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Synthesis, Spectral and Electrical Conductance Properties of Terpolymer Resin-IV

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Abstract: *Terpolymer resin ANBAF-IV were made by combining 2-amino 6-nitrobenzothiazole, adipamide with formaldehyde at 124 □ in the presence of an acid catalyst in a 4:1:5 molar ratios. Thin layer Chromatography (TLC) was utilized to test and confirm the purity of a newly synthesized terpolymer. Elemental analysis was used to establish the compositions of terpolymer. Gel permeation chromatography was used to measure the number average molecular weight. To figure out the structure, researchers looked at electronic spectra, infrared and nuclear resonance magnetic spectra. The electrical characteristics of the ANBAF-IV terpolymer were examined over a wide range (314-403K), the activation energy of electrical conduction was calculated and the logσ vs 1000/T plot was shown to be linear over a wide temperature range.*

Keywords: Terpolymer resin, Electrical Conductivity, Condensation, Morphology, Elemental Analysis.

I. Introduction

Terpolymers are unique and versatile, which is why they are so important in the field of material research. Terpolymers have advanced at a breakneck pace, with applications in packaging, adhesives, and coatings in electrical sensors and organometallic semiconductors. Semiconductor materials are the building blocks of modern electronics, which include radios, computers, telephones, and a variety of other gadgets. Transistors, solar cells, various types of diodes, including the light-emitting diode and the silicon controlled rectifier, as well as digital and analogue integrated circuits, are examples of such devices.

Despite the fact that a wide range of conjugated organic molecules are classified as semiconductors, their carrier mobility is typically limited. This is owing to the difficulty in transferring electrons from one molecule to the next.

Phenolic resins have large number of practical application in electronic controls, insulating materials, protective adhesives, aerospace industries etc. because of their high thermal stability, heat and chemical resistance and electrical insulation properties [1, 3]. An effective approach to reduce interparticle gaps by nanofillers for making highly conductive graphite/polymer composites were reported based on the conductive tunneling mechanism [4]. Increased doping reduces the Seebeck coefficient in conventional semiconductors, and there is an optimum doping concentration for thermoelectric cooling or power production applications is an overview of the power factor (electrical conductivity times the square of Seebeck coefficient) testing findings for various electrically conductive polymers [5].

One-dimensional conductive polymers are attractive materials because of their potential in flexible and transparent electronics. Despite years of research, on the macro- and nano-scale, structural disorder represents the major hurdle in achieving high conductivities [6]. The mechanical and electrical properties of the composite with different weight percentages of nanotubes have been investigated. The high aspect ratio and the good conductivity of MWNT have been used to improve the performance of rubbery epoxy matrix nanocomposites [7]. The electrical and thermal conductivity of systems based on epoxy resin (ER) and poly (vinyl chloride) (PVC) filled with metal powders have been studied [8]. Keith J. M. et al [9] have explained the electrical conductivity of carbon / polypropylene composites tested by using single fillers included carbon black, synthetic graphite, and carbon nanotubes. Borker and colleagues [10,11] investigated the optical and electrical properties of conducting copolymers such as poly (aniline-co-n-ethylaniline) and poly (aniline-co-n-ethylaniline) (aniline-co-m-methylaniline). Solubility, spectroscopic technique, and electrical conductivity measurements were used to characterise the products. With increasing N-ethylaniline concentration, copolymer conductivity drops.Epoxy resin