

Research Note

## The Characteristics of Cesium-137 Extraction from Radioactively Contaminated Soil in Fukushima Using Quaternary Ammonium Salts and Microwave

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● **Summary** ● In the interim storage facility of Fukushima, volume reduction and recycling technologies about the radioactively contaminated soil are currently in development. In this study, we conducted  $^{137}\text{Cs}$  extraction tests from radioactively contaminated soil (15677 Bq/kg-dry) in Fukushima under various conditions: different structures of quaternary ammonium salts (intercalation into layered silicates) and irradiating microwave (promotion of molecular motion). The extraction amount of  $^{137}\text{Cs}$  was 889 Bq/kg-dry with the combination of Didodecyldimethylammonium Chloride and ammonium ion. Cs extraction amounts with the quaternary ammonium salts were higher than that with ammonium ion alone or hydrochloric acid alone. This reason is that the quaternary ammonium salts were intercalated into the interlayers and expanded the interlayer distance. The amount of cations eluted increased with that of  $^{137}\text{Cs}$  extracted, and there is a high correlation between the two. It was clarified that the quaternary ammonium salts having long and thin structures promotes the extraction of  $^{137}\text{Cs}$  from the radioactively contaminated soil due to the absence of steric hindrance. In the case of using the quaternary ammonium salts whose pH is 6 as a solvent, we confirmed that the soil mineral structure did not change before and after extraction test. The extracted amount of  $^{137}\text{Cs}$  (1262 Bq/kg-dry) from the soil with microwave irradiation for 10 minutes is higher than that of the shaking test. In addition, the combined use of the microwaves can shorten the extraction time to 1/2160 (30 sec/ 64800 sec).

**Key Words:** quaternary ammonium salt, microwave, cesium-137, extraction test, Fukushima

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