

Immobilization of iodine species in ettringite and the inorganic anions selective mechanism

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Since ettringite is one of main and active component in hydrated cement, this mineral is assumed to play a crucial role in toxic ions immobilization in hydration cement, especially for anionic species. Understanding the immobilization mechanisms of I^- and IO_3^- in ettringite is particularly important in hazardous and radioactive waste management. In this study, various concentrations of I^- and IO_3^- were coprecipitated with ettringite, showing contrast immobilization preference in ettringite. Iodine (I^-) is difficult to be incorporated in ettringite. In contrast, IO_3^- is easier to immobilize in ettringite through hydrogen bond and electrostatic force via anion exchange with SO_4^{2-} . Even through both I^- and IO_3^- are monovalent anions, the immobilization preference of these anions are different in ettringite. To figure out the immobilization mechanism of I^- and IO_3^- via ettringite, various anions with different ionic radius and valence were selected to co-precipitate with ettringite. Based on the different anions' properties and the structure of ettringite, the immobilization performance and mechanism of various anions via ettringite is finally proved to relate to the subjected anions' hydration ability and ionic radius. The highly hydrated anions with smaller ionic radius than sulfate could be easily incorporated in ettringite.

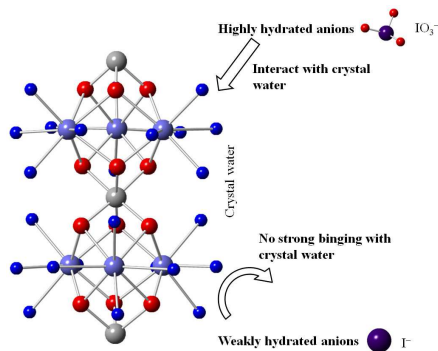


Fig. 1: Schematic illustrations for the I^- and IO_3^- immobilization mechanism of ettringite.