SORPTION OF ANIONS AND FORMATION OF SECONDARY MINERALS AT HYPERALKALINE SPRING IN OMAN

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In Japanese transuranic (TRU) waste disposal facilities, ^{129}I is the most important key nuclide for the long-term safety assessment. Kd values of I- ion to natural minerals are therefore important factor for the assessment. At the disposal facilites, however, degradation of the cement materials in the repositories can produce a high pH pore fluid and affect to anion sorption behavior. Therefore, an understanding for behavior of anions such as I- at the hyperalkaline conditions should be necessary in the assessment.

Natural hyperalkaline spring water ($pH > 11$) has known to originate from the partly serpentinized peridotite. Springs emanated from Oman ophiolite is one of famous hyperalkaline springs. The spring water is characteristically hyperalkaline, reducing, low-Mg, Si and HCO_3^-, and high-Ca, while the surface water is moderately alkaline, oxidizing, high-Mg and HCO_3^-. Therefore, mineral formation and anion uptake at the springs are excellent analogue for interaction between cement pore fluid and natural Mg- HCO_3^- groundwater. In this context, mineral formation and anion uptake at the hyperalkaline springs in Oman were extensively investigated.

Water and precipitate samples were collected at the different distance from the spring vent to identify the effect of mixing ratios between spring and surface water on mineral composition. All samples including water and precipitates were analyzed iodine concentration by ICP-MS. The mineral composition of each precipitate was identified by XRD and XRF.

In all precipitates, aragonite was observed. In some samples, calcite, Mg-Al hydrotalcite-like compounds (HTlc) and brucite were also included. HTlc was observed at the springs with relatively high-Al concentration and brucite was the opposite. Calcite was observed only near the springs. At far from the springs, calcite formation was inhibited due to high-Mg fluid from surface water. During formation of the minerals at the mixing points, HCO_3^- in the surface water was fixed as carbonate minerals such as aragonite and calcite. $H_3SiO_4^-$ in the surface water was dominantly fixed into interlayers and surface of HTlc. Iodine in the springs and surface water was mainly fixed in aragonite. This result was consistent with the results from laboratory experiments reported by Kitano and Okumura (1973) for F, Cl and Br.