Environmental Friendly Natural Surfactant in Replacement to the Hazardous Synthetic Surfactants

Maria Taj Muhammad
Department of Chemistry, Jinnah University for Women, Karachi, Pakistan.

ABSTRACT

Many of the natural plant material contains amphoteric properties which can be served as a surfactant. A comprehensive competitive work was performed to study the behavior of natural surfactant in relation to the synthetic surfactants using conductometer and spectrophotometry. The interactions can be observed best when temperature is low and at high temperature its property to form a micelle is bit poor. A full range of temperature were selected and study was performed over that range to monitor the behaviour and interactions of the natural and synthetic surfactants as these interactions are temperature dependent and found to be favourable at lower temperatures. The pH was shows influence on these interactions. pH is also used to know the number of replaceable proton in a surfactant along with its nature and interaction behaviour. Different organic pollutants were used to optimize its behaviour and interactions. Different ionic organic pollutants were monitored in this study. A wide range of surfactant concentrations were selected to do the optimization. For this purpose pre- to post micelle concentrations of synthetic and natural surfactants were selected and tested. As concentration changes the behaviour of indication were also changed.

Natural surfactant shows a self-degradation behavior at ambient temperature and dark, both anaerobic and aerobic conditions were tested. Based on its behavior and degradation properties, the optimized natural surfactant is not just cheap, easily available, user friendly but also a good alternative to the synthetic surfactants. One single natural surfactant can serve the work of different synthetic surfactants. The natural surfactant holds better surfactancy and efficient in working as compare to synthetic surfactants.

Moreover, they also combine with different environmental toxin and degrade them as well. Thus they are beneficent to the eco system as well. They can even degrade toxin which is non degradable even in presence of fenton.

Keywords: Surfactant, Natural Surfactant, Organic Pollutant, Environment.

METHODOLOGY

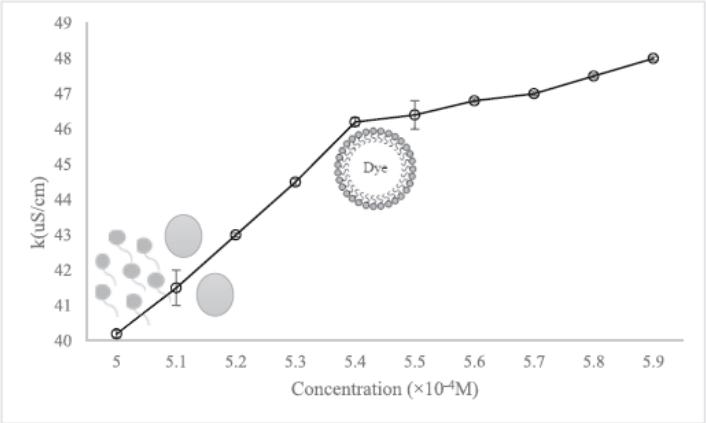
Chemicals & Equipment's

Ionic dyes (cationic and anionic dyes), Surfactants (natural and synthetic), acid and base buffer solutions, metal standard solutions. Spectrophotometer UV-Vis 1600, pH meter, Conductometer, Water bath.

Methods

Natural surfactants were prepared using plant material. Extraction were performed in deionized water. 12 hour staring were performed. These surfactants were then subjected to react with organic pollutants and than observed using above mentioned instruments.

RESULTS



The aggregation point using natural surfactant was very low (values 4.4×10^{-4}M) which is 10 times below the point observed using synthetic surfactants (8.3e-3M). It is the point at which monomer gathered to form of micelle and shows activity and here maximum interactions can be observed. Monomer gathered to form micelle and it contains different points where they form micelle (first and second point). The point monitored using natural surfactant is far below as compare to the point observed using many synthetic well known widely used surfactants. Temperature plays vital role in these interactions. Exceptionally good results were observed when the natural surafctant behaviour was observed. As mentioned in figure. its CMC is also very low and they are easily degradable at different environmental conditions as mentioned.

REFERENCES

1. W. Wang *et al*.,Transport behaviors of anionic azo dyes at interface between surfactant-modified flax shives and aqueous solution: synchrotron infrared and adsorption studies Appl. Surf. Sci. (2017)
2. Y. Zhang *et al*. Transport of anionic azo dyes from aqueous solution to Gemini surfactant-modified wheat bran: synchrotron infrared, molecular interaction and adsorption studies Sci. Total Environ. (2017)
3. T. Chakraborty *et al*. The methods of determination of critical micellar concentrations of the amphiphilic systems in aqueous medium Arab. J. Chem. (2011)
4. S.T. Muntaha *et al*. Study of changes in conductivity and spectral behaviour before and after micelle formation in the dye-surfactant system J. Mol. Liq. (2014)