# HTO Contamination on Polymeric Materials

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Polymeric materials are used as gaskets, insulators, gloves and casing panels in the solid-polymer-electrolyte (SPE) tritiated water electrolyzer system of the Tritium Process Laboratory. We have tested a number of polymeric materials to evaluate the contamination by tritiated water and the change in contamination by irradiation. Part of the samples was irradiated with gamma-rays or electron beams up to the integrated dose of 1500 kGy. HTO contamination on polymeric materials both being exposed to HTO vapor and being immersed in HTO water was considered in the test. The polymeric samples were exposed to 740-1110Bq/cm$^3$ of HTO vapor with a 1kPa of $H_2O$ pressure at a temperature ranged 288 to 298K for a given period up to 70 weeks. The other polymeric samples were immersed in 70000 Bq/cm$^3$ of HTO water at a temperature ranged 288 to 298K for a given period up to 52 weeks. Static leaching tests were carried out for every sample immersed in distilled water, and the amount of leached HTO was evaluated as a function of leaching time. The exposed time affected negligibly the total amount of leached HTO from the rubber samples exposed to HTO vapor. The immersed time in contrast affected strongly the total amount of leached HTO from the rubber samples. The total amount of leached HTO from radiation-crosslinkable butyl rubber and radiation-degradable perfluoro Karlez® rubber immersed in HTO was considerably increased as the integrated dose was increased. However, we found that the total amount of leached HTO from the irradiated rubber can maintain the similar amount from unirradiated by setting the hydrogen/fluoride ratio of the polymeric component to the suitable number.