Effect of calcium sulfate dehydrate and external electric field on the sedimentation of fine insoluble particles

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ABSTRACT

Several reports show that calcium sulfate dehydrate can induce the sedimentation of insoluble substances in waste water. Silt, clay, and feldspar were selected in this study to settle with calcium sulfate dehydrate in water, and the parameters of particle interaction were calculated using the extended DLVO theory. Results indicate that the key to sedimentation is the electrostatic force between particles. Electrostatic force facilitates cosedimentation of calcium sulfate dehydrate with silt or clay, but not with feldspar, and their combination is weak. External electrical field can promote the sedimentation of silt, clay, and humic acid but not the cosedimentation of calcium sulfate dehydrate with insoluble substances. Moreover, an external electric field can facilitate the dispersion of clay and calcium sulfate dehydrate aggregates. Most of the electron charges after the cosedimentation of calcium sulfate dehydrate and silt was neutralized, but a certain amount of electron charge remained after the combination of clay and calcium sulfate dehydrate. Suspended particles in water continued to increase after the sedimentation of feldspar and calcium sulfate dehydrate, thereby implying that new nuclei must have been discharged by calcium sulfate dehydrate.

Keywords: Coagulation; Gypsum; Extended DLVO theory; Insoluble particle

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