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\* The journal is indexed in Web of Science and due to a technical error was not included in the 2013 Journal Citation Reports. We have confirmation from the JCR editors that the journal will be included in the 2013 JCR to be released in June 2014.

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## PREPARATION AND STUDY OF THE ELECTRICAL AND OPTICAL PROPERTIES OF A NEW AZO DYE (4-ACETAMINOPHENOL – [2-(4-AZO)]-4-AMINO DIPHEYL SULFONE)

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The electrical and optical properties of a new azo dye powder (4-Acetaminophenol – [2-(4-Azo)]-4-Amino dipheyl sulfone) have been investigated. The dielectric constant  $\epsilon'$  and dielectric loss  $\epsilon''$  depend on the frequency up to 50 KHz and are nearly constant beyond. The optical constants such as refractive index  $n$ , the dispersion energy  $E_d$ , the oscillation energy  $E_o$ , lattice dielectric constant  $\epsilon_L$ , the light frequency dielectric constant  $\epsilon_\infty$ , the ratio of carrier concentration to the effective mass  $N/m^*$  and energy band gap  $E_g$  have been determined by reflection spectra in the wavelength range (200-1100) nm. The nonlinear properties and thermo-optic coefficient of this azo dye dissolved in ethanol using Z-scan technique is also investigated.

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**Keywords:** Electrical properties; Optical constants ; Z-scan, Azo dye

### 1. Introduction

Azo dye has received great attention due to its environmental stability, ease of preparation, and its optical and electrical properties. Much work has been carried out on the molecular design, synthesis, and assembly of structures with desired properties [1-3]. Knowledge of optical constants of a material such as refractive index and extinction coefficient are quite essential to examine material's potential opto-electronic applications [4]. Further, the optical properties may also be closely related to the material's atomic structure, electronic band structure and electrical properties.

In this paper, the dielectric constant  $\epsilon'$  and dielectric loss  $\epsilon''$  have been measured for a new azo dye powder (4-Acetaminophenol-[2-(4-Azo)]-4-Amino dipheyl sulfone) in the frequency range (100 -  $2 \times 10^6$ ) Hz. The optical constants of the azo dye powder discs of 1cm diameter are determined by optical characterization method, also, the nonlinear optical properties for the azo dye in the ethanol solution were investigated by the use of the Z-scan technique.

### 2. Experimental details

#### 2.1 Sample preparation

An azo dye was prepared by a method similar to that described by Fox [5]. In the present method the dye was prepared as follows

1.(0.006 mol, 1.4898 g) of the amine was dissolved in 2 ml of concentrated HCl and then 10 ml of distilled water was added, then the mixture was stirred and kept in an ice bath.

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