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Evaluation of EPDM and Silicone rubber compounds for application in Reprocessing Plant

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Many elastomers seals are used in the nuclear industry. Among these elastomers, ethylene propylene diene monomer (EPDM) and silicone rubbers have excellent radiation stability. Both the rubbers can be used for gasket and O-ring application in Reprocessing Plants. To study the suitability of these rubbers for application in the plant, EPDM rubber compound and silicone rubber compounds were prepared and test slabs were fabricated. These rubber compounds were tested for their mechanical properties. Two test slabs of EPDM rubber compound were taken. First test slab was irradiated in gamma chamber followed by exposure to nitric acid (6 M) and the second test slab was exposed to nitric acid followed by irradiation in gamma chamber. Samples were taken out of gamma chamber at regular intervals of time and mechanical properties were tested. Similar procedure was adopted for silicone rubber compound also. The mechanical properties of both the rubber compounds were found to degrade with radiation. Elongation at break of the EPDM rubber compound decreased to 50% of its initial value at a dose of 1 MGy. For silicone rubber, an identical decrease was found even at a dose of 0.1 MGy. When silicone rubber compound was exposed only to radiation, elongation at break decreased to 50 % of its initial value at a dose of 1 MGy. Hence, for seal application in radiation atmosphere alone, silicone rubber can be used up to a dose of 1 MGy and for seal application in combined radiation and acid atmosphere, EPDM rubber can be used up to a dose of 1 MGy.

Country/Int. organization

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