§7. Development of Tritium Cleanup System for LHD

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We are planning to carry out DD experiments using LHD in the near future. The device will generate a small amount of tritium, at most 430GBq/year, as a reaction product. In order to remove it from the exhaust gas, we are developing a tritium cleanup system based on a new concept. As was reported in the last annual report and the proceedings of an international conference¹⁾, we have already done a conceptual design of the new system. According to the design, elemental tritium in the exhaust gas of LHD is directly fixed to hydrogen absorbing alloys. Impurities, such as methane and water vapor will be decomposed by nonvolatile getter materials. Hydrogen isotopes including tritium will become elemental form and will be absorbed by alloys. The result of the conceptual design

revealed that the outlet concentrations are 0.0kBq/m³ for water vapor tritium and 0.3kBq/m³ for elemental tritium, in contrast to the outlet concentrations, according to the wet system previously designed, of 64.9kBq/m³ for water vapor tritium and 1.4kBq/m³ for elemental tritium, so that it is obvious that the dry system is far more advantageous from the viewpoint of safety.

Production of a laboratory scale cleanup system is in progress. Last year we have assembled a part of the system. As is shown in Fig.1, the experimental system is composed of a vacuum chamber and a getter vessel. Using this system, we have begun performance tests of nonvolatile getter materials. Because, there is few report regarding decomposing getter materials and to design the cleanup system in detail, these data of the materials are very important.

References
1) Sakuma, Y. et al, Preliminary Design of Tritium Cleanup System for the Large Helical Device, Proc. Tritium Material Interaction (1996) 110.

Fig. 1. Flow Chart of the Laboratory Scale Cleanup System