

Thermodynamic and Kinetic Study of the Interaction between Alkylpyridinium Ions and Pyrene Derivatives in Aqueous Solution

Rosenbluth,

Weiss-Lopez,

Olea,

The kinetics of fluorescence quenching of pyrene and three of its derivatives by a series of n-alkylpyridinium ions has been studied. The quenching process is diffusion controlled for all the systems studied, independent of the charge in the aromatic molecule and the size of the alkyl chain in the pyridinium ions. Pyrenesulfonate, PS, and pyranine form ground-state complexes with these quenchers. The association constants were determined by using a kinetic scheme where both dynamic and static quenching were included. A linear relationship between the free energy change and number of carbon atoms was found for PS, and a methylene contribution equal to -1.1 kJ/mol was determined from the slope. A similar correlation was established for pyranine, but a slope change was observed when the alkyl chain has more than 10 carbon atoms. From the initial slope, an incremental free energy of -0.35 kJ/mol was obtained. The ground-state complex formation is determined mainly by an electrostatic intera