HYDRATION FEATURES OF COMPOSITE SYSTEMS BASED ON HIGH-DISPERSED SILICA AND SUCROSE IN DIFFERENT MEDIA

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The state of water in the hydrated sucrose powder, in its melt, and composite systems containing 3 parts of silica (A-300 or AM1) and 1 part of sucrose in air, low-polar organic solvent-deuterochloroform and CDCl₃ medium with addition of strong acids has been studied by low-temperature ¹H NMR spectroscopy. It was demonstrated that at the joint mechanoactivation of sucrose with nano-silica, its amorphization takes place. In this case, the adsorption of water in such a composite is not accompanied by the dissolution process in interfacial water of the sucrose immobilized on the SiO₂ surface. It was found that the effect of sucrose solubility increasing accompanies the placement of the composite in a medium that does not dissolve water and sucrose, an organic solvent - deuterochloroform. It was suggested that it is due to an increase the contact area of adsorbed water clusters with the sucrose surface. The maximal concentration of sucrose, which dissolves in interfacial water, is about 30% by weight. The replacement of hydrophilic silica (A-300) by hydrophobic silica (AM1), while maintaining the concentration ratio of components and the amount of adsorbed water, reduces the free energy of water binding in the composite system. The obtained regularities can be used in the design of a new generation of enterosorbents.

**Keywords:** low-temperature ¹H NMR spectroscopy, sucrose, hydrodensed, hydrophilic and hydrophobic silica; composite system.

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