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ELECTRONIC SPECTRA OF 4-N-HEPTYL-4'-CYANOBIPHENYL (7CB) IN NEMATIC AND ISOTROPIC LIQUID STATES

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Abstract The linear dichroism spectra of the ultraviolet absorption of 7CB have been observed in a nematic single liquid crystal at several temperatures and in an isotropic liquid.

In a previous paper[1], the linear dichroism spectra of the ultraviolet absorption of MBBA were reported in a nematic single liquid crystal at 23.4 - 24.3°C. In the present letter, the results for 7CB are reported.

The sample of 7CB was purified by distillation in vacuo twice and crystallized four times. The UV spectra in the 190 - 400 nm region were obtained with a Cary 14M recording spectrophotometer. The sample of nematic single liquid crystal in a homogeneous orientation was prepared by the same technique as that used in the previous measurement of MBBA[1]. The

gap of the cell was 1.21 μm. The emf of a chromel-P - constantan thermocouple for the temperature measurements was measured by a precision digital meter (Yokogawa Electric Works. Ltd. Type 2501). In order to estimate

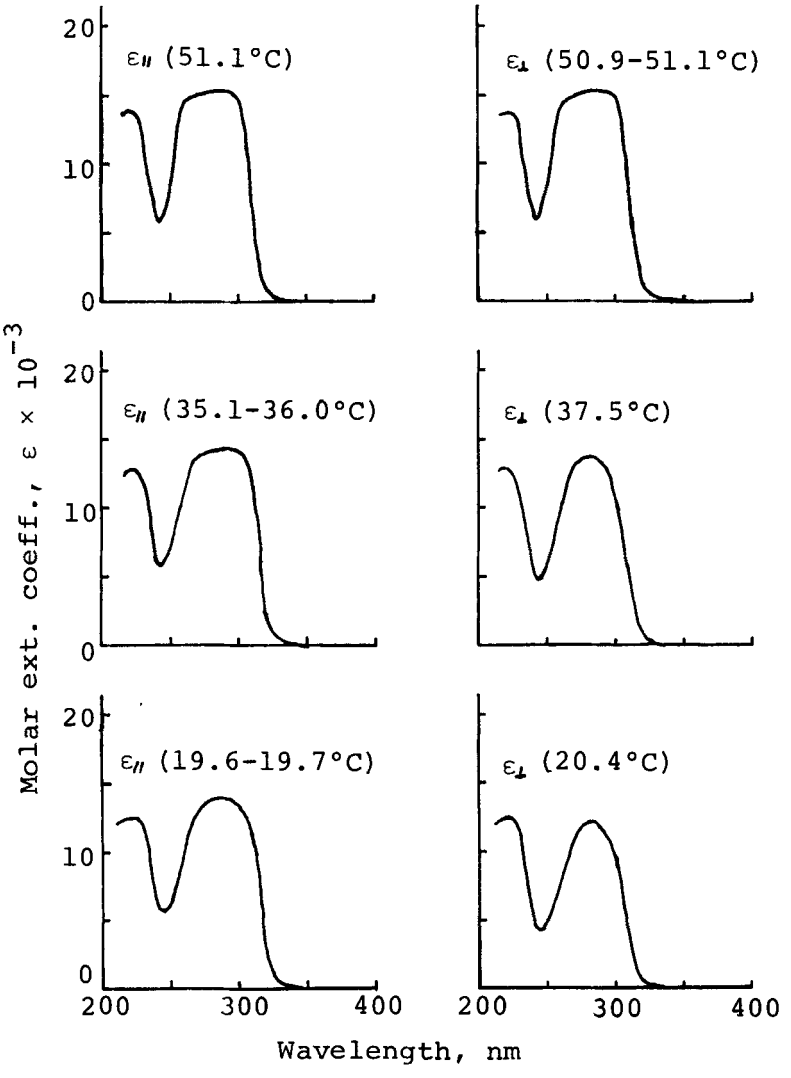

Figure 1. Linear dichroism spectra of 7CB in nematic single liquid crystal and isotropic liquid at several temperatures.

molar extinction coefficients, we used the observed densities of 7CB[2].

Figure 1 shows the linear dichroism spectra of the nematic single liquid crystal and the UV absorption spectrum of the isotropic liquid. The dependence of the UV spectrum on temperature is different from that obtained for MBBA in nematic poly-liquid crystal[3]. In MBBA the wavelength (λ_{max}) of the absorption maxima did not shift and the molar extinction coefficient (ε_{max}) increased with increasing temperature. On the other hand, in 7CB ε_{max} increases very little as the temperature rises, and the broad absorption spectrum in 250 - 330 nm may be composed of two overlapping bands and split with increasing temperature. The oscillator strength (f) of the band appeared in 250 - 330 nm is plotted against temperature as shown in Figure 2.

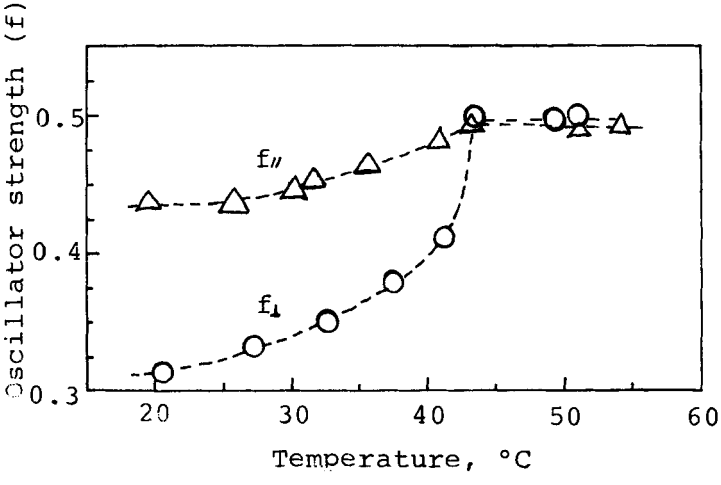

Figure 2. Plots of oscillator strength against temperature for the band appeared in 250 - 330 nm.

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