

## Migration of $\text{SeO}_4^{2-}$ in granite under aerobic and anaerobic conditions

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Selenium ( $^{79}\text{Se}$ ,  $T_{1/2} = 3.77 \cdot 10^5$  yrs) belongs among long-lived fission products, being present in spent nuclear fuel (SNF). Due to the long lifetime of the radioisotope, the complex chemistry, its high mobility and mainly anionic character, Se contributes significantly to the risk associated with the storage of radioactive waste in deep underground repositories in geological environment. The retention of selenium in the environment depends namely on its actual oxidation state. Selenium can occur in –II, 0, IV and VI valence states. Sorption decreases with increasing oxidation number. Therefore, selenate ( $\text{Se}^{\text{VI}}\text{O}_4^{2-}$ ) is namely considered as highly mobile, non-sorbing selenium specie in comparison with other species.

The presented experiments are focused on the study of selenate sorption and diffusion within granitic rock from the Grimsel test site (GTS). The results will complement in-situ diffusion experiment in GTS, performed within the international project LTD III (Long Term Diffusion Phase III).

The migration behavior of selenate was studied by sorption and diffusion experiments under anaerobic conditions in glove box in order to simulate conditions during in-situ experiment in GTS. The sorption distribution coefficients were determined by static batch method with crushed granitic material as a solid phase (S/L ratio = 1:10;  $c(\text{Se}) = 10^{-5}$  mol/l). The diffusion coefficients were determined using through diffusion method on granitic discs ( $c(\text{Se}) = 10^{-3}$  mol/l). The experimental set-up was unique due to fully laboratory anaerobic conditions in the glove box.

The results of experiments confirmed the non-sorbing, conservative behavior of selenate. Comparison of results with selenate sorption data obtained on Czech and Swedish granitic shows similar behavior of selenate on studied crystalline rocks irrespective to redox conditions.

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