Solvation and temperature effect on the charge-transfer complex between 2-amino-4-picoline with 2,5-dihydroxy-p-benzoquinone

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Abstract

The charge-transfer (CT) complex between the donor 2-amino-4-picoline (2A4P) and the acceptor 2,5-dihydroxy-p-benzoquinone (DHBQ) was studied spectrophotometrically in different polar and non-polar solvents. The molecular composition of the complex, in all solvents, was determined by Job's method of continuous variation and photometric titrations to be 1:1. Benesi-Hildebrand equation has been applied to estimate the formation constant (K-CT) and molecular extinction coefficient (epsilon) of the formed complex. The variation in K-CT was rationalised based on Taft-Kamlet and electric permittivity parameters of the used solvents. Thermodynamic parameters H degrees, G degrees and S degrees were estimated, they were all negative so the studied complex is reasonably stable and exothermic in nature. In addition, the thermodynamic properties were observed to be sensitive to the nature of the solvent. Moreover, the solid 1:1 CT complex between 2A4P and DHBQ was isolated and characterised using elemental analysis, FTIR and H-1 NMR measurements.

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