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INTERACTIONS BETWEEN SODIUM DODECYLSULPHATE AND DIDODECYLDIMETHYLAMMONIUM BROMIDES VESICLES IN AQUEOUS SOLUTIONS

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Abstract

The calorimetric results of heat of dilution of SDS aqueous solution [0.0348 mol kg⁻¹] in water and DDAB vesicle solution [0.002 mol kg⁻¹] were applied to estimate the enthalpies of interactions between an anionic surfactant SDS and vesicles formed by DDAB in aqueous solutions at 25°C and 40°C. They are negative in the whole investigated SDS concentration range at both temperatures. The enthalpy of interaction changes illustrate the difference between the SDS monomers energetic state in water and that in the DDAB vesicle bilayers. The plots of interaction enthalpy against SDS concentration have completely different shapes at both temperatures. These have been discussed in terms of electrostatic interactions between: positively charged lipid head groups with oppositely charged SDS molecules, which penetrate the vesicular bilayers. It appeared that dependence of interaction enthalpy on SDS concentration can be used to reveal the phase transitions from a liquid crystal to gel state in vesicular system bilayers. Adding SDS to DDAB vesicle solution affects significantly, electrostatic interactions of vesicular bilayers leading to changes of aggregates structural features that have been confirmed by transmission electron microscope examinations.

Keyword: Mixed surfactants; enthalpy of surfactant interaction; structural changes; phase behaviour; Isothermal Calorimetric Titration (ITC); Transmission Electron Microscopy.

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