Spectral Properties of Fluorescein in a Reversed Micellar Medium of Cetyltrimethylammonium Chloride in 1-Hexanol – Cyclohexane and Its Analytical Application.

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The photophysical properties fluorescein (FL) was studied in reversed micellar solutions of cetyltrimethylammonium chloride (CTAC). The distribution of the Fl dye species in the reversed micellar system was examined using absorption and emission spectra. The results obtained that the increasing of pH in the aqueous phase of 1-hexanol-cyclohexane/CTAC/H_2O system (at R_W =[H_2O]/[CTAC] = 4 and mole fraction of 1-hexanol = 0.045) causes an increase in emission intensity of FL, attributed to the conversion of its neutral forms, H_2F in bulk solvent, to the anion forms, HF^-, then to the dianion forms F^{2-} at interface of the reverse micellar system. Fl was used as a probe in basic medium for determination of the critical micelle concentration (CMC). With an increase in the CTAC concentration at a fixed R_W, the absorbance and emission intensity of Fl rises suddenly at CMC. Furthermore, the standard free energy of micellization, calculated from the CMC data, indicates that the micellization is promoted by an increase in the water ratio R_w and a decrease in the 1-hexanol fractions in the reversed micellar bulk solvent. The spectra of the mixture of $2x10^{-5}$ mol dm^{-3} of fluorescein and $2x10^{-5}$ mol dm^{-3} of rhodamine B in the reversed micellar solution of 0.048 mol dm^{-3} CTAC (R_w = 4), far above its CMC, in 1-hexanol–cyclohexane water buffered (pH=10) are used for the determination of the mole fraction of 1-hexanol in bulk solvent as shown in Fig. 1.

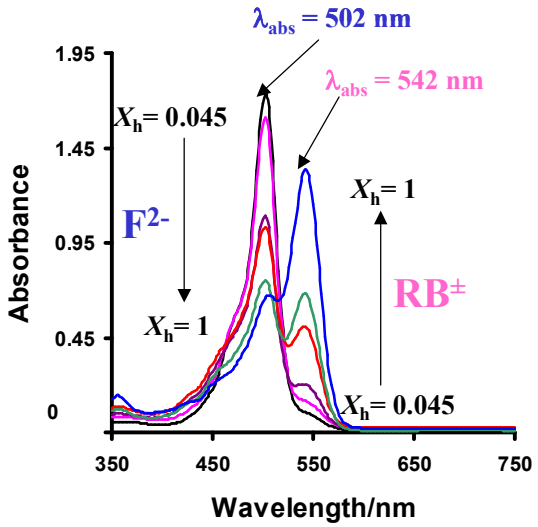

Fig. (1): Absorption spectra the mixture of $2x10^{-5}$ mol dm^{-3} of fluorescein and $2x10^{-5}$ mol dm^{-3} of rhodamine B in reversed micellar solutions at different mole fractions of 1-hexanol (X_h) in the bulk solvent at 25°C.