

Research Note

## Immobilization of Liquid Waste Containing Cesium Using Alkali Activated Aluminosilicate Materials

KOIDE Minami, SHIOTA Kenji, FUJIMORI Takashi, OSHITA Kazuyuki, TAKAOKA Masaki\*

● **Summary** ● Alkali-activated aluminosilicate materials (AAM) were prepared using pure materials at the reagent level to try to clear the fundamental mechanism of immobilization of Cs in AAM, and the reaction of the direct stabilization of Cs in solution. Sodium aluminate, sodium silicate solution, and CsCl solution were used as raw materials and 30 g of AAM were made under the mixing ratio of 9 ( $H_2O/Na_2O$ ). The Japanese leaching test (JLT-46) were conducted, and the leaching ratio of Cs was calculated. The crystal structures of products were analyzed by powder X-ray diffraction. As a result, the leaching ratio of Cs in the basic condition (Si/Al = 1.8, 12 days curing, 15% concentration of Cs solution) was 6.8%. In the conditions where the Si/Al ratio was varied from the basic condition, the leaching ratio became lower as the Si/Al ratio decreased. When the Si/Al ratio was 1.5, the leaching ratio reached 5.1%. This result is consistent with the previous studies that the smaller the Si/Al ratio, the better the immobilization of Cs due to the amorphous (geopolymer) structure. It is also found that the longer the curing time, the lower the leaching ratio, which was 1.7% under the 60-day curing condition. In addition, leaching ratio was influenced with Cs concentration in the solution, the lowest leaching ratio was 4.0% at the sample with a 10% concentration of Cs solution. From the XRD analysis, the insolubility of Cs was improved by the formation of zeolites containing Cs in the structure such as Zeolite Rho and Zeolite D, but if the concentration of Cs in the samples exceeds that can be incorporated into the structure of these zeolite, the excess Cs may leach out, resulting in a high leaching ratio.

**Key Words:** alkali activated aluminosilicate solids, liquid waste containing cesium, leaching test, XRD, zeolite

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\*Corresponding author Address: Department of Environmental Engineering, Graduate School of Engineering, Kyoto University,

*Kyoto-daigaku-katsura, Nishikyo-ku, Kyoto 615-8540, Japan*

E-mail: takaoka.masaki.4w@kyoto-u.ac.jp