



KINETIC AND EQUILIBRIUM STUDIES OF
CYCLODEXTRIN-AZO DYE INCLUSION COMPLEXES

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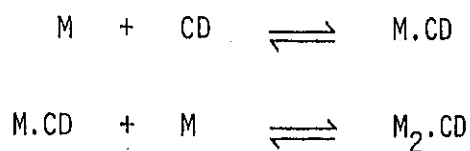
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ABSTRACT

The cyclodextrins are cyclic oligosaccharides, which are able to form inclusion complexes with various organic molecules. The guest molecule is held within the hydrophobic cavity of the cyclodextrin by secondary forces alone. Whereas α -cyclodextrin is usually only capable of including a single guest molecule, it has been shown recently that the larger cyclodextrins, β and γ , are able to include two guest molecules simultaneously. This behaviour has been found for the series of azo dyes: methyl orange, tropaeolin and roccellin.

The presence of a guest dimer within the cyclodextrin cavity was detected by spectroscopic techniques: UV/visible absorption, induced circular dichroism and luminescence. The mechanism of one host-two guest complexation, given below, was determined by temperature-jump relaxation spectrophotometry.



where M = dye monomer

CD = cyclodextrin

In the case of the dyes investigated, dimer formation within β - and γ -cyclodextrin occurs at dye concentrations at which the amount of dimer in free solution is negligible in the absence of cyclodextrin. Hence, β - and γ -cyclodextrin effectively increase the dimerisation constant of the dyes.

The ability of the cyclodextrins to include two guest molecules simultaneously has significance in the field of directed synthesis. It may be possible to use the cyclodextrins to facilitate the association of molecules, which could lead to an increase in the rate of certain reactions which the two molecules might undergo.