SYNTHESIS AND CHARACTERIZATION OF COPOLYMER RESIN-II DERIVED FROM 2,2-DIHYDROXYBIPHENYL, FORMALDEHYDE AND PROPYLENE DIAMINE

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Abstract

Synthesis ofcopolymer resin (2,2'DBPDF) have been prepared by the condensation of 2,2-dihydroxybiphenyl (BP) and Propylenediamine(PD) with formaldehyde (F) in the presence of acid catalyst and using 2:1:3 molar ratio of reacting monomers. Copolymer resin compositions have been determined on the basis of their elemental analysis and the number average molecular weights of resin were determined by conductometric titration in non-aqueous medium. Viscometric measurements in dimethyl formamide (DMF) have been carried out with a view to ascertain the characteristic functions and constants. The UV-visible, FTIR and proton nuclear magnetic resonance (H^1 NMR) spectra were studied to elucidate the structure. The surface features and crystalline behavior of the ligand and its complexes were analyzed by scanning electron microscope (SEM).

Keywords: Synthesis, 2,2'-dihydroxyipheyl, propylenediamine, formaldehyde, polycondensation, resin, structure, degree of polymerization, characterization.

Introduction

Polymers very special classes of polymers are known for their versatile uses and are found to be amorphous, crystalline or resinous in nature. Phenolic resins have been the workhorse as matrix resins in composites for structural and thermal applications in aerospace because of their ease of processability, thermal stability, versatile characteristics and cost effectiveness. W. Tang and coworkers[1] studied the thermal decomposition kinetics of thermotyropiccopolyesters made from p-hydrocinnamic acid and p-hydrobenzoic acid. Copolymers occupy an intermediate position between organic and inorganic compounds and it is hoped that the study of copolymers will lead to the production of polymer, which are both thermally stable and useful as fabricating materials. P. E. P. Michael et al. studied synthesis, characterization and thermal degradation of 8-hydroxyquinoline–guanidine–formaldehyde copolymer[1].Rahangdale and coworkers studied thermal degradation of polymers derived from 2, 4-dihdroxy-acetophenone,dithioxamide and formaldehyde[2].

Copolymer resins are derived from 2,4-dihydroxypropiophenone, biuret, and formaldehyde in hydrochloric acid as catalyst and studied their thermal degradation[3]. Thermal degradation of*m*-nitroaniline, *m*-chloroaniline and *m*-aminophenol has been studied by Dash *etal.*[4]and 2-hydroxyacetophenone,oxamide and formaldehyde[5]. S. L. Oswal et al synthesized and studied thermal properties of copoly(maleimide-methylmethacrylate), terpoly(maleimide-methylmethacrylate-acrylicacid), and terpoly-(maleimide-methyl Methacrylatemethylacrylic acid). The thermal behaviour was studied by TG and DSC techniques[6].Thermoanalysis and rheological behavior of copolymers of methyl methacrylate, N-phenylmaleimide and styrene studied by G. Jungang et al[7]. In order to synthesize polymers having numerous practical applications, there is a need to investigate the effect of heat on the polymers in order to establish their thermal stability. It must be pointed out that all the methods proposed have been developed by assuming that both activation energy and kinetic model do not