

Determining diffusive parameters using out-diffusion experiment with consideration of sampling effect

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To know the details of diffusive properties of geo-materials is vital in geological disposal engineering projects. Out-diffusion experiment involves the process of heavy metal when diffuses out of geometries. It has simple structure and easy-operational experiment procedure. A theoretical solution considering the adsorption effect and sampling effect was developed. By applying theoretical analyses, we can estimate and decrease the errors induced by sampling. Sensitive analyses were also conducted to estimate a reasonable sampling time range and frequency. With the assist of theoretical analyses, a proper experiment can be designed. In this study, we assumed that heavy metal is linearly adsorpted on the surface of geo-material and linearly desorpted into the porous solution. We tested clay samples to get the effective diffusion-coefficient and capacity factor and examined the effect of sampling. As the linearly adsorption assumption may not be sufficient, especially to describe heavy-metals which easily adsorpted, we also try to discuss the effect of the heavy metal adoption effect to the diffusive process in these experiments.

Keywords: mass transport, diffusion, out-diffusion experiment, contaminants, heavy metal