

Adsorption Studies at the Laboratory Scale

The reduction of noble gas emissions from large radiopharmaceutical production facilities is a key issue in increasing the sensitivity of the International Noble Gas Monitoring Network. To study the possibility of increasing the efficiency of the current xenon traps in place at the Institute for Radioelements (IRE) a laboratory set-up for stable xenon was realized at SCK•CEN to investigate different adsorption materials under different conditions. The set-up consists of a gas management system and adsorption bed that simulates in the best possible way the industrial conditions at IRE. Detection of the breakthrough of xenon is performed by the principle of measuring the difference in thermal conductivity between a pure helium flow (reference) and the helium-xenon flow. The set-up is calibrated for a wide range of xenon concentrations (< 1000 ppm). Two adsorption materials were studied: a commonly used activated carbon (Norit RKJ 1) and a new silver zeolite material (Ag-ETS-10). The results obtained for the silver zeolite are very promising. The adsorption capacity is very high at room temperature and the efficiency for the xenon retention remains constant even at low xenon concentrations. Several regeneration tests have been performed, showing no decrease of the xenon adsorption capacity.

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