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# Synthesis and Study Dielectric Properties of a new Schiff-base liquid crystal

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**Abstract.** A new central linkage group aromatic Schiff base liquid crystal has been synthesized by using condensation of an Alkyl chloride ( $C_nH_{2n+1}(Cl)_{n=4,5,6,7}$ ). This crystal was characterized by Fourier transform infrared (FTIR) spectroscopy, differential scanning calorimetry (DSC) and polarizing optical microscopy (POM). Schiff base liquid crystal sample exhibiting the smectic phase. The temperature variation of the dielectric anisotropy ( $\Delta\epsilon$ ) of the sample has been measured. The dielectric anisotropy was found to be ( $\Delta\epsilon = 0.38$ ). This research studies the effects of concentration of Schiff base liquid crystal on the behavior of optical limiting and threshold power.

**Keyword.** DSC; Schiff base; liquid crystal; Optical limiting; laser.

## INTRODUCTION

The materials of liquid crystalline are very interest subject in different scientific areas including material science, life sciences, and their applications in numerous fields, such as thermo-conducting materials, electro-optics, the fields of optics and fast switching [1,2]. The relevance of liquid crystals largely depends not only on their expanded application in display apparatus/devices but also on a variety of scientific applications [3]. However, the use of liquid crystals in different devices is dependent upon some properties which may include the following: optical transmittance, dielectric anisotropy, dielectric constant, birefringent behavior, elastic constants, etc. Smectic liquid crystals show both orientational order and some translational order [4]. The molecules are gathered into layers, applying positional order in one way. Inside of the layers, the ordering can be designated by the smectic order factor [5]. Several sorts of molecules packing in layers; each sort matches with altered varieties of smectic phases. The smectic phases are coded with letters A, B, C, etc. SmA and SmC phases are classified as the most vital smectic phases. A characteristic feature of smectic liquid crystals is not only the exhibition of a phase transition behavior but also their dielectric properties and results from optical studies. These studies are useful in explaining the molecular dynamics and structure as well as the interaction between different molecular types which may depict likely phases as can be seen in molecular samples [6]. In this work, the LC properties of E-2- chloroethyl 4(4-hydroxybenzylidene) aminobenzoate have been investigated. The anticipation of this study was that the side pendants would offer channels for carrier transport and the rigid backbone would performance as a mechanical strength manufacturer. Their synthesis, liquid crystalline properties, thermal analysis and dielectric anisotropy of the Schiff base liquid crystal will be described. Also, employed is the use of a standard and reliable tool-“Optical polarizing microscopy (OPM)” used in the determination of phase transitions in the liquid crystal.