

INFLUENCE OF GUM ARABIC ON THE PRECIPITATION OF GOETHITE PARTICLES IN HIGHLY ALKALINE MEDIUM

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Abstract

Influence of gum arabic (GA) on the precipitation of goethite in highly alkaline medium was investigated using XRD, 57-Fe Mössbauer, FT-IR and FE-SEM. In absence of GA long goethite rods with nanosize width (~30nm), as a single phase, were produced. The lateral aggregation of two or more goethite rods is visible. A very strong effect of GA on the precipitation of goethite in a highly alkaline medium was noticed. At a prolonged time of autoclaving time the ferrihydrite-like phase transformed to goethite and hematite. The formation of hematite as the end product of this precipitation process was controlled by the dissolution/recrystallization mechanisms. The effect of GA addition to the precipitation system of $\text{Fe}(\text{ClO}_4)_3$ salt in highly alkaline medium was assigned to the surface interactions of GA with nuclei and crystallites (particles) formed during the kinetics investigated. It was assumed that a thick layer of GA biopolymers suppressed the formation of goethite from the ferrihydrite-like phase, which is generally a fast process in the absence of GA. In such a way the conditions for nucleation and crystal growth of hematite are created and with a prolonged autoclaving time the reactions were shifted to the formation of hematite as end-product.

Keywords: Goethite, XRD, 57-Fe Mössbauer, FTIR, FESEM

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