

Precipitation of Hematite from Dense β -FeOOH Suspensions with Ammonium Amidosulfonate Adding

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Precipitation of hematite (α -Fe₂O₃) from aqueous solutions has been the subject of many investigations. The hydrolysis of aqueous Fe(III)-salt solutions, microemulsion hydrolysis, sol-gel or crystallization from ferrihydrite were used in the synthesis of α -Fe₂O₃. Some precipitation methods are limited due to small yield and they can be only of academic interest. On the other hand, the crystallization from concentrated aqueous Fe(III)-salts solutions yields α -Fe₂O₃ in high quantities. However, in the latter case it is more difficult to control the size and shape of α -Fe₂O₃ particles.

In the present work we have investigated the precipitation of α -Fe₂O₃ particles from dense β -FeOOH suspensions in the presence of amidosulfonate anion under hydrothermal conditions at 160 °C. The samples were characterized by ⁵⁷Fe Mössbauer, FT-IR, XRD, FE-SEM and EDS. The crystallization kinetics of α -Fe₂O₃, the geometrical shape and size of α -Fe₂O₃ particles depended on the concentration of ammonium amidosulfonate added at the start of the precipitation process. The aggregation effect plays an important role in the formation of α -Fe₂O₃ particles. It was also concluded that the geometrical shape and size of both primary and secondary particles were impacted by the preferential adsorption of sulfonate groups under acidic conditions in a dense suspension.

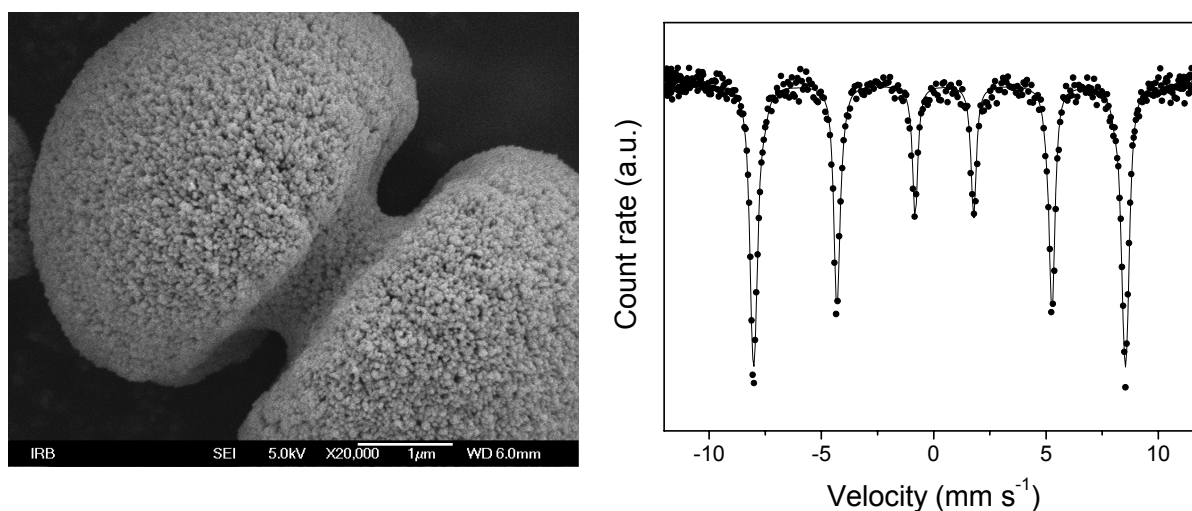


Fig. 1: FE-SEM image of selected sample shows a large α -Fe₂O₃ particle in the form of a double cupola consisting of much smaller particles (left) and the corresponding ⁵⁷Fe Mössbauer spectrum (right).