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Synthesis and characterization of magnetite/clay composites

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Nowadays, the receipt and investigation of different properties of magnetite/clay composites is one of the most rapidly developing areas of modern nanoscience. Magnetic materials known to mankind for a long period, and it is well known, what kind of the role played by the magnetic phenomena in human life. However, searching for data on the preparation and characteristics of magnetic composites showed that these composites is very little studied. In connection with this research objective was synthesis of magnetite/montmorillonite and magnetite/kaolinite composites and study their different properties.

In this work were synthesized magnetite/montmorillonite and magnetite/kaolinite composites of sequential treatment with salts of iron (II) and (III).

Magnetic properties and phase analysis of these composites were characterized by vibration sample magnetometry and XRD analysis. Vibration sample magnetometry results were showed themselves above the clay minerals have magnetic properties in native form, a fact confirmed by the absence of a magnetic hysteresis for them. The resulting composites are shown based on their magnetic properties and responsive to an applied magnetic field. Depending on the availability of iron oxide particles in the inter-packet space of montmorillonite and kaolinite minerals has the phenomenon of magnetic hysteresis. As the concentration of magnetite in the composites magnetization increases to a maximum value (27.6 emu/g and 31.6 emu/g), typical for magnetite/montmorillonite and magnetite/kaolinite composites, respectively. Magnetization values of the magnetite/montmorillonite and magnetite/kaolinite composites are comparable with the magnetization value of magnetite, which is associated with the state of nanoscale magnetite particles in the composite structure of clays.

Were synthesized magnetite/montmorillonite and magnetite/kaolinite composites, and with the inclusion of particles of magnetite in the structure of these minerals is proved by XRD and SEM. The results of these methods was also demonstrated the presence of magnetite phase in all the samples. Based on these results it is concluded that synthesizing magnetite/montmorillonite and magnetite/kaolinite composites can achieve high rates of their magnetic properties. The concentration of magnetite in the composites will be relatively is low.