

Thermochimica Acta 1996 vol.284 N2, pages 263-277

Interactions of water with human serum albumin suspended in water-organic mixtures

Borisover M., Sirotkin V., Solomonov B.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

Calorimetric enthalpy changes on suspending a partially hydrated preparation of human serum albumin (HSA) in various water-organic mixtures are discussed together with the water sorption isotherms. Experimental data indicate that suspending the HSA preparation is accompanied mainly by two processes. The first is water desorption-sorption which superficially obeys the Langmuir model. The influence of the medium on the thermodynamic parameters of water sorption can be described approximately by thermodynamic data on the solvation of water at infinite dilution. The second effect is a non-sorption process attributed tentatively to rupture of protein-protein contacts in the HSA preparation on suspending it. Depending on the nature of the solvent and its water content, such transformation of the HSA preparation can result in deviations from the Langmuir isotherm of water sorption by the suspended protein. This transformation is accompanied by the corresponding increase in the accessible surface area of the protein preparation and a significant enthalpy change. Experimental data cast doubt on the validity of the traditional opinion that the significant increase in water sorption by proteins at high water activities results from the various kinds of water-water interaction on the protein surface. It appears that the imposition of the transformation of the protein preparation on water sorption-desorption can determine both the calorimetric profile and thermodynamic data on suspending the protein preparation in various solvents.

[http://dx.doi.org/10.1016/0040-6031\(96\)02842-0](http://dx.doi.org/10.1016/0040-6031(96)02842-0)

Keywords

Human serum albumin, Organic solvents, Thermodynamics, Water sorption