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Synthesis and Study of Thermal Degradation Process of 2,4-Dihydroxyacetophenone-Guanidine-Formaldehyde Copolymer

Preeti Mishra[1], D. M. Chafle[2] and W. B. Gurnule[1]

Department of Chemistry, Kamla Nehru Mahavidyalaya, Sakkardara, Nagpur, India[1]

Department of Chemistry, Taywade College, Mahadula, Koradi, Nagpur, India[2]

prietyamitmishra@gmail.com and wbgurnule@gmail.com

Abstract: *The resin DAPGF-III, in a molar ratio of 3: 1: 5 was made by heating in the presence of 2M hydrochloric acid for 5h by polycondensation of Guanidine hydrochloride and 2,4-Dihydroxyacetophenone in the presence of formaldehyde. The preliminary structure of the copolymer was evaluated by spectral methods such as elemental analysis, ^{1}H-NMR, FTIR and UV-Visible techniques. The molecular weight of the copolymer was determined by non-aqueous conductivity titration performed by using alcoholic KOH. TGA analysis of the synthesized copolymer is carried out by non-isothermal thermogravimetric analysis, where the sample is exposed to continuous temperature rise at a heating rate of 20°C / min in an air atmosphere and is used to study the rate, decomposition and thermal stability analysis of newly synthesized copolymer at which it was executed. Thermal parameters such as apparent entropy (ΔS), frequency factor (A), change in free energy (ΔG), and rate of reaction were determined according to the methods of Freeman Carroll (FC) and Sharp Wentworth (SW). The activation energy measured by the FC method was confirmed by the SW method.*

Keywords: Polycondensation, Spectral methods, TGA, Thermokinetic parameters, Guanidine, Synthesis

I. INTRODUCTION

In current years, the usage of polymers in all regions of lifestyles has extended significantly. Although numerous scientists have urgently recommended the synthesis of environmentally pleasant polymers with a few organic activities, consisting of antibacterial agents. The examination of thermal decomposition of terpolymer resins has currently grow to be a subject of interest. Polymer component senhance the producing procedure and product quality. A non-stop coating section may be shaped without adversely affecting the coating, enhancing thermal balance [1]. The thermally solid terpolymer resin has advanced the improvement of polymer materials. These terpolymers, that are acetophenone changed with formaldehyde / furfuraldehyde, show off first rate thermal and antibacterial activity [2]. Gurnuleet al. synthesized copolymer become constituted of4-hydroxyacetophenone, biuret, and formaldehyde, and pyrolysis become investigated for thermal balance [3]. Katkamwar et al. A terpolymer resin (8HQDF) synthesized via way of means of condensation of 8-hydroxyquinoline, dithiooxamide, and formaldehyde in an acidic medium [4]. Kushwaha et al. p-nitrophenol resorcinol with antibacterial activity-A resin synthesized from formaldehyde [5]. Singru et al, investigated thermal and kinetic research of resins derived from 8-hydroxyquinoline-five sulfonic acid-oxamide-formaldehyde [6]. Jadhao et al. investigated the thermal decomposition of terpolymer resins crafted from 2,2-dihydroxybiphenyl, urea and formaldehyde [7]. Due to the excessive thermal balance of the copolymer, specific issues had been made to research the synthesis of the copolymer. Thermogravimetric evaluation offers records on cloth degradation and thermal balance, as a consequence many analysts mixed copolymers to enhance thermal balance [8] [9] [10]. Kinetic parameters consisting of activation power (Ea) and thermodynamic parameters consisting of entropy change (ΔS), unfastened power change (ΔF), obvious entropy (S *), and frequency factor (Z) are It may be decided via way of means of analysing the thermal evaluation information. [11-13], Sharp Wentworth [14], Freeman Carroll [15], Phadnis Deshpande technique [16]. Pratik et al. Investigating the thermal decomposition of copolymers of salicylic acid, guanidine, and formaldehyde [17],