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Experimental Study on Thermal Chemical Separation of Cesium by Melting from Municipal Solid Waste Incineration Ash, Sewage Sludge Incineration Ash and Soil

Yosuke KAMATA*, Makoto SATO, Fumiaki KAMBAYASHI, and Seiichi ABE

KUBOTA Corporation   Water & Environment R & D (1-1 Hama 1, Amagasaki, Hyogo 661-8567 Japan)

Summary

Due to the occurrence of the Great East Japan Earthquake, large amount of radioactive cesium (Cs) diffused around the Fukushima area, and the treatment of solids to which Cs was transferred has become a pressing issue. Melting technology can volatilize alkali metals and heavy metals with the addition of chlorides or combustibles by reduction or chlorination reaction and separate those metals into molten fly ash. Because Cs is also a kind of alkali metal element, it is thought to be capable of separation by a similar mechanism. So, in this study, for the purpose of investigating the volatilization characteristics of Cs, laboratory melting test was performed for municipal waste incineration ash, sewage sludge incineration ash and soil doped with non-radioactive Cs. When $CaCl_2$ was added as a chloride, volatilization of alkali metals and heavy metals was promoted for all kinds of solids, so $CaCl_2$ was found to have Cs volatilization promoting effect. Alkali metal element which had larger atomic number got higher volatilization rate. The higher the basicity of molten slag was, the higher volatilization rate was. When activated carbon was added as a combustible, volatilization of heavy metals was promoted, but that of alkali metals was not promoted. However, by the co-addition with $CaCl_2$, activated carbon expressed volatilization promoting effect also for the alkali metals, and Cs volatilization rate of more than 99% was obtained. Further, when PVC waste was added as a volatilization promoter, because it contained both chlorides and combustibles, volatilization of alkali metals and heavy metals was promoted to the same extent as in the case of $CaCl_2$ addition, so PVC waste was found to have sufficient Cs volatilization promoting effect.

Key Words: Cesium, Melting, Separation, Municipal solid waste incineration ash, Sewage sludge incineration ash