

Phase studies and efficient recovery of inorganic metal salts from the microemulsion system using a sugar-based non-ionic surfactant.

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Abstract

In the present work, the phase behaviour of the microemulsion system formulated by using water, organic solvent, and a sugar-based non-ionic surfactant was investigated in detail. We have used a sugar-based non-ionic surfactant for formulation of microemulsion, as it is a greener alternative for the formulation of a microemulsion system, owing to the following aspects: a) better physicochemical properties as compared to that of the conventional non-ionic surfactants, b) non-toxicity, and c) biodegradability. The extraction of heavy metal ions from the metal complexes as well as the recovery efficiency of heavy metal ions using a microemulsion system has been investigated. The maximum absorbance values of metal ions, after recovery from the metal complexes, were measured. Moreover, the UV-Visible spectrophotometric studies revealed that the absorbance increases with an increase in metal ion concentration in the aqueous phase while its value decreases with an increase in the concentration of potassium thiocyanate in the aqueous phase after the extraction of the metal ions from the metal complexes. Furthermore, it has also been evaluated that 4.0 mol/L potassium thiocyanate is the optimum concentration required for efficient recovery of 0.05 mol/L cobalt ion as well as nickel ions. The recovery efficiency of cobalt ions was found to be 97%, whereas that of nickel ions was determined to be 94% respectively. In addition to being an environmentally friendly approach, the present work is an economically viable option too, as it deals with the studies related to the extraction and efficient recovery of metal ions.

Keywords: microemulsion system; inorganic metal salts; sugar-based non-ionic surfactant; extraction; recovery efficiency