UDC 621.762

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GENERATION OF FERROMAGNETICS NANOCOMPOSITES OF DIFFERENT SETTING

I. CHEMICAL SYNTHESIS OF NANOCOMPOSITES OF Fe-Co-Ni INDUSTRIAL SETTING

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There are experimentally worked out and offered the method of synthesis for ferromagnetic nanoflokes with the given properties and structure by force of the chemical deposition of salts for metals with next their postproduction. Connection between the concentration of components in reactionary mixture, by introduction of additions, temperature and viscidity of environment, sizes and properties of the got salts of metals which, in turn, determine properties of ferromagnetic Fe-Ni-Co materials is revealed. The optimal conditions of realization for experiment are certain.

Key words: nanocomposites, ferromagnetics, nanoflokes, synthesis, citrates, ascorbares, modifier, thermoreduction, specific surface

In literature the considerable volume of facts in relation to the methods of receipt of ferromagnetic powders is accumulated [1-7].

Powders on the basis of iron get by different methods, what can be divided into physical methods which are based on condensation of vapor of metals in inert environments, chemical methods - on the receipt of ferromagnetic powders by renewal of metals.

There are presently developed and another methods of receipt of nanodemensional powders of metals: plasma, in a boiling layer, by evaporation of vapor in the atmosphere of inert gas, supersonic profluvium of metallic vapor to the vacuum, explosion during passing of high currents and other [6,7]. Plasmachemical methods allow to get powders of metals with the size of parts of 0.01-1.0 mcm, from which produce connections of different durability, porosity and heat-resistance, but its are technically difficult. Methods, related to evaporation and condensation, allow to get powders on the basis of iron with the size of parts in a nanodisperse range. The lack of powders is subzero corrosive firmness.

Methods based on thermal decomposition of connections of metals with ligands are modern and actual from the point of view of possible its further application. Powders, as a rule, do not have a complex of necessary properties for the technical use.

Authors are offered the method of receipt of nanodisperese powders of ferro-

magnetics, that is based on physical and chemical principle of synthesis of nanocomposites powders by method of the chemical deposition of salts of metals, in particular citrates and ascorbares with its next renewal. Thus to solution of mixture of initial salts of metals before addition of reagent-precipitator enter connections which reduce solubility of salts and on the next stages of its renewal and unloading provide formation of nanodemensional ferromagnetic powders with the given properties and dispersion.

Important advantage of chemical method is realization of modeling of properties and structure of metals salts by the way of the purposeful picking up of initial components, application of additions which influence on the processes of crystallization and next forming of metallic parts in a nanodisperse range.

The important feature of modern physics and chemistry of the dispersible systems is possibility of management of formation processes and by properties of the dispersible system on the initial stage of its forming, in particular, citrates, from aquatic-organic solutions flows in two stages: generation in solution of crystallizational foci's as complexes of molecules increase of crystalline embryos [8]. During forming of citrates by a chemical method important is a concentration of initial components, pH solution, order of mixing, speed of addition and interfusion of components of reaction, temperature, viscidity, presence of foci's of crystallization and other

The important condition of synthesis is an acceleration of delivery of metals ions to the surface of salts of metals crystals. The process of crystallization was executed after permanent interfusion of components. The use of continuous process of deposition on the permanent regime allows to provide constancy of all physical and chemical and technological conditions of process.

Optimal speed of introduction of fresh solution to the system is 10-20 ml/s. As dispersion of sediment is determined by a correlation between speed of generation of nucleuses and speed of its increase, then it is possible to assume that at the chosen conditions of deposition of increase of fresh solution introduction in a greater degree assists the increase of crystals of salts and in a less measure - to education of nucleuses.

Salts of metals appear in a sour environment and the decrease of pH solution assists formation of greater crystals of salts. Treason of pH to 4-5 results in the increase of size of crystals of to 1.3-3.0 mcm. Increase of temperature from 5 to 30 °C results in an increase medium-sized of crystals from 0.5 to 1.0 mcm. The size of parts depends also on satiety of solution: at high satiety of solution more shallow parts are formed.

One of basic components which are responsible for the sizes of parts during forming of salts of metals carbon containing connections in aquatic-organic solutions, in particular, saccharides in an quantity 1-2 % from mass of salts are offered. In supersaturated solutions on the foci's of its crystallization the nucleusess of hard phase of salts of metals are created, and place is taken them further increase.

Viscidity of solution is largely determined by the temperature of realization of experiment, and also addition of other components and with it increase content of hard phase approaches the balanced state. Speed of crystallization is proportional to the absolute temperature: than below finished temperature in solution which contains

modifiers, that more dispersible is sediment. Satiety salt of metals is formed on a measure supersaturated 1.5-1.6 and by a temperature 5-10 °C, that allows to get fallouts in a nanodisperse range.

In parallel from supersaturated solutions on the verges of nucleuses of modifiers during introduction of reagent-precipitator of lemon (ascorbic) acid its salts of *Fe-Co-Ni* appear which hold back in the self-weighted state.

The conducted researches showed that salts of metals can be got and in default of carbohydrates, but herein time dispersion of fallouts diminishes and increases their propensity to formation of agglomerates. During the combined deposition of iron salts, cobalt and nickel at optimal conditions in presence, for example, lemon acid, there is formation of the mixed salts $(FeCoNiC_6H_2O_7)\cdot n\ H_2O$.

Conclusions. The analysis of numerous syntheses for metals salts in the nanodieperse state with the next receipt of nanopowder of ferromagnetics is executed. On the basis of the conducted researches the physical and chemical conditions of synthesis of salts of metals which provide the optimal complex of characteristics during all process from corpecipitation salts of metals to its renewal and the optimal concentrations of components in reactionary mixture and optimal conditions for realization of experiment are set; introduction of additions; temperature and viscidity of mixture are worked out.

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