# Environmental impact of amino acids on the stability of $^{79}SeO_4^{2-}$ immobilized in layered double hydroxides

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$^{79}Se$ isotope as one of the radionuclides, which is produced by nuclear electricity in chemical forms of selenate($SeO_4^{2-}$) and/or selenite ($SeO_3^{2-}$) with a half-life time of $3.27\times10^5$ years. $^{79}Se$ oxyanions can be immobilized by layered double hydroxides (LDHs) for disposal underground, which are commonly anionic exchangers in cementitious materials. The natural accidents such as earthquakes or related phenomena can disturb the resulting vault and accelerate radionuclides wastes to leach into the soil and water environment. Amino acids are monomers of proteins which are originally from degraded substances of dead soil animals and microorganisms.

In the present work, different layered double hydroxides bearing $SeO_4^{2-}$ were prepared. Effects of several amino acids on the stability of $SeO_4^{2-}$ in LDHs was explored under alkaline conditions. Glycine, aspartic acid and cysteine have promoted the release of $SeO_4^{2-}$ from MgAl-LDH and ZnAl-LDH. Glycine, aspartic acid and cysteine also showed higher sorption amount than phenylalanine and tryptophan on MgAl-LDH and ZnAl-LDH. Especially, cysteine was much more highly sorbed on ZnAl-LDH. Therefore, under the alkaline geochemical environment, amino acids which have smaller molecular sizes and higher charge densities might cause the risk to release $^{79}SeO_4^{2-}$ from cement disposal sites and the second radionuclides contamination.