

EXPERIMENT #5

CMC Determination by Dye

Surface active materials tend to self-assemble into some geometric shapes and become suspended in the solution beyond a critical amount. These are called as micelle. Different techniques can be applied to determine CMC of the surfactant such as surface tension measurement and dye solubilization.

Method

In the experiment, determination of CMC will be performed using “Dye solubilization technique”. This technique is based on the spectral changes around the CMC. Below the CMC, the dye (pinacyanol chloride) exhibits pink color due to the formation of highly insoluble salt of the surfactant anion with the dye cation. Above the CMC the solution turns blue due to the solubilization of the dye by the micelles. The test is conducted by mixing the surfactant solution with a 10^{-5} mol/l dye solution. The solutions are then equilibrated in the dark for two hours for obtaining high accuracy and measurements are taken using UV-Spektropotometer. Naked eye is also enough to see changing in the color of the solutions.

The pink, violet and blue colors are characterized by the absorption at 477, 563 and 608 nm wavelengths, respectively. Intersection of the corresponding wavelengths is taken as the CMC that is indicated in the following figure.

Report

Discuss your observation based on the mechanism of the dye solubilization and spectral changes of the suspensions.

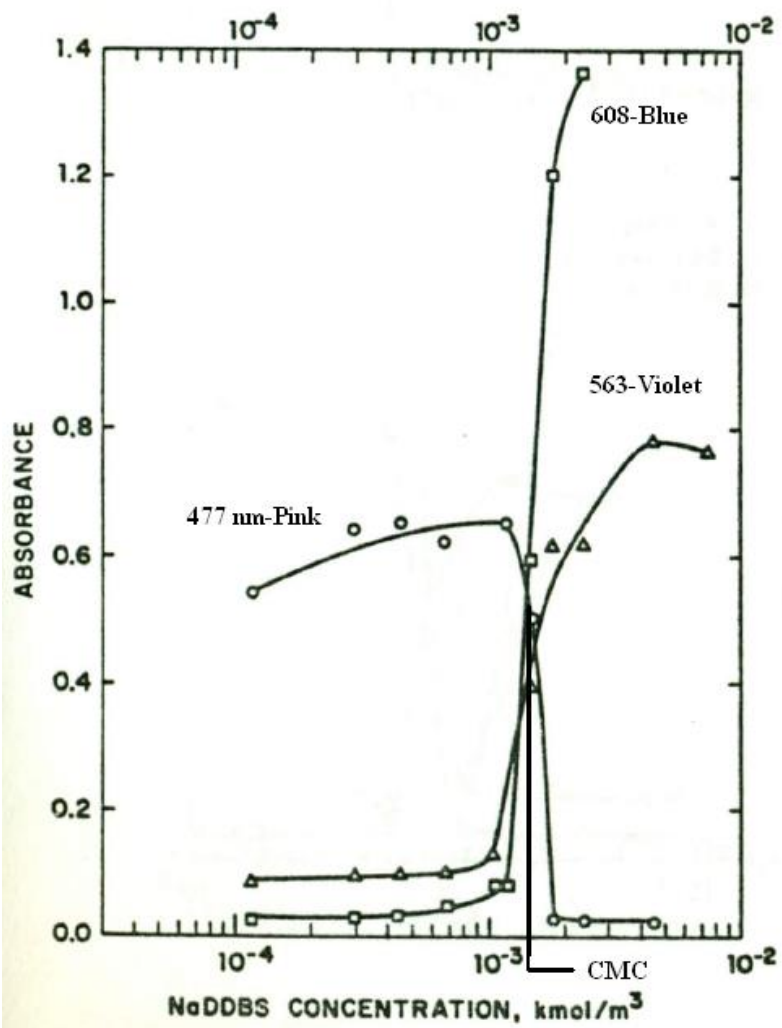


Figure Absorption of Pinacyanol as a function of NaDDBS concentration.