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Thermal and Spectrophotometric Analysis of Liquid Crystal 8CB/8OCB Mixtures
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Abstract

The binary system of 4-octyl-4¿-cyanobiphenyl (8CB) and 4-octyloxy-4¿-cyanobiphenyl (8OCB) has been studied by means of differential scanning calorimetry (DSC) and ultraviolet absorption spectrophotometry (UV). The phase-transition temperatures, enthalpies, and entropies have been determined by using calorimetric methods on DSC. The results indicate clearly the existence of threephase regions across the crystalline-to-smectic A, smectic A-to-nematic, and nematic-to-isotropic transitions in the 8CB/8OCB mixtures. The obtained phase-transition temperatures of the 8CB/8OCB mixtures are between the data for 8CB and 8OCB. A few of the phase transitions cannot be observed at high heating rates. The phase-transition temperatures of the 8CB/8OCB mixtures rise with the heating rate between 2°C/min and 15°C/min. The activation energies were calculated by the Ozawa method for the phase transitions of 25% 8CB and 75% 8OCB liquid crystal mixtures. UVexperiments were carried out to characterize the absorptivity constants of liquid crystal and their mixtures. The molar absorptivity and maximum absorption wavelengths were measured in chloroform solution by UV spectrophotometry. The maximum absorption wavelength of the 8CB/8OCB mixtures increases with decreasing percent weight of 8CB in 8OCB, a result associated with the different lengths of the alkyl chain.

Keywords

Liquid crystal mixtures, Phase transition, 8CB, 8OCB, UV, DSC.