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Effect of Carbonate on Lanthanides Migration Behavior in Compacted Bentonite

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The apparent diffusion coefficients of La, Nd, Eu, Dy, Er and Lu in compacted bentonites were investigated in various bicarbonate concentration. The apparent diffusion coefficients of lanthanides tended to decrease with increase of dry density. In the lower bicarbonate conditions than 0.25 M lanthanum had the largest diffusion coefficient of ca. 10^{-13} m²/s at 1.0 Mg/m³ and diffusion coefficient was small as atomic number becomes big. On the other hand in the higher bicarbonate conditions than 0.25 M Lutetium had the largest diffusion coefficient and diffusion coefficient was small as atomic number becomes small. Especially Lanthanum and Neodymium had smaller diffusion coefficient than 10^{-14} m²/s even at 1.0 Mg/m³. Diffusion coefficient of Europium was around 10^{-13} m²/s at 1.0 Mg/m³ and less influence of bicarbonate concentration. Diffusion coefficient of Lutetium increased from 2×10^{-14} to 10^{-12} m²/s with bicarbonate concentration up to 1.0 M.

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