Synthesis of PVP-coated nanoparticles based on ferrum oxide

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Magnetic nanoparticles, especial Fe_3O_4, are the most interesting particles among others because of their attractive properties and a wide range of application in various areas. But magnetic nanoparticles have huge surface energy and strong magnetic interactions between particles, which lead them to be more affected by uncontrollable aggregation in normal conditions of preparation. Stabilization could be achieved by electrostatic and steric repulsion. Particles coating by ionic compounds increase electrostatic repulsion, when two particles approach, that provide more effective stabilization.

Synthesis of nanoparticles based on ferrum oxide and stabilized by polyvinylpyrrolidone (PVP) is presented in this work. Investigation of structure and morphology of obtaining nanoparticles was carried out by a Hitachi TM3030 scanning electron microscope with Bruker XFlash-MINSVE microanalysis system at an acceleration voltage of 15 kV. The X-ray measurements were performed with a D8 ADVANCE diffractometer using X-ray tube radiation with Cu-anode and a graphite diffracted beam monochromator. The Mossbauer studies were carried out using MS1104Em spectrometer operating in constant acceleration mode with triangular mode of the source's Doppler speed referred to the absorber. The 57Co nuclei in the Rh matrix were used as source. The Mossbauer spectrometer was calibrated at room temperature using standard α-Fe absorber.