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Ferromagnetic nanopowder Iron-based materials, obtained by synthesis from iron citrate for medical applications

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In recent years composite magnetic nanopowder materials are used more and more in pharmaceuticals as a magnetic basis for a multiple medicaments. The apparent advantage of using such composite pharmaceutical systems is maintaining the proper level of therapeutic agents local concentration in the affected area along with a significant decrease in overall dosing and general reduction of by-effects on the human body.

The aim of present work is developing of nanodispersed ferromagnetic α-Fe powder with physical and chemical properties complex (phase composition, high specific surface, chemical stability in plasma and tissue fluid, active dissolution in gastric acid, chemical purity) required for use in medicines.

A methodic of iron content increase retaining its dispersion was developed by use of low-temperature decomposition/restoration in hydrogen of iron citrate salts $Fe_3\{C_3H_5(O)(COO)_3\}_2$ instead of oxalate salts.

For this purpose the processes of low-temperature iron synthesis from its citrate salt was studied. Iron citrate salt was decomposed and restored in temperature range 250-450°C with hydrogen in special technological conditions.

It was established, that using low-temperature (350-400 °C) method of nitrate salts decomposition/restoration in hydrogen atmosphere, the obtained ferromagnetic α-Fe nanopowder has specific surface area of 31,4 m^2/g and higher physico-chemical stability in blood plasma compared to standard α-Fe powders (iron powder 3.200.26 and Carbonyl Iron). High values of specific surface area and magnetic characteristics allow to recommend ferromagnetic α-Fe powder as magnetic bases for pharmaceutical composite materials.