
Effect of Solution Conditions on the Proportion and Morphology of Goethite Formed from Ferrihydrite

R. M. Cornell and R. Giovanoli

Institute of Inorganic Chemistry, University of Berne Freiestrasse 3, CH-3000 Berne 9, Switzerland
Laboratory of Electron Microscopy, University of Berne Freiestrasse 3, CH-3000 Berne 9, Switzerland

Abstract: In alkaline media and at 70° C dilute suspensions of ferrihydrite transformed to goethite between pH 11.2 and 14 and to a mixture of goethite and hematite above and below this pH range. Increasing the temperature of the transformation or the concentration of the suspension reduced the pH range in which goethite alone formed. The morphology of goethite was chiefly a function of the pH of the system. Acicular crystals formed at all pHs and exclusively above pH 12.2. Epitaxial twinned crystals predominated at pHs below 11, and twins free from hematite formed at higher pHs. Increasing the suspension concentration, ionic strength, or temperature extended the pH range over which twinned crystals formed. Electron micrographs showed that twins formed mainly during the initial stage of the transformation, whereas acicular crystals formed over a longer period. Thus, the twins appeared to nucleate in the ferrihydrite; nucleation of acicular particles took place in solution.

Key Words: Ferrihydrite • Goethite • Hydroxyl • Iron • Morphology • Transmission electron microscopy

Clays and Clay Minerals; October 1985 v. 33; no. 5; p. 424-432; DOI: [10.1346/CCMN.1985.0330508](https://doi.org/10.1346/CCMN.1985.0330508)
© 1985, The Clay Minerals Society
Clay Minerals Society (www.clays.org)
