

Desorption behavior of intrinsic cesium in smectite: Effect of aggregation on the cesium fixation in clay particles

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The radiocesium from the Fukushima Daiichi nuclear power plant accident is retained at the surface soils around the power plant. The expandable fine grained clay minerals such as smectite and vermiculate are the candidates for the host phases of radiocesium. The sorption mechanism of cesium in the clay minerals is expected to be cation exchange reaction in the interlayer of the clay minerals. Therefore, the retained Cs must be desorbed to the solutions in the presence of high concentrations of major cations. On the other hand, some natural observations after the Fukushima accident have shown that the radiocesium in the contaminated soils or sediments is merely desorbed to the water even in saline solutions (e.g. Aoi et al 2013 JPGU meeting). The purpose of the study is to reproduce the unexpected fixation of cesium in clay minerals from the laboratory experiment by using standard well characterized smectite (Kunipia-F). The desorption behavior of intrinsic trace Cs (10 nmol/g from LA-ICP-MS) in smectite by major cations were systematically examined. The results of the present study showed that the aggregation of smectite by the presence of the divalent cations or high concentration of monovalent cations lead to the fixation of cesium in the clay aggregates.

Keywords: cesium, smectite, desorption, fixation, aggregation