RHEOLOGY OF INTERFACIAL LAYERS OF COMPLEXING IONIC SURFACTANT WITH PROTEIN

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Surface phenomena with assistance of the nature high-molecular-mass surface active substances including proteins are important for a stability analysis of dispersion systems stabilized by these substances. Proteins, being high-molecular-mass surfactants, and their mixtures with low-molecular-mass surfactants are important components in the medical, food and other industries because of its ability to stabilize dispersed systems. The formation of protein interfacial layers is sufficiently complex process and includes the stages of adsorption, orientation, conformational changes, fractal structure formation, two-dimensional phase separation and establishment of intermolecular contacts giving to the interfacial layer the rheological behavior peculiar to solid [1].

The structure and behavior of proteins and its mixtures with surfactants at the liquid interface have been investigated by different methods: IR spectroscopy, ellipsometric measurements, Wilhelmy method, methods of surface shear Rheology (2D-rheology) and rheological methods for investigation emulsions (3D-rheology).

At a mobile interface the formation of protein (and gelatin) with low molecular mass surfactant interfacial layers with specific structural-rheological properties (strength, high non-Newtonian viscosity and, especially, elasticity) provides the realization of the structure-mechanical barrier as the factor stability of emulsions and, respectively, thin liquid films, that appears much at the stage of coalescence.

Protein emulsion stability is determined as stabilizing interfacial layers of high strength and respectively the rupture probability of thin liquid films [2, 3]. It has been shown that a lifetime of the emulsion film stabilizing by protein in the presence of low molecular mass surfactants is controlled by its rheological properties. The effects of a binding degree of surfactant by protein (protein and surfactant concentration) and charge of modified protein macromolecule (pH value) on these properties are investigated.

All collected experimental results confirm significant role of rheological properties of protein interfacial adsorption layers that determine the emulsion stability against coalescence and act on mechanics and flow of emulsions [4].

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