INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Surfactants are used in many industries, and they are integrally related to many consumer products. However, at the same time, they contaminate water. The environmental fate of the surfactants is considerably important due to their effects on the health of human beings and animals. Their increasingly ubiquitous domestic and industrial use, and the difficulty in removing them by the traditional treatment methods has attracted the attention of the environmentalists and researchers. The foam fractionation process and the removal of different types of surfactant by this method have been discussed in the Chapter 1 of this thesis. Chapter 2 of this thesis focuses on materials and methods.

Chapter 3 of this thesis focuses on the removal and recovery of a cationic surfactant [i.e., cetyltrimethylammonium bromide (CTAB)] by foam fractionation. The surfactant concentration was five times its critical micellar concentration (CMC) and the airflow rate was varied in the range 0.4 – 1.6 $dm^3\ min^{-1}$. About 60% of the surfactant was recovered from the top of the cylindrical column in the form of a semi-solid paste. Recovery of the surfactant in the presence of various inorganic salts (i.e., NaCl, $CaCl_2$, and Na_2SO_4) at different airflow rates was also investigated. The zeta potential at the air–water interface was measured to determine the stability of the foam. Chapter 4 of the study focuses on the removal and recovery of an anionic surfactant [i.e., sodium dodecyl sulfate (SDS)] from water by foam fractionation in the presence of oily effluents (i.e., benzene, toluene, and hexane). The effects of oils on the removal and recovery of SDS were studied at the airflow rates in the range of 0.4–1.6 $dm^3\ min^{-1}$. The SDS concentration was above its CMC. About 72% recovery of SDS was achieved in the form of a semi-solid cake. The foam stability was analyzed by measuring the zeta potential at the air–water interface and through the entering, spreading, and bridging coefficients. The adsorption of the surfactant at the air–water interface was estimated from the surface tension measurements. Chapter 5 reports the effect of addition of methanol and ethanol on the removal and recovery of an anionic surfactant [i.e., sodium dodecylbenzene sulfonate (SDBS)]. The concentrations of SDBS were 500, 1000, 2000, and 3000 mg dm^{-3}. The airflow rate was varied in the range 0.4 – 1.6 $dm^3\ min^{-1}$. About 77% of the surfactant was recovered from the top of the column. The addition of alcohol lowered the foam volume and surfactant recovery. The zeta potential increased with the addition of alcohol. Surface tension measurements revealed the adsorption of surfactant at the air–water interface. Chapter 6 of this thesis focuses on the summary and future scopes.