

Thermochromic Excited – State Dipole Moment Measurements of p-Cyano-N,N-diethylaniline in Ethyl Acetate

A. Kowski, B. Kukliński, and P. Bojarski

Institute of Experimental Physics, University of Gdańsk,
ul. Wita Stwosza 57, PL-80-952 Gdańsk, Poland

Reprint requests to Prof. A. K., ul. Gen. W. Sikorskiego 11, PL-84-200, Wejherowo, Poland.
E-mail: fizpb@univ.gda.pl

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The effect of temperature on absorption and fluorescence spectra of p-cyano-N,N-diethylaniline (CDEA) in ethyl acetate has been studied for temperatures ranging from 293 K to 418 K. At $T = 293$ K two fluorescence bands are observed: long wavelength emission (LE) and short wavelength emission (SE) of much lower intensity compared to the first one. With temperature increase (which leads to the decrease of dielectric constant ϵ of the solvent) the intensity of SE band strongly increases, however its hypsochromic shift compared to the shift of LE band is rather slight. The electric dipole moments for CDEA determined based on this thermochromic method are: $\mu_e^{LE} = 13.4$ D and $\mu_e^{SE} = 7.5$ D for $\mu_g = 5.5$ D, and $\mu_e^{LE} = 13.9$ D and $\mu_e^{SE} = 8.3$ D for $\mu_g = 6.6$ D. The values obtained are compared with those of p-cyano-N,N-dimethylaniline (CDMA) determined using different methods.

Key words: Thermochromic Absorption and Fluorescence Band Shifts; Dipole Moments in the Excited State; Dual Fluorescence.