

Crystallization process of mineral included in sea water

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Summary

Crystallization of calcium carbonate in sea water, i.e. biomineralization through seashells, is important problem in relation with the fixation of carbon dioxide in atmosphere. On the other hand, calcium carbonate is used as various materials in industries. In industries the control of the polymorphism is demanded because the properties of the calcium carbonate depend on the polymorphs. In nature the precise control is realized in the presence of various substances. In this work the crystallization of calcium carbonate was carried out by mixing the CaCl_2 and Na_2CO_3 solutions, and the dependence of the crystallization behavior of the polymorphs on the operational condition and the effect of additives on it are investigated. It appeared that at 298 K both calcite and vaterite crystals tend to crystallize, however, the vaterite content is larger at 0.2 mol/l than that at 0.05 mol/l. The calcite content linearly increased with time by the transformation from vaterite to calcite. After the reaction the calcium concentration decreased and attained to the stationary value. The stationary value of the calcium concentration was higher at 0.2 mol/l than at 0.05 mol/l. When magnesium chloride was used as an additive the stationary value of the calcium concentration got larger than that in the pure system in both cases of 0.2 and 0.05 mol/l. The effect of magnesium ion on the crystallization behavior of calcium carbonate appeared to depend on the feed concentration. At 323 K aragonite crystal tended to precipitate with calcite.