
Crystal Nucleation and Growth in Hydrolysing Iron(III) Chloride Solutions

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Abstract: 0.5 molal iron(III) chloride solutions were hydrolysed at room temperature by base additions in the range OH/Fe mole ratio 0– 2.75. After an ageing period the hydrolysed solutions were used to produce amorphous hydroxide gels from which crystalline products were grown at 65° C, at low pH or high pH. Examination of crystal composition and morphology and comparison with similarly treated nitrate solutions showed that the nucleation of hematite and goethite is inhibited in chloride containing solutions, which allow growth of small rod shaped β -FeOOH to predominate or occur exclusively in gels at pH 1– 2. The addition of seed crystals of hematite and goethite allows competitive growth of all three minerals. The transformations β -FeOOH \rightarrow α -Fe₂O₃ and β -FeOOH \rightarrow α -FeOOH at pH 1– 2 proceed by dissolution and reprecipitation and are promoted by adding seed crystals.

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