



Contribution ID: 327

Type: Poster

Migration parameter studies of Czech granitic rocks determined by electromigration methods

Thursday, 15 May 2014 17:30 (1h 15m)

In several concepts of deep geological repository (DGR) development granites are considered as potential host rocks (Sweden, Finland, Czech Republic). Safety calculations, evaluating safety functions of DGR engineered and natural barriers, require information about radionuclide migration in fractured rock, both by advection and by diffusion in rock matrix. These two processes are the most important for radionuclide activity decrease. Radionuclide diffusion into rock matrix is namely studied in laboratory, nevertheless also in-situ experiments are performed (e.g., Long term diffusion project, Grimsel URL, Switzerland). However, due to the diffusion experiments velocity, such studies usually take rather long time (months or even years). The through electromigration method (TEM) can be used for diffusion parameter studies, especially due to speeding up the experimental work in comparison with standard through diffusion methods. In TEM experiments both formation factor (Ff) and effective diffusion coefficient (De) values could be obtained.

The invented experimental cell for TEM experiments, based on the work of M. Löfgren (Löfgren, 2004) and further improved in ÚJV laboratories (Večerník, Brůha, 2012), was used. This experimental cell enables to use samples with diameter of 40–50 mm and lengths up to 100 mm. In this study, comparison of migration parameters on different Czech granitic rocks were performed not only for samples from different sites but also compared the archive and fresh drill core samples. Iodide anion as a tracer in sodium chloride background electrolyte was used in experiments. Samples from the same sites were also used in through diffusion studies with tritium as a tracer.

Based on obtained results, it can be seen, that the diffusion of iodide anion, as a tracer in electromigration experiments, is affected by anion exclusion in most samples. Migration of negatively charged anionic species in pore space is slower than neutral non-sorbing ^3H . There are also noticeable relations between formation factor values obtained by TEM experiments and others parameters describing the rock sample properties (e.g. diffusivity, hydraulic conductivity).

Acknowledgement:

The activities leading to these results were financially supported by Ministry of Trade and Industry of the Czech Republic projects FR-TI1/362 and FR-TI1/367.

References:

- Löfgren M. (2004): Doctoral Thesis, Royal Institute of Technology, Stockholm, Sweden.
Večerník P., Brůha P. (2012): Funkční vzorek FV TIP 2402/2012/7 (in Czech), ÚJV Řež, a. s., Czech Republic.

Primary author: Mr VEČERNÍK, Petr (ÚJV Řež, a. s.)

Co-authors: Ms HOFMANOVÁ, Eva (ÚJV Řež, a. s.); Mr NAJSER, Jan (ARCADIS CZ a.s.); Dr HAVLOVÁ, Václava (ÚJV Řež, a. s.)

Presenter: Mr VEČERNÍK, Petr (ÚJV Řež, a. s.)

Session Classification: Poster Session - Chemistry of Nuclear Fuel Cycle / 1st ASGARD International Workshop

Track Classification: Chemistry of Nuclear Fuel Cycle / 1st ASGARD International Workshop