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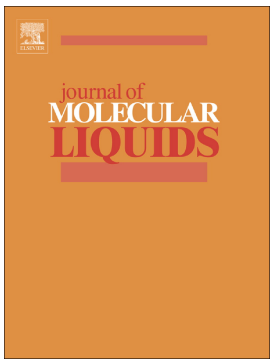

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ACCEPTED MANUSCRIPT

A Novel approach for analyzing refractive Indices and birefringence of Nematic Liquid Crystals

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Abstract:

In this paper, we have proposed new technique for determining the ordinary and extra ordinary refractive indices and birefringence of liquid crystals EPAP Valerate, HOBA and NOBA through image analysis method in conjunction with polarizing optical microscopy as a function of temperature by keeping the liquid crystal sample between the polarizers attached with a hot stage and a high-resolution camera. Liquid Crystals employed with image intensities is being used to find out the optical transmittance which is necessary for evaluating the refractive indices by validating the Swanepoel's method. Results obtained in this image analysis method are compared with experimentally determined values of EPAP Valerate, HOBA, NOBA performed with wedge technique and are found in good agreement with an accuracy of $\pm$ 0.0001. Image analysis method is simple and suitable to determine the refractive indices of liquid crystals.

Keywords: Liquid crystals, Optical transmittance, image analysis, Ordinary and extra ordinary Refractive indices, birefringence.

1. Introduction:

Nematic liquid crystals are vastly studied [1,2] due to their theoretical and technological applications in display devices etc. Devices and configurations based on liquid-crystal materials are being developed for spectroscopy, imaging and microscopy, leading to new techniques for optically probing systems in various fields. Liquid crystals show specific optical properties due to the anisotropy of molecular organization when they are subjected to external parameters like

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