

The influence of nonionic surfactants and B-cyclodextrin on the state of 5-phenylthio-8-mercaptoquinoline in aqueous media

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Abstract

© Research India Publications 2015. Using spectrophotometry method the condition of 5-phenylthio-8-mercaptoquinoline within a wide pH range (pH 0-10) was studied in water, the aqueous solutions of a nonionic surfactant Brij35 and β -cyclodextrin (β CD). It was found that in water within the range of pH = 2-6 5-phenylthio-8-mercaptoquinoline is poorly soluble after the self-association of zwitterionic (HR^{\pm}) reagent forms. In other areas of pH the aqueous solutions of the reagent are transparent due to the transition of zwitterions in protonated (H_2R^+) or anionic (R^-) form. The spectral parameters of mercaptoquinoline in surfactant solutions or cyclodextrin were similar to the observed ones in aqueous, strongly acidic and alkaline environments. However, in neutral and slightly acidic pH areas the spectra of the reagent differed greatly in the presence of β CD and Brij35. The latter allowed to suggest that due to the different polarity of the mercaptoquinoline microenvironment in surfactant solutions and β CD various tautomeric forms of the reagent are stabilized. The molecular form (HR) is realized in the micellar environment, and the presence of cyclodextrin stabilizes the zwitterionic form ($\pm HR$), which proves the presence of a chromophore node in an aqueous medium. By varying the ratio of Brij35 and β CD in the neutral pH range, it is possible to observe the corresponding tautomeric transition. The comparison of 5-phenylthio-8-mercaptoquinoline absorption spectra results in various environments allowed to identify the spectral parameters and pH range of different reagent forms. The mathematical processing of optical density absorbance dependencies on pH showed that Brij35 supplements, unlike β CD ones, change the acid-base properties of a reagent by micelle solubilization. The influence of cyclodextrin is explained by the formation of "guest-host" complex with the phenyl substitute of 5-phenylthio-8-mercaptoquinoline. As micelle forming surfactants so as cyclodextrins may be used to increase the solubility of 8-mercaptoquinoline aromatic derivatives in water.

Keywords

5-phenylthio-8-mercaptoquinoline, Nonionic surfactant, Solubilization, β -cyclodextrin