

Temperature Effect on the Pyrene Complexation to β -Cyclodextrin for Complexes with Multiple Stoichiometries

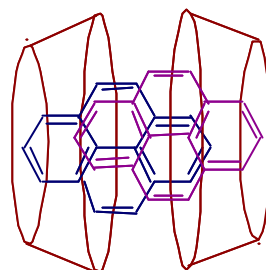
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Cyclodextrins are known to form supramolecular complexes with a number of guest molecules. The pyrene/ β -cyclodextrin system forms complexes of multiple stoichiometries. Pyrene is used as a guest molecule because it has several favourable photophysical properties. The shape of pyrene's fluorescence spectrum is sensitive to the polarity of its environment, and

the appearance of excimer fluorescence emission

at 473 nm is evidence for the formation of

a 2:2 pyrene/ β -cyclodextrin complex. Earlier



work on the complexation dynamics of the pyrene/ β -cyclodextrin system has shown that the formation of the multiple stoichiometry complexes is not straightforward. In order to better understand the effects behind this, steady-state fluorescence studies of the system were carried out at a range of temperatures. The excimer intensities at increasing β -cyclodextrin concentrations were determined for pyrene concentrations of 0.0001 M, 0.0004 M, and 0.0005 M. All pyrene concentrations were fitted in Scientist (Micromath v.2.02) simultaneously using the equilibrium constant equations, the mass balance equations for pyrene and cyclodextrin and the quantum yield equation for the excimer emission.