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Research Paper :

Anionic-anionic mixed aqueous micellar systems-A study to explore synergistic effects on micellisation

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ABSTRACT

The present study has been initiated with a view to explore synergistic effects on micellar behaviour of anionic – anionic mixed aqueous micellar systems. The conductometric technique has been used to measure the specific conductivity of the aqueous surfactant systems involving alkali metal dodecylsulphates (abbreviated as LiDS, NaDS, KDS) in presence of microquantity (1.0 x 10^{-4} mol. dm^{-3}) of various anionic surfactant additives *viz.* caprate, laurate, myristate, and dodecylsulphates of Li, Na, K metals. The comparative assessment of the data reported in Table I and Table II suggest that micellisation is facilitated in presence of the above cited additives *i.e.*, cmc is lowered with additives.

Key words : Anionic surfactants, Synergism, Conductance, Alkali metals and Wanionic surfactant additives

Researchers and academicians alike (Aicart *et al.*, 2006; Atwood and Flovenie, 1983; Avakawa and Brain, 1980; Barry and Russel, 1972 and Bufe and Wolff, 2006) have already shown a keen interest for various surface active agents, also termed as surfactants. They have been enthusiastic about their various facets *viz.* the physicochemical characterization, shape/size determination of micellar aggregates. W.J. Leigh and coworkers (Bunajdad and Eastore, 2004; Cook *et al.*, 2001 and Hartl *et al.*, 2007) have, of late, shown how significant organometallics are to the wide domain of surfactants. Several national/ international publications (Jacobs *et al.*, 2006; Jaliceour and Philip, 1975; Kim *et al.*, Kumar, 1994 and Leigh and Li, 2002) have appeared in literature just to prove the merit of various physical properties of surfactants. Techniques such as viscometry and electrical conductivity have proved handy to study neutral polymer micelle interactions (Lelong *et al.*, 1951). Bumajdad and Eastoe (Malik *et al.*, 1984) employed conductivity to study water in oil microemulsions stabilized by mixed surfactants. Tania *et al.* (Mc. Brain, 1939) have resorted to spectroscopy and conductomretry to probe interaction between water soluble poly {1,4- phenylene – [9, 9 – bis (4- phenoxy butyl- sulfonate)] fluorene -2, 7 diyl} copolymer and ionic surfactants. Aicart and co-workers (Mehta *et al.*, 1979) examined electrochemical, microscopic and spectroscopic characterization of vesicles and prevesicle nanostructures of mixed cationic surfactant systems.

In the recent past, researchers (Mehrota *et al.*, 1970) have undertaken a study on electrically conductive bacterial cellulose by incorporation of carbon nanotubes. Kim and co-workers (Modaressi *et al.*, 2007) have, however, carried out a similar looking study using dielectrophoresis of surface conductance modulated single-walled carbon nanotubes with cationic surfactants. Hartl *et al.* (Niisson *et al.*, 2006) have investigated into ion sensitivity of surface conductive single crystalline diamond. Jacobs *et al.* (Niisson *et al.*, 2006) have dealt with aspects on dynamics of alkyl ammonium intercalants with in organically modified montmorillonite: Dielectrical relaxation and ionic conductivity. Rajamani *et al.* (Robins *et al.*, 2003) have performed a study on carbon nanotube based transparent conductive thin films. NMR diffusometry and electric conductometric techniques have been employed to study interactions between gemine surfactants, 12-s-12, and beta cyclodextrin (Sarah *et al.*, 2006). Bufe and Wolff (Sibel and Osman, 2007) have recently undertaken a study on switching electrical conductivity in an AOT – isooctane –water microemulsion through photodimerization of solubilized N-methyl-2-quinoline, conductometric measurements have been found extremely handy to look into CTAB aggregation in aqueous solutions of ammonium based ionic liquids (Sharma *et al.*, 1986). Conductometric method (Shun-Cheng *et al.*, 2004) has also been a worthy tool to investigate interaction between some anionic dyes and cationic surfactants. Sarah *et al.* (Tania *et al.*, 2005) have carried out work on conductometry and fluorometry on using mixed micellar systems of cationic surfactants in aqueous media.

The present investigation has been initiated with a