AIMS AND SCOPES OF THE PRESENT STUDY

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Interfacial and aggregation behaviour of surfactants, surfactant derived gels and metallosurfactants are some of the key factors of chemical, biological, pharmaceutical and industrial purposes. In view of their versatile applications, it is considered to be significant in studying oppositely charged surfactant aggregation, their gelation behavior as well as the metallosurfactants that will eventually shed further light in understanding the microstructure of the entities studied herein.

i) Interfacial and aggregation behavior of $(C_{12}AAS)Na_2$+HTAB mixtures at different compositions can be studied by different physicochemical processes, *viz.*, surface tension, conductance, fluorescence absorbance/emission spectroscopy studies. Studies on the interfacial and micellization behavior of $(C_{12}AAS)Na_2$+HTAB are expected to provide new insights and can be used as drug delivery systems, especially in dermatological formulations and to synthesize otherwise water insoluble inorganic nanoparticles.

ii) Theoretical investigations on $(C_{12}AAS)Na_2$+HTAB mixtures are not plentiful in literature. $(C_{12}AAS)Na_2$+HTAB mixed systems are highly relevant in terms of their wide range of applications in industries, *viz.*, enhanced oil recovery, waste water treatment, textile wetting, detergency, paper manufacturing, pharmaceutical production, fabrication of nanostructured materials, drug delivery, cell lysis, microemulsion formulation, molecular separation, lubrication, cleaning operations and antimicrobial activity. Studies on the micellar structure and composition of surfactant mixtures can provide new insights, that would eventually help in understanding its bulk and interfacial properties that can also minimize the experimental circumscription.

iii) Concentration and composition dependent $(C_{12}AAS)Na_2$+HTAB mixed aggregates can generate precipitate, gel, liquid crystal and texture. One of aims of the present work is to

undertake physicochemical investigations on different types of aggregates formed by $(C_{12}AAS)Na_2$+HTAB. While HTAB shows antimicrobial activities, however, $(C_{12}AAS)Na_2$ are biocompatible. Because of its toxicity, individual use of HTAB is unwarranted. However, when HTAB is used in combination with $(C_{12}AAS)Na_2$, its toxicity is expected to get substantially reduced. To check the biocompatibility of gels and its possible dermatological application, cytotoxicity, skin irritation and histological studies are considered to be worthy.

IV) Physicochemistry of metallosurfactants show manifold applications such as recovery of organic complexes, micelle enhanced ultra-filtration, removal of organic pollutants, enhanced recovery of oil, removal of heavy metal from waste water, synthesis of mesoporous materials, adsorption, batteries, catalysis, ceramic precursors, nonlinear optics, electronic conductivity and sensors. Naturally occurring phospholipids are widely used for synthesis the vesicle and shows different versatile application, *viz.* drug delivery, therapy, DNA transfection, potential drug carrier and nano particle synthesis.