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P3.233 Generation of tritiated methane by reaction between tritium and methane on catalyst

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Detritiation system (DS) is the key system to ensure safety of a fusion reactor. The DS must be designed to make sure of detritiation when an extraordinary event such as fire happens. Assuming that an accidental release of tritium and production of hydrocarbons by combustion of cables in case of fire occurs simultaneously, tritiated methane will be generated by the reaction between tritium and methane in a catalytic reactor of DS as a side reaction. If a large amount of tritiated methane was generated, a catalytic reactor kept the temperature at 773K for combustion of the tritiated methane was needed. However, a catalytic reactor at 773K has a risk to induce tritium permeation through the walls of the catalytic reactor and fire caused by temperature runaway of the catalytic reactor by heat of reaction of hydrocarbons combustion. In the present study, we investigated experimentally how to control generation of tritiated methane in a catalytic reactor for avoiding the risks. Our experimental investigation indicated that a generation rate of tritiated methane was sufficiently small, so that DS for extraordinary situation did not need a catalytic reactor at 773K for combustion of the tritiated methane. Details will be reported at the conference and the paper.

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