

عنوان مقاله:

Thermodynamic Study of the Ion-Pair Complexation Equilibria of Dye and Surfactant by Spectral Titration and Chemometric Analysis

محل انتشار:

مجله تحقیقات شیمی تجزیه و تجزیه زیستی، دوره 4، شماره 2 (سال: 1396)

تعداد صفحات اصل مقاله: 11

نویسندگان:

Hakimeh Abbasi Awal - *Department of Analytical Chemistry, Faculty of Chemistry, University of Tabriz, Tabriz*
۵۱۶۴۴-۱۴۷۶۶, Iran

Bahar Ghasemzadeh - *Department of Analytical Chemistry, Faculty of Chemistry, University of Tabriz, Tabriz*
۵۱۶۴۴-۱۴۷۶۶, Iran

Abdolhossein Naseri - *Department of Analytical Chemistry, Faculty of Chemistry, University of Tabriz, Tabriz*
۵۱۶۴۴-۱۴۷۶۶, Iran

خلاصه مقاله:

Surfactant-dye interactions are very important in chemical and dyeing processes. The dyes interact strongly with surfactant and show new spectrophotometric properties, so the UV-vis absorption spectrophotometric method has been used to study this process and extract some thermodynamic parameters. In this work, the association equilibrium between ionic dyes and ionic surfactant were studied by analyzing spectrophotometric data using chemometric methods. Methyl orange and crystal violet were selected as a model of cationic and anionic dyes respectively. Also sodium dodecyl sulphate and cetyltrimethylammonium bromide were selected as anionic and cationic surfactant, respectively. Hard model methods such as target transform fitting (TTF) classical multi-wavelength fitting and soft model method such as multivariate curve resolution (MCR) were used to analyze data that were recorded as a function of surfactant concentration in premicellar and postmicellar regions. Hard model methods were used to resolve data using ion-pair model in premicellar region in order to extract the concentration and spectral profiles of individual components and also related thermodynamic parameters. The equilibrium constants and other thermodynamic parameters of interaction of dyes with surfactants were determined by studying the dependence of their absorption spectra on the temperature in the range ۲۹۳–۳۰۸ K at concentrations of 5×10^{-6} M and 8×10^{-6} M for dye crystal violet and methyl orange, respectively. In postmicellar region, the MCR-ALS method was applied for resolving data and getting the spectra and concentration profiles in complex mixtures of dyes and surfactants.

کلمات کلیدی:

Dye-surfactant interaction, Classical fitting, Target transform fitting, MCR, Absorption titration, thermodynamic parameters

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