Oxidation of Hydrogen over Honeycomb Catalysts under the presence of Water Vapor

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The air cleanup system is one of the important installations in the fusion power plant. When tritium leaks to working ereas, the last barrier is the wall of the building. Thus, it is necessary to remove tritium immediately for the prevention of its leakage to the environment. Tritium released is usually oxidized with catalysts, and them tritiated water vapor is collected with adsorbents. In this system, it is required to process a large amount of air for the rapid removeal of tritium in the building after the accident. Processing of a large amount of air leads to a greater pressure loss, which this neccessitates greater power of pumps and blowers. The pressure loss can be reduced by replacing the packed bed of catalysts with the honeycomb catalysts. We are now in the proccess of investing applicability of honeycomb catalist and adsorbent to the ditritiation system.

It is known that the oxidation performance of catalysts decreases when water vapor is coexistent in the processed air. Thus, it is thought that water vapor influences the oxidation performance of the catalyst of the ditritiation system since water vapor is inevitably present in the air. In this study, the authors performed oxidation experiments of hydrogen in humid gases over honeycomb-type catalysts, and investigated the influence of water vapor on the rate of catalytic oxidation. The experiments were conducted by changing the amount of water vapor in the process gas. The result of the experiments suggests that the rate of catalytic oxidation decreases with increasing water vapor content and its influence varies depending on the temperature. It is also indicated the rate of oxidation substantially decreases at the lower temperatures even in the cace where water vapor contents is considerably lower. Therefore, it is necessary to consider some countermeasures to decrease in the catalytic activity by coexistent water vapor.