

EFFECTS OF PROCESS CONDITIONS ON THE PARTIAL PRESSURE CURVE OF HYDROGEN (INCLUDING TRITIUM)

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We previously investigated the tritium cleanup system installed in the decomposition-processing vessel we developed. The system removed tritium only in the form of hydrogen molecules. To examine the performance of the system, we used computer-based simulation and observed the change of partial pressure of hydrogen, including tritium, during processing by the tritium cleanup system. For processing gas consisting of hydrogen (partly tritium), methane (partly tritiated methane), and helium, the partial pressure curve of hydrogen clearly bent at two points. The first bend corresponded to the completion of one cycle of processing. The second bend corresponded to the time when helium became the dominant component in the remaining gas.

These observations inspired the present study, in which we examined the effects of process conditions on the partial pressure curve of hydrogen and its bend points. We found that both bends occurred later and the interval between them lengthened as the initial volume of gas and the volume of the buffer tank increased. And as the proportion of methane increased, the second bend also occurred later and the interval also lengthened, but the first bend did not change. The number of bends on the partial pressure curve of hydrogen may correspond to the number of gas components carrying tritium, and the change in locations of these bends could be used as an index for estimating the behavior of cleanup systems to process gases.