

Interaction of dimethyl sulphoxide with chloranil by ESR and optical methods

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Abstract. The molecular charge-transfer absorption bands have been observed in solution of dimethyl sulphoxide (DMSO) and tetrachloro-*p*-benzoquinone (chloranil) in chloroform and cyclohexanone. The stability constant, the thermodynamic parameter of the complex and the extinction co-efficient of CT bands at 350 nm in chloroform and 360 nm in cyclohexanone have been estimated on the assumption of the 1:1 complex formation. Detection of ESR signal of the solution of chloranil in pure DMSO ($g \approx 2$) indicates the formation of chloranil radical anion, the precursor being the charge-transfer complex, which dissociates partly in high dielectric constant DMSO.

Keywords. Charge transfer; electron spin resonance; optical property.

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1. Introduction

A series of studies (Slifkin 1964; Beukers and Szent 1962) have been made on the charge-transfer interactions of chloranil as electron acceptor with DMSO as donor. In view of the importance of chloranil as a model for biological quinones, studies on its complexation have been extended to many drugs, notably phenothiazines as donors, but in each case only the chloranil anion spectra were observed without any indication of charge-transfer (CT) band (Saucin *et al* 1968). Similar results have been obtained for other groups of bio-molecules (Slifkin 1961, 1973). Various purines and pyrimidines on mixing with chloranil in DMSO slowly develop a red colour (Machmer and Duchesne 1965). The molecular mechanism of DMSO on TCNE has been thoroughly studied by optical and ESR technique by Stewart *et al* (Stewart 1966). The object of the present investigation is precisely to find the interaction of DMSO, if any, with chloranil.

2. Experimental

DMSO and the solvents used were of the spectroscopic grade product of E-Merck, Germany. The chloranil was prepared by prescribed method (Arnold and Collins 1942) and was purified by vacuum distillation and crystallization from benzene. The measurements of absorption spectra were taken with Cary D-17 spectrophotometer. Difference spectra were taken using two separate cells, one containing chloranil,