

Adsorption of proteins on nano-silica modified with antimicrobial drugs

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The research is devoted to the preparation of new nanocomposites on the basis of silica matrices with antiseptic properties and to the investigation of their sorption capacity for proteins in the presence of antimicrobial drugs. Nanocomposites were prepared by impregnation of ornidazole and urotropine on the surface of silica. Nanosilica (A-300) was used as a matrix. Ornidazole (1-(3-chloro-2-hydroxypropyl)-2-methyl-5-nitroimidazole) and urotropine (hexamethyleneteramine) were used as substances-modifiers.

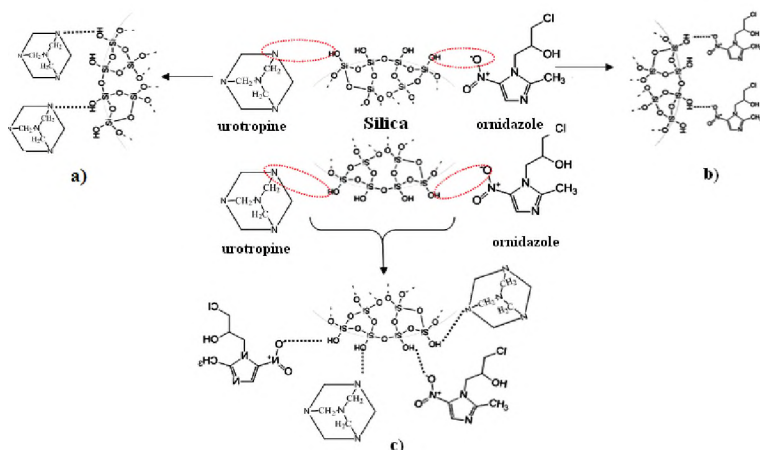


Fig. Scheme for the preparation of nanocomposites: *a)* silica + urotropine (urosil); *b)* silica + ornidazole (ornidasil); *c)* combined nanocomposite made from silica + urotropine and ornidazole (ornurosil)

Adsorption of proteins on the surface of the received nanocomposites was investigated under static conditions and compared with adsorption on unmodified silica. The results of the study of the sorption capacity of nanocomposites relatively to the proteins showed that the maximal amount that ornidasil was able to adsorb was 162 mg/g, for urosil it was 207 mg/g, for the combined composite ornurosil it was 209 mg/g, during the exposure time of 48 hours with the temperature of 18 °C and pH = 4.6 (Table).

Table. Sorption capacity of the nanocomposites relatively to a protein depending on the duration of exposure

Exposure time	Sorbent			
	Initial silica	Ornidasil	Urosil	Ornurosil
	The amount of protein adsorbed from the BCA model solution, mg/g of sorbent			
6 hours	146	132	160	135
12 hours	153	148	189	167
24 hours	178	160	200	181
48 hours	189	162	207	209

The obtained results indicate that the prepared nanocomposites possess a sufficient proteonectic ability, which opens up new possibilities for the creation of combined medications on the basis of silica and biologically active substances.