

Iodine uptake by calcium carbonate polymorphs

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Iodine has high radioactivity for long term in geological repository, which will be planned as transuranic(TRU) waste repository. Therefore, the immobilization of iodine must be investigated.

Naturally-occurring calcium carbonate, discovered in hyperalkaline spring (pH<12) in Oman, has high distribution coefficient of iodine, especially aragonite. The uptake of iodine on calcium carbonate is effective, because it is possible to form calcium carbonate. Therefore iodine interaction with calcium carbonate must be investigated.

In this study, I conducted some experiments, coprecipitation, adsorption, and desorption, to understand incorporation of iodide and iodate on calcium carbonate, calcite and aragonite.

Coprecipitation was conducted by synthesis of calcium carbonate in the presence of iodide or iodate ion in water. Adsorption was also conducted by synthesis of calcium carbonate, but iodide or iodate ion is not in water. Synthesis calcium carbonate put into iodide or iodate solution (solid/liquid = 400mg/40mL). Iodide and iodate concentrations were 50, 100, 500, 1000, 5000, 10000 ppm respectively both experiments. Then, this solution was open air and stirred with a magnetic stirrer at 25°C for about 24h.

The phase of calcium carbonate was effected by iodate not iodide, and then vaterite and monohydrocalcite were generated instead of calcite and aragonite, respectively. Aragonite has relatively high distribution coefficient than calcite in the experiments of adsorption and coprecipitation in laboratory as the field in Oman. The coprecipitation process of iodide by aragonite was dominant than the adsorption process.

Keywords: calcium carbonate, polymorphs, iodine, adsorption, coprecipitation, natural analogue