

SORPTION/DESORPTION STUDIES OF SELENIUM ON FRACTURE-FILLING
MINERALS UNDER AEROBIC. AND ANAEROBIC CONDITIONS

by

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ABSTRACT

The long-lived radioactive selenium isotope, ^{79}Se ($t_{1/2} = 6.5 \times 10^4$ a), could have an adverse impact on the environment and is, therefore, of concern in the assessment of the environmental effects of a high-level radioactive waste disposal vault. Under the conditions used in this study the most probable selenium species in solution are the selenite species HSeO_3 and $\text{Se}(\text{O})_2$; (under oxidizing conditions) and the selenide HSe^- , (under reducing conditions). Relatively insoluble elemental Se, $\text{Se}(0)$, may exist under certain Eh-pH conditions that were achieved in these experiments. This study was designed to determine the effect of the ionic strength and three ranges of redox potential on the removal of selenium in solution in contact with fracture-filling minerals commonly occurring in granitic rock. Three reference rock types - granite, gabbro and basalt - were included in this study for comparison with published data.

Phyllosilicates that have exchangeable OH^- ions, and the iron minerals goethite and hematite, were found to remove significant amounts of selenium from the tracer solution. The effect of hydrazine on the removal of selenium from solution requires further investigation. Increased ionic strength generally resulted in lower sorption but with some notable exceptions.

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