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DIFFERENTIAL SCANNING CALORIMETRY OF p-SEXIPHENYL

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ABSTRACT: The nematic-to-isotropic transition for the liquid crystal forming compound p-sexiphenyl was determined with pressure differential scanning calorimetry. Temperature and heat of the transition was 553°C and 0.6 Kcal/mole, respectively.

We have recently reported the liquid crystal transition for p-sexiphenyl observed with the aid of hot-stage polarized light microscopy and differential scanning calorimetry (DSC). [1] Temperature and enthalpy values were measured for the solid-to-smectic and smectic-to-nematic transitions, but we were unable, at that time, to detect the nematic-to-isotropic transition. Because of the interest in this transition, expressed in recent theoretical studies of rod-like nematic liquid crystals, [2,3,4] we have attempted again to measure the temperature of the nematic-isotropic conversion by DSC.

The DSC experiment was performed on a purified sample of p-sexiphenyl by using a DuPont Model 990 Thermal Analyzer with a DSC attachment and a DSC pressure cell. The cell was pressurized at 500 psi with argon and the sample was heated at a rapid rate of 50°C/minute to 600°C. This fast heating rate allowed all the transition to be observed prior to irreversible thermal decomposition of the p-sexiphenyl. The use of high pressure is necessary

to suppress volatilization at the very high temperatures. For integration, the DSC experiment was repeated by using a time-base scale.

The DSC trace is reproduced in Figure 1. The temperature and enthalpy for the nematic-isotropic transition for p-sexiphenyl was measured at 553°C and 0.6 Kcal/mole, respectively.

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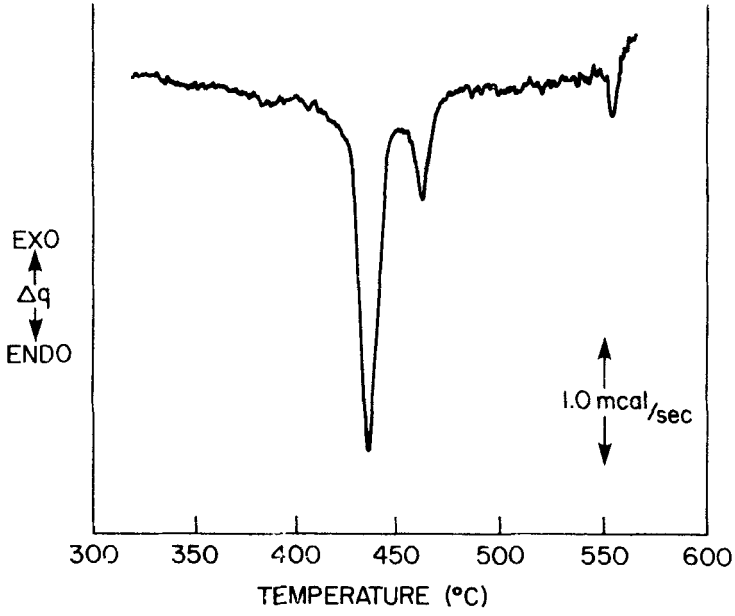

Figure 1: DSC Trace for p-Sexiphenyl. Heating Rate = 50°C/min, Pressure = 500 psi Argon, Sample Size = 4.05 mg.