

## **SYNTHESIS, CHARACTERIZATION AND THERMAL AND ELECTRICAL STUDIES OF POLYANILINE- CDS NANOCOMPOSITE BY CHEMICAL OXIDATIVE ROUTE**

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### **ABSTRACT**

A monomer aniline has been taken to synthesize polyaniline by chemical oxidative route in presence of sulfuric acid as an oxidant and Ammonium persulphate as oxidizing agent.

The composites of nano size CdS with polyaniline have been synthesized by the same procedure

The prepared products were characterized by XRD, FTIR, UV-Visible spectroscopy TGA, DTA, TEM, SEM, DC/AC electrical conductivity .

FTIR absorption band at  $3600-3500\text{cm}^{-1}$  confirmed the highly attached polyaniline with CdS nanoparticles. The XRD study reveals the increase in crystalline nature of nanocomposite. TEM showed the CdS particles are in nano range with the average diameter of 21 nm which was evenly distributed in polymer matrix. Thermo gravimetric analysis clearly indicated the increase in thermal stability of nanocomposite than the pure PANI. The uniform intercalation of CdS nanoparticles results in a cooperative phenomenon between the polyaniline and the nanoparticles, as a consequence, the CdS nanoparticles increased the electrical conductivity of polyaniline nanocomposite to  $1.79 \times 10^{-3} \frac{\text{S}}{\text{cm}}$  compared to the pure polyaniline ( $10^{-10} \frac{\text{S}}{\text{cm}}$ ) and Silicon ( $10^{-4} \frac{\text{S}}{\text{cm}}$ ) semiconductors. Its electrical conductivity was found to be analogous with existing semiconducting metals. The fact is supported by the ample of experimental results and characterization evidences.

Keywords: Polyaniline, electrical conductivity, thermal stability, CdS nanoparticles.