

## **Physico-Chemical nanomaterials science**

### **The interaction between casein and cationic surfactant benzethonium chloride**

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The association processes between casein and model cationic surfactant benzethonium chloride (BTC) was studied by the spectroscopy method. It was shown that small surfactant (pre-micellar) addition to the aqueous casein solution leads to protein denaturation but new secondary structures of unstructured casein can form complexes with surfactant. The association between BTC and protein starts both as electrostatic interaction of "head" surfactant groups with charged segments of protein and hydrophobic interaction of BTC tails with casein hydrophobic parts. Under some critical surfactant concentration (less than CMC) casein fragments saturate in surfactant molecules and phase separation of mixtures take place. Further BTC addition leads to dissolving casein-BTC structures. During storage the inversion of absorbance values observes. The maximum of absorbance on the second day shifts towards lower surfactant concentrations. After that mixtures absorbance decreases slowly.

For obtaining of information about character of microenvironment inside of the casein–BTC complexes the UV spectroscopy was used. As mark we choose pyrene. Pyrene – highly hydrophobic substance with small size molecule. The intensity of the pyrene absorbance peaks can be used for estimation of their ability for pyrene dissolving.

The obtained results show that, on the one hand, under the high (micellar) BTC concentrations the insignificant shift of pyrene absorbance peaks can indicate on changes in casein macromolecules. On the other hand, the absorbance maximum of pyrene in casein–BTC mixtures corresponds to the minimum absorbance of the casein–BTC systems without pyrene additions. The the ability of mixtures for dissolution of pyrene increase with transition to the high surfactant concentrations. Here the formation of hydrophylic complexes which containe the hydrophobic volumes take place.