Investigation of the diffusion of U(VI) and Am(III) through Opalinus Clay with AMS down to ultra-trace levels

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Clay rocks, such as Opalinus Clay (OPA), are considered as potential host rocks for the final disposal of high-level nuclear waste. In the scenario of ground water ingress into the emplacement chambers, possibly released actinides would be transported through the clay mainly by diffusion. The diffusion of U through OPA has not been investigated below concentrations of ≈ 5 × 1019 atoms per m³ of clay. In the present study, diffusion profiles of U(VI) and Am(III) were determined with AMS at unprecedented ultra-trace levels down to ≈ 5 × 1014 atoms/m³, allowing for the exploration of potential differences in the diffusion behavior of U(VI) and Am(III) at ultra-trace concentrations compared to higher concentrations.