

Interaction of strontium and its geochemical companion elements with eco-compliant mixed chelator and impact on the corresponding dissolution from the soil

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Ternary complexation of strontium and its geochemical companions with a mixed chelator system containing two eco-compliant chelators (GLDA, 2-[bis(carboxymethyl)amino]pentanedioic acid; HIDS, 2-(1,2-dicarboxyethylamino)-3-hydroxy-butanedioic acid) was studied. The equilibrium constants of the ternary complexes (ML_{mix} ; $M = Sr^{2+}, Mg^{2+}, Ca^{2+}$, and Ba^{2+} ; $L_{mix} = GLDA:HIDS, 1:1$) were derived from the potentiometric measurement results (ionic strength, 0.10 mol L⁻¹; temperature, 25±0.1 °C). The overall complexation between the elements and L_{mix} occurred in the following order: $Ca^{2+} > Mg^{2+} > Sr^{2+} > Ba^{2+}$, which has been interpreted using the atomic radii and solution-phase electronegativities of those elements. The impact of mixed chelators on the extraction rates of Sr^{2+} , Mg^{2+} , Ca^{2+} , and Ba^{2+} from NIST-certified Reference Material, Peruvian Soil (SRM 4355), was studied to correlate the corresponding dissolution efficiency vis-à-vis experimentally-derived complexation constants.