Features of adsorption human Ig on the surface of magnetically sensitive nanocomposites

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The coating of nanoparticles with a protein shell allows the creation of sites of specific binding of NPs to cell membranes, and the protein can play the role of a vector for nanomaterials in the biological environment.

The peculiarities of the interaction of protein substances with the surface of NPs are influenced by a number of factors: chemical nature, physico-chemical properties of NPs, reaction of the environment, nature of the protein, etc.

Therefore, it is relevant to study the possible mechanisms of interaction of nanoparticles for medical and biological purposes with blood plasma proteins.

In this work, the adsorption interaction of normal human immunoglobulin with Fe_3O_4 and Fe_3O_4/SiO_2 nanoparticles in phosphate buffer medium and saline (Natrii chloridi Solutio 0.9%) was investigated.

The experimental results of kinetics studies were analyzed and the adsorption isotherm was constructed. The experimental kinetic adsorption curves have been analyzed using kinetic equations that take into account the properties of the sorption processes involving protein molecules. The adsorption curve of isotherm has been analyzed by means of using Lengmuir, Freundlich, BET adsorption models, by Lengmuir's modify model for the adsorption of low molecular weight polymeric compounds as well by the Dubinin-Radushcevych model. The fit of a particular model is estimated by the value of the correlation coefficient R2.

It has been found that the adsorption capacity of NPs magnetite for normal human immunoglobulin is significantly higher than for Fe_3O_4/SiO_2. Moreover, the values obtained by adsorption in the buffer solution medium are higher for magnetite.