

Nanocomposites and nanomaterials

The process of obtaining nanosized magnetite particles in Fe⁰(St3)-H₂O-O₂ system

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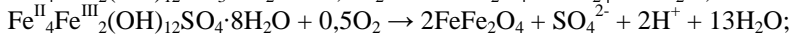
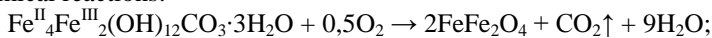
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In the course of constant science and technologies development a wide range of ferrimagnetic materials are synthesized. These materials are characterized by the variety of qualities and can be used in some industries. However, the development of economically advantageous methods of obtaining nanosized ferrites, including magnetite, with specified physicochemical qualities and their reproducibility is still vital nowadays.

According to scientific literature works [1], when the process of ferrite formation is done through intermediate compounds, in particular through layered double hydroxides of iron ([Fe(II)-Fe(III)] LDH), it facilitates the formation of smaller particles. Using this principle we have experimentally obtained magnetite particles having spheric shape in nanoscale range by means of gradual formation and transformation of carbonate containing (GR(CO₃²⁻)) and sulphate containing (GR(SO₄²⁻)) [Fe(II)-Fe(III)] LDH in Fe⁰(St3)-H₂O-O₂ system. The formation and transformation are done by rotational and corrosive method. It is shown that changing the concentration of initial phase of [Fe(II)-Fe(III)] LDH enables to control the size of obtained nanoparticles of final phase – magnetite.

The analysis of obtained kinetic regularities of iron-oxygen phase formation in indicated system testifies that these processes corresponds to the following chemical reactions:



and under some physicochemical conditions lead to the formation of magnetite monophase with narrow size distribution of nanoparticles.

1. Wang J., Deng T., Dai Y. Comparative study on the preparation procedures of cobalt ferrites by aqueous processing at ambient temperatures // J Alloys Compd.-2006.-**419**, N 1-2.-P. 155-161.