Determination of design parameters for the cloud point extraction of Remazol Turquoise Blue G-133 dye using Triton X-114 surfactant

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a b s t r a c t

A design method has been proposed for cloud point extraction (CPE) process. The aim was to determine the concentration of non-ionic surfactant Triton X-114 (TX-114) needed to achieve the preferred extraction of Remazol Turquoise Blue G-133 (RTB G-133) dye at different operating conditions (feed dye concentration and temperature). The solute concentrations of 25, 50, and 75 ppm, and surfactant concentrations of about 0.01–0.1 M were used. The feasibility of the CPE process was also studied using the thermodynamic parameters. For design calculations, knowledge of the following two features were needed: (1) the solubilization isotherm of RTB G-133 in TX-114 at different operating temperatures and (2) estimation of the change of the fractional coacervate phase volume with the feed surfactant, dye concentration and the operating temperature. The experimental data were fitted on to a Langmuir type solubilization isotherm. Correlations were then established for the variation of isotherm parameters with temperature. From the defined correlations and formulated design method, the concentration of feed surfactant necessary to obtain 1 ppm concentration of dye in the dilute phase was evaluated at specific operating temperatures and feed dye concentrations. The design method developed will greatly aid the scale-up of CPE.

Keywords: Remazol Turquoise Blue G-133; Triton X-114; Cloud point extraction; Isotherm; Fractional coacervate

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