# Leaching behavior of iodine anion from metakaolinite-sodium-silicate-based geopolymer

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$^{129}I$ is one of the most important fission products for safety assessment of radioactive waste repositories. This is due to its long half-life ($1.57 \times 10^7$ y) and high mobility in the environment where iodine is present mainly as anion ($I^-$, $IO_3^-$) with very low adsorptivity on most of minerals. It is therefore important to ensure iodine confinement in waste forms. This study investigated basic characteristics of a cement-alternative material candidate, "geopolymer (GP)", on iodine confinement under two conditions. One is that aqueous solutions of $I^-$ and $IO_3^-$ were solidified in GP, and the other is that layered double hydroxide (LDH) particles adsorbing $I^-$ and $IO_3^-$ were solidified in GP.

First, metakaolinite-sodium silicate-based GP samples were prepared by mixing an iodine anion aqueous solution. In the static leaching test for the GP samples aged at 40 ºC, $I^-$ and $IO_3^-$ in the GP samples mostly leached into pure water. Fractions of $I^-$ and $IO_3^-$ leached from the GP samples aged at 60 ºC was about 20 %, suggesting that increase of solid density at higher aging temperature decreased leaching. $I^-$ and $IO_3^-$ were hardly adsorbed on powdered geopolymer. These results suggest that confinement of iodine anions by GP is not chemical but physical. Next, iodine anions were adsorbed on LDH and then the LDH was solidified in GP. Fraction of $IO_3^-$ leached from the GP sample aged at 60 ºC, about 20 %, was similar to the value for the first test. Effect of the use of LDH on iodine anion leaching from GP is discussed.