hayashi, 1990). In all H_2O + e experiments, H_2O molecules are mixture of $H_2O(g)$, $H_2O(r)$ and $H_2O(v)$. So this cross section set is not applicable for exact calculations, and can use only for approximate applications.

In the case of H_2O, the concentration of $H_2O(v)$ is small at 300 K. At high temperature, the effect of $H_2O(v)$ is important and interesting.

All molecules have the component M(g), M(r), M(v) and M_n (n = 2), depend on the pressure and temperature condition of the experiment. Most interesting experimental results occur in the triatomic molecules. The change from linear mode combination of three atoms to bend mode combination of three atoms, or vice versa, occur very easy in the triatomic molecules by vibrational excitation.

Almost theoretical results of electron collision cross sections for molecules are for M(g). Theoretical studies involving the M(r) and M(v) are urgently required for many molecules.

I would like to present our recent two conference reports at the end of this report.

M. Hayashi and Y. Nakamura : 51th GEC, Maui 265-266 (1998)
M. Hayashi and Y. Nakamura : EMS-99, Tokyo 175-176 (1999)

The photodissociation of H_2O in the first absorption band has been studied in great detail by P. Andresen, R. Schinke, V. Engel, R. L Vander Wal, V. Staemmler, F. F. Crim, D. Hausler, and so on, both experimentally and theoretically.

Photodissociation processes consist essentially of two steps. The first step is the absorption of a photon leading to the excited state. The second step is the subsequent dissociation of this complex to the products. This has been tested for several different initial vibrational and rotational states.

$$H_2O\ [X^1A_1(000)J_{kakc}] \xrightarrow{\text{IR laser}} H_2O\ [X^1A_1(v_1, v_2, v_3)J_{ka'kc'}] \xrightarrow{\text{excimer laser}} OH\ (n, j) + H$$

The experimental procedure require three lasers.

1. H_2O is vibrationally excited to a well defined rotational state with a tunable IR laser. This IR excitation is used to prepare single rotational and vibrational states of H_2O in the electronic ground state.

2. The prepared H_2O is photodissociated using 193 nm ArF excimer laser.

3. A third probe laser is used to determine the vibrational state distribution of the OH product by laser induced fluorescence.

Details are not discussed here. Please find the selected papers from this bibliography. Photodissociation dynamics of H_2O at 121.6 nm (Lyman-α wavelength) have been studied by some authors. The results are also interesting but complicated a little bit.

The author would like to expect that the similar studies on electron collision cross section experiments of single rotational and vibrational states of H_2O in the electronic ground state.

JTP7.07

Temperature Dependence of Electron Drift Velocity and Electron Collision Cross Section Sets for Ground State and Vibrationally Excited State of the CO_2 Molecule

Makoto Hayashi and Yoshiharu Nakamura*

Gaseous Electronics Institute
4-15-14-503 Sakae, Naka-Ku, Nagoya 460-0008, Japan
**Faculty of Science and Technology, Keio University*
3-14-1 Hiyoshi, Yokohama 223-8522, Japan

The drift velocity of electrons in carbon dioxide have been calculated at gas temperatures ranging from 193 to 573 K and at E/N values up to 100 Td assuming that the gas was a mixture of the ground state molecules and the vibrationally excited molecules and its mix ratio depended on the temperature. The calculated drift velocities agreed well with the measurement of Elford (1980).

Generally, target molecule M in beam and swarm experiments consists of the mixture of different states:

$$M = M(g) + M(r_j) + M(v_i) + M_N ,$$

where M(g), $M(r_j)$, $M(v_i)$ and M_N represent the ground state molecules, the rotationally excited molecules, the vibrationally excited molecules and the van der Waals clusters consisting of N molecules (N≥2), respectively. It is known that the concentration of $M(v_i)$ increases with temperature. For example, the concentration of $CO_2(v_i)$ in CO_2 has been calculated to be 8.4 % at 313 K and 26.5 % at 673 K, respectively [1,2]. This is due to the low threshold energy (0.083 eV) of the lowest vibrational excited level (010) mode. The concentrations of rotationally excited molecules are much larger than of the vibrationally excited molecules. The concentration of the clusters are important at low temperature and high pressure conditions.

Most of theoretical calculations of electron collision cross sections have been performed for pure M(g) target, not for the M(v) molecules.

A number of different electron collision cross sections for molecules have been determined with beam and swarm experiments. So far, in most of the experiments it is implicitly assumed that the target molecules are all in the ground state, or electron collision cross section set of M(g), M(r) and M(v) are almost the same. Strictly speaking, this assumption is not correct, and in particular, cannot be applied to the molecules which have temperature dependence in electron collision cross sections.

Take the CO_2 molecule. The ground state $CO_2(g)$ is linear, but $CO_2(010)$ is bent and this has a dipole moment. Electron collision cross section set of $CO_2(g)$ and $CO_2(v)$ are expected to be different each other. In fact, Buckman [3], Ferch [1] and Strakeljahn [4] have determined the grand total cross section Q_T for $CO_2(g)$ and $CO_2(v)$ and found that $Q_T(v)$ of CO_2 are larger than $Q_T(g)$ at the electron energies lower than about 10 eV.

It seems to be quite difficult to determine directly the electron collision cross section sets of $CO_2(g)$ and $CO_2(v)$ from the beam and swarm experiments. However, if the cross section sets of $CO_2(g)$ and $CO_2(v)$ are available, we can calculate the electron swarm parameters of a known concentration of $CO_2(g)$ and $CO_2(v)$ very easily. Momentum transfer cross sections q_m for $CO_2(g)$ and $CO_2(v)$, which have been based on the compilation of Hayashi [5] and recent experiments of Nakamura [6] and Strakeljahn [4], are shown in Fig. 1. Tentatively, we have assumed that all other inelastic cross sections of $CO_2(g)$ and $CO_2(v)$ are practically the same [7,8]. At a given temperature, the concentrations of $CO_2(g)$ and $CO_2(v)$ are known, then we have calculated the values of electron drift velocity W in CO_2. The results are shown in Fig. 2. The calculated W values at three temperatures are in general agreement with the experimental data of Elford [9].

Haddad [10] have discussed the importance of the populations of vibrationally excited CO_2 molecules already. They also have mentioned the contributions due to CO_2 molecules in rotational states and have concluded that such states are not likely to play a significant role compared with vibrationally excited molecules. But they could not reproduce their experimental data for W at high E/N from the analysis.

A similar analysis on $H_2(g)$, $H_2(r)$ and $H_2(v)$

also have to be started. The H_2 molecule have the famous long-standing controversy in the vibrational excitation cross section [11]. In the present paper, we propose to investigate and to measure the cross sections for molecules not only in the ground state but also in the excited states which should have different cross sections from those in the ground state. Although the difference among the cross section sets for $H_2(g)$, $H_2(r)$ and $H_2(v)$ may be small compared with the CO_2 molecule since the H_2 molecule is diatomic. Theoretical studies involving the excited species are urgently required.

The term "*temperature dependence* of cross section" may not be appropriate. The molecules, $CO_2(g)$, $CO_2(r)$ and $CO_2(v)$, have the definite and individual cross section sets, and their concentrations change with temperature. The temperature dependence is caused through different concentration of the excited components at different temperatures. Attachment cross section of the excited molecules is quite different from the ground state molecules for many attaching gases.

We wish to thank Professor H. Tawara for valuable comments.

References

[1] Ferch J, Masche C, Raith W and Wiemann L 1989 *Phys. Rev. A* **40** 5407

[2] Johnston, W M, Mason, N J and Newell, W R 1993 *J. Phys. B* **26** L147

[3] Buckman S J, Elford M T and Newman D S 1987 *J. Phys. B* **20** 5175

[4] Strakeljahn G, Ferch, J and Raith W 1998 *J. Phys. B* **31** (to appear)

[5] Hayashi M 1990 *Nonequilibrium Processes in Partially Ionized Gases*, Plenum 333

[6] Nakamura Y 1995 *Aust. J. Phys.* **48** 357

[7] Schulz G J and Spence D 1969 *Phys. Rev. Lett.* **22** 47

[8] Srivastava S K and Orient O J 1983 *Phys. Rev. A* **27** 1209

[9] Elford M T and Haddad G N 1980 *Aust. J. Phys.* **33** 517

[10] Haddad G N and Elford M T 1979 *J. Phys. B* **12** L743

[11] Crompton R W and Morrison M A 1993 *Aust. J. Phys.* **46** 203

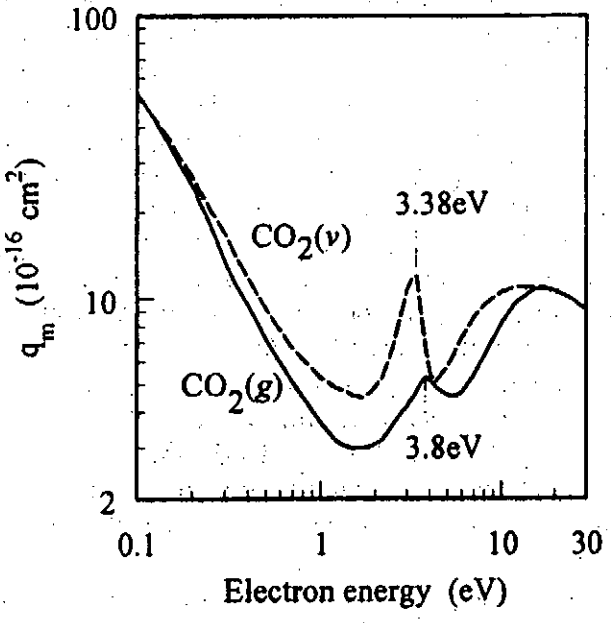

Fig. 1. The assumed elastic momentum transfer cross sections for the ground state (solid curve) and vibrationally excited CO_2 molecules (broken curve).

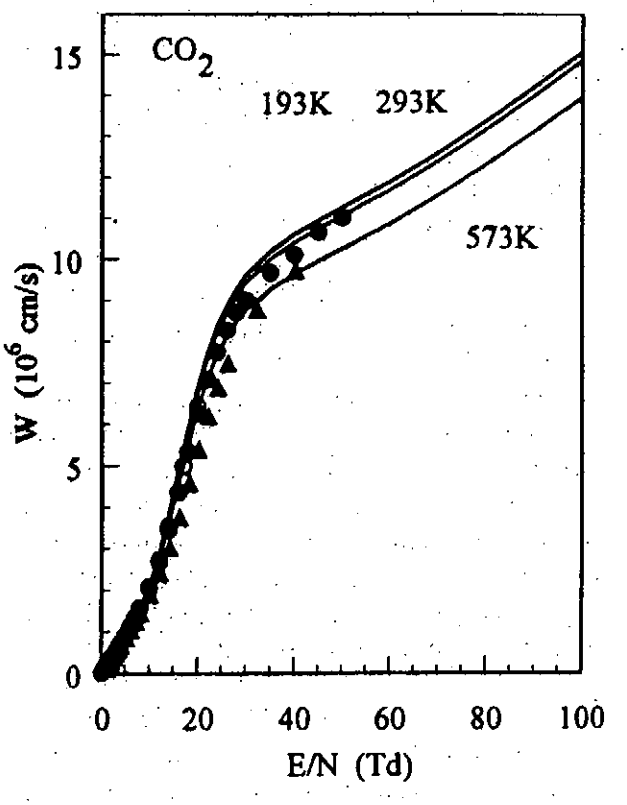

Fig. 2. Calculated electron drift velocities in CO_2 at different temperatures. Open and closed circles and closed triangles show the measurements of Elford [9] at 193, 293 and 573 K, respectively.

May We Measure the Exact Values of Electron Collision Cross Sections for Molecules by Beam and Swarm Experiments ?

M. Hayashi and Y. Nakamura*

Gaseous Electronics Institute
4-15-14-503 Sakae, Nakaku, Nagoya 460-0008 Japan
**Faculty of Science and Technology, Keio University*
3-14-1 Hiyoshi, Yokohama 223-8522 Japan

We cannot measure the exact values of DCS for molecules intrinsically. Of course, we can measure the approximate values of DCS for molecules, but can measure the exact values of DCS for atoms. The reason is very simple.

Target molecule M in both beam and swarm experiments consists of the mixture of different states :

$$M = M(g) + M(r_J) + M(v_1) + M_N$$

where $M(g)$, $M(r_J)$, $M(v_1)$ and M_N represent the completely ground state molecules, the rotationally excited molecules, the vibrationally excited molecules and the van der Waals clusters consisting of N molecules ($N \geqq 2$), respectively. Usually beam and swarm experiments are carried out at about 300 K. The concentration of $M(g)$ is small compared to $M(r_J)$ (except H_2 molecules) at 300 K. Then the molecule M is always mixture of $M(r_J)$ and $M(v_1)$, and the concentration of $M(r_J)$ and $M(v_1)$ changes with temperature. And electron collision cross section sets from elastic to inelastic collision processes for $M(r)$ and $M(v)$ are different each other. The target molecules M in the beam and swarm experiments are always mixtures of different molecules $M(r_J)$ and $M(v_1)$. In the case of H_2, the target gas consists of $M(g)$ and $M(r_J)$, especially $M(g)$ and $M(r_1)$ at 78 K.

Most clear change of cross sections of $M(r_J)$ and $M(v_1)$ will occur for triatomic molecules. CO_2, N_2O and so on. Triatomic molecules can change from linear to bend, or vice versa easily. The authors [1] have presented the different elastic momentum transfer cross sections q_{mr} and q_{mv} for $CO_2(r)$ and $CO_2(v)$, where they assumed that all other inelastic cross sections of $CO_2(r)$ and $CO_2(v)$ are practically the same. Then they have calculated the electron drift velocity W as a function of gas temperature T. When T increas, concentrations of $CO_2(v)$ increases, then W decreases with T at the same E/N, the electric field over the gas number density, around 50 Td.

We have a comment to the interesting and important paper of W. Johnstone, et al. [2]. They have measured the temperature dependence of elastic DCS for CO_2 at 4.0 eV. Unfortunitly, q_{mv} for $CO_2(v)$ at 4 eV is almost equal to q_{mr} for $CO_2(r)$ [1]. Then we propose the same experiments at about 3.4 eV for CO_2, because the temperature dependence of DCS seems to be very large there.

Winstead and McKoy [3] calculated the elastic DCS for $N_2O(g)$ at low electron energies and compare the experimental DCS data for $N_2O(r) + N_2O(v)$ mixture at 300 K. We can see large discrepancy between them at lower than about 10 eV. We urge Winstead and Mckoy to calculate the DCS

for $N_2O(v)$ and also $N_2O(r)$ for comparison. We can see the same discrepancy of DCS for CO_2 [4] [5] at low electron energies..

H_2 molecules have the famous long standing controversy in the vibrational excitation cross section [6]. A possible way to solve the problem may be as follows. At first, theoreticians calculate the q_{ms}, q_{mr}, q_{mv}, q_{rs}, q_{rr}, q_{rv}, q_{vs}, q_{vr}, and q_{vv} for $H_2(g)$, $H_2(r_1)$ and $H_2(v_1)$, as a function of electron energies. Using these data, we calculate the electron swarm parameters. From beam experiments, we cannot determine the values of q_{ms}, q_{mr}, q_{rs}, q_{rr} for $H_2(g)$ and $H_2(r_1)$ at the same time. It is clear that the threshold energies of q_r and q_v for $H_2(g)$ and $H_2(r_1)$ are different. Bhattacharyya, et al. [7] have shown that elastic integral cross sections q_{tr} are larger than q_{ts} for 20 to 200 eV for $H_2(g)$ and $H_2(r_1)$. We want the elastic DCS values for $H_2(g)$ and $H_2(r_1)$ at low electron energies lower than 10 eV. Swarm experiments also carried out in the mixtures of $H_2(g)$ and $H_2(r_1)$, except for para-$H_2(g)$ at 78 K (concentration of $H_2(g)$ is 99.3 %). We compare the experimental and calculated swarm parameters at given conditions.

Usually, theoreticians calculate the DCS for M(g), not for $M(r_J)$ and $M(v_1)$, for most molecules. Theoretical studies involving the rotationally and vibrationally excited species are urgently required for many molecules. There is a interesting paper given by A. Jain [8].

If we have the cross section sets for excited inert gas clusters, we can calculate the electron swarm parameters of inert gases at high pressure and low temperature conditions. The concentration of the clusters for atoms and molecules are important at low temperature and high pressure conditions.

Most interesting temperature dependence occur for attachment cross sections q_a [9]-[13]. The values of non-dissociative q_{an} and dissociative q_{ad} are quite different for M(r) and M(v), and M(r) and M(v) have the definit and individual cross sections, independ on the temperature. Apparent temperature dependence of attachment cross section is caused through different concentration of the excited components M(r) and M(v) at different temperatures.

[1] M. Hayashi and Y. Nakamura, 51th GEC, Maui, JTP7.07, 265 (1998) CO_2
[2] W. M. Johnston, N. J. Mason and W. R. Newell, J. Phys. B26, L147 (1993) CO_2
[3] C. Winstead and V. McKoy, Phys. Rev. A57, 3589 (1998) N_2O
[4] H. Tanaka, T. Ishikawa, T. Masai, T. Sagara, L. Boesten, M. Takekawa, Y. Itikawa and M. Kimura, Phys. Rev. A57, 1798 (1998) CO_2
[5] J. C. Gibson, M. A. Green, K. W. Trantham, S. J. Buckman, P. J. O. Teubner and M. J. Brunger, J. Phys. B32, 213 (1999) CO_2
[6] R. W. Crompton and M. A. Morrison, Aust. J. Phys. 46, 203 (1993) H_2
[7] P. K. Bhattacharyya, D. K. Syamal and B. C. Saha, Phys. Rev. A32, 854 (1985)
[8] A. Jain, Z. Phys. D21, 153 (1991) CH_4, SiH_4 H_2
[9] W. M. Hickam and D. Berg, J. Chem. Phys. 29, 547 (1958) SF_6, et al.
[10] M. Allan and S. F. Wong, Phys. Rev. Lett. 41, 1791 (1978) H_2
[11] D. M. Pearl, P. D. Burrow, I. I. Fabrikant and G. A. Gallup, J. Chem. Phys. 102, 2737 (1995) CH_3Cl
[12] W. Wang, L. G. Christophorou and J. Vergrugge, J. Chem. Phys. 109, 8304 (1998) CCl_2F_2
[13] L. G. Christophorou, 20th ICPIG, Pisa 3-13 (1991) review

2003. 12. 14.

Numbers of References

on Electron and Photon Collisions with Atoms and Molecules published in the 20th Century

Atoms (17)			Molecules (51)					
A + e,	A + hν			M + e,		M + hν,		
He 2	2170 *		2	H_2, D_2	2000	5	CH_4	780
Ne 10	1140 *			N_2	2240 ○			
Ar 18	1960 ○			O_2	1700		CF_4	390
Kr 36	1000			CO	1190		CCl_4	210
Xe 54	1180 ○			NO	880		CCl_2F_2	250
							CH_3Cl	90
Li 3	450			F_2	190 ○			
Na 11	800			Cl_2	360 ○		SiH_4	230
				Br_2	140 ○		SiF_4	140
K 19	370			I_2	240 ○		GeH_4	50
Rb 37	220							
Cs 55	370			HF	260	6	C_2H_4	370
				HCl	320		CH_3OH	350
O 8	390			HBr	200			
				HI	130	7	SF_6	920 ○
F 9	90							
Cl 17	130		3	CO_2	1240 ○			
				H_2O	1200 ○	8	C_2H_6	260
Cu 29	180						C_2F_6	150
Cd 48	210			O_3	480		Si_2H_6	70
Ba 56	340			N_2O	450			
				NO_2	350	9	C_3H_6	120
Hg 80	600			H_2S	270		C_2H_5OH	60
				SO_2	290			
				CS_2	260			
				OCS	280	11	C_3H_8	190
not final, but							C_3F_8	100
finished mostly			4	C_2H_2	390			
						12	C_4F_8	100
include electron				NH_3	500		C_6H_6	240
swarm papers				NF_3	110		C_6F_6	100
				BF_3	110			
include				BCl_3	90	60	C_{60}	300
review papers				PH_3	80			
				H_2CO	180		$M_r + M_v$	850

* He(Ne) + e only. Not include He(Ne) + hν papers.

○ The bibliography was published already.

Recent Issues of NIFS-DATA Series

NIFS-DATA-56 S. Born, N. Matsunami and H. Tawara,
A Simple Theoretical Approach to Determine Relative Ion Yield (RIY) in Glow Discharge Mass Spectrometry (GDMS): Jan. 2000

NIFS-DATA-57 T. Ono, T. Kawamura, T. Kenmotsu, Y. Yamamura,
Simulation Study on Retention and Reflection from Tungsten Carbide under High Fluence of Helium Ions: Aug. 2000

NIFS-DATA-58 J.G. Wang, M. Kato and T. Kato,
Spectra of Neutral Carbon for Plasma Diagnostics: Oct. 2000

NIFS-DATA-59 Yu. V. Ralchenko, R. K. Janev, T. Kato, D.V. Fursa, I. Bray and F.J. de Heer
Cross Section Database for Collision Processes of Helium Atom with Charged Particles.
I. Electron Impact Processes: Oct. 2000

NIFS-DATA-60 U.I. Safronova, C. Namba, W.R. Johnson, M.S. Safronova,
Relativistic Many-Body Calculations of Energies for n = 3 States in Aluminiumlike Ions: Jan. 2001

NIFS-DATA-61 U.I. Safronova, C. Namba, I. Murakami, W.R. Johnson and M.S. Safronova,
E1,E2, M1, and M2 Transitions in the Neon Isoelectronic Sequence: Jan. 2001

NIFS-DATA-62 R. K. Janev, Yu.V. Ralchenko, T. Kenmotsu,
Unified Analytic Formula for Physical Sputtering Yield at Normal Ion Incidence: Apr. 2001

NIFS-DATA-63 Y. Itikawa,
Bibliography on Electron Collisions with Molecules: Rotational and Vibrational Excitations, 1980-2000 Apr. 2001

NIFS-DATA-64 R.K. Janev, J.G. Wang and T.Kato,
Cross Sections and Rate Coefficients for Charge Exchange Reactions of Protons with Hydrocarbon Molecules: May 2001

NIFS-DATA-65 T. Kenmotsu, Y. Yamamura, T. Ono and T. Kawamura,
A New Formula of the Energy Spectrum of Sputtered Atoms from a Target Material Bombarded with Light Ions at Normal Incidence: May 2001

NIFS-DATA-66 I. Murakami, U. I. Safronova and T. Kato,
Dielectronic Recombination Rate Coefficients to Excited States of Be-like Oxygen: May 2001

NIFS-DATA-67 N. Matsunami, E. Hatanaka, J. Kondoh, H. Hosaka, K. Tsumori, H. Sakaue and H. Tawara,
Secondary Charged Particle Emission from Proton Conductive Oxides by Ion Impact; July 2001

NIFS-DATA-68 R.K. Janev, J.G. Wang, I. Murakami and T. Kato,
Cross Sections and Rate Coefficients for Electron-Impact Ionization of Hydrocarbon Molecules: Oct. 2001

NIFS-DATA-69 S. Zou, T. Kato, I. Murakami,
Charge Exchange Recombination Spectroscopy of Li III Ions for Fusion Plasma Diagnostics: Oct. 2001

NIFS-DATA-70 I. Murakami, T. Kato, A. Igarashi, M. Imai, Y. Itikawa, D. Kato, M. Kimura, T. Kusakabe, K. Moribayashi, T. Morishita, K. Motohashi, L. Pichl
AMDIS and CHART update (1): Oct. 2002

NIFS-DATA-71 S. Zou, L. Pichl, M. Kimura and T. Kato
Total, Partial and Differential Ionization Cross Sections in Proton-hydrogen Collisions at Low Energy: Jan. 2003

NIFS-DATA-72 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Argon –: Jan. 2003

NIFS-DATA-73 J. Horacek, K. Houfek, M. Cizek, I. Murakami and T. Kato
Rate Coefficients for Low-Energy Electron Dissociative Attachment to Molecular Hydrogen: Feb. 2003

NIFS-DATA-74 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Carbon Dioxide –: Apr. 2003

NIFS-DATA-75 X. Ma, H.P. Liu, Z.H. Yang, Y.D. Wang, X.M. Chen, Z.Y. Liu, I. Murakami and C. Namba
Cross-section Data Measured at Low Impact Energies for Ar^{q+} Ions on Argon and Neon Targets. Apr. 2003

NIFS-DATA-76 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Sulphur Hexafluoride –; May 2003

NIFS-DATA-77 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Nitrogen Molecule – ; June 2003

NIFS-DATA-78 A. Iwamae, T. Fujimoto, H. Zhang, D. P. Kilcrease, G. Csanak and K.A. Berrington
Population Alignment Collisional Radiative Model for Helium-like Carbon:Polarization of Emission Lines and Anisotropy of the Electron Velocity Distribution Function in Plasmas: Aug. 2003

NIFS-DATA-79 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Xenon – ; Sep. 2003

NIFS-DATA-80 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Halogen Molecules – ; Dec. 2003

NIFS-DATA-81 M. Hayashi
Bibliography of Electron and Photon Cross Sections with Atoms and Molecules Published in the 20th Century – Water vapour – : Dec. 2003