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SOLUBILIZATION OF ALCOHOLS BY TETRAALKYLAMMONIUM HALIDES AT 40°C

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ABSTRACT

Maximum additive concentration, MAC, data for alcohols (1-butanol and 2-methyl-1-propanol) suggest that solubility of alcohols in water increases in the presence of tetraalkylammonium halides i.e., these alcohols are thereby solubilized. It is found that MAC of 1-butanol sharply increases with increasing surfactant concentration upto 0.18 M and then slowly upto 0.26 M. The MAC increases still further beyond 0.26 M of tetralkylammonium halides. The solubilizing capability for different surfactants is found to follow an order as : TEAI > TEAB > TEAC > TMAI > TMAB > TMAC. On the other hand, solubilization of 2-methyl-1-propanol in these surfactant systems follows an order as: TEAI > TEAB > TEAC > TMAI > TMAB > TMAC.

Key words : Solubilization, Solubilizate, Tetraalkylammonium Halides, Maximum Additive Concentration (MAC).

Solubilization is one of the most important properties of the surface active agents adorned with cleansing capability to varied extents. The spontaneous dissolving of a normally water insoluble substances with the help of surfactants is termed as a process of solubilization. As a matter of fact, various organic compounds which are either insoluble or sparingly soluble in water can be brought into their aqueous solutions in the presence of surfactants. Solubilization, alongwith some other processes like emulsification and adsorption etc., has a major role to play in cleaning a surface free from dirt.

The phenomenon of solubilization is however of great interest from theoretical as well as practical point of view and many aspects thereof were accordingly reviewed[1, 2]. Similarity between adsorption (on activated carbon) and solubilization into surfactant micelle was observed[3], and it was confirmed that both adsorption and solubilization proceeded involving hydrophobic interaction and that both increased with increasing size of the non-polar aminoacid residue. Another study on solubilization of alkaline earth metal soaps[4] brought forth that the process followed an order as : Mg > Sr > Ba > Ca. A review[5] however considered various techniques and applications of solubilization involving various aqueous solutions. Hydrotropy and solubilization for C_4–C_{18} alkyltrimethylammonium bromides has however been another useful study[6]. Tsuji *et al.*[7] investigated the influence of surfactants upon solubility and aqueous stability of beta-lactam antibiotics. Varied solubilizing effectiveness of sodium dodecylsulphate complexes with various proteins[8] was probed. Quantitative analysis of interfacial barrier to membrane transport of cholesterol solubilized in a charged micellar system was carried out by research workers[9] in the past. A useful study on enhanced solubilization of immunoreactive proteins from Brugia malayi adult parasites using cetyltrimethylammonium bromide was conducted[10]. Krishna and Flanagan[11] however worked on micellar solubilization of a new antimalarial drug, beta-arteether. Puri *et al.*[12] explored into solubilization of growth hormone and other recombinant proteins from Escherichia Coli inclusion bodies by using a cationic surfactant. Cserhati and Forgacs[13] searched into the binding of aminoacids to the cationic surfactants, cetyltrimethylammonium bromide. Rheological studies on the solubilization by the surfactant SDS of complexes between three acidic polysaccharides and an organic base chloride were carried out[14]. Boonchan *et al.*[15] made a probe into the surfactant-enhanced biodegradation of high molecular weight polycyclic aromatic hydrocarbons by stenotrophomonas maltophilia.

An attempt to modify sparingly water soluble drugs to easily water soluble drugs was made possible by an investigation on crystalline molecular complexes generated between surfactant and various additive compounds[16]. Solubilization of gliclazide by aqueous micellar solutions was studied by Alkhamis *et al.*[17], whereas saito *et al.*[18]