World Academy of Science, Engineering and Technology
International Journal of Chemical and Materials Engineering
Vol:10, No:07, 2016

Synthesis and Characterization of Poly(2-[[4-(Dimethylamino)Benzylidene] Amino]Phenol) in Organic Medium: Investigation of Thermal Stability, Conductivity, and Antimicrobial Properties

Authors : Nuray Yilmaz Baran, Mehmet Saçak

Abstract : Schiff base polymers are one class of conjugated polymers, also called as poly(azomethines). They have drawn the attention of researchers in recent years due to their some properties such as, optoelectronic, semiconductive, and photovoltaic, antimicrobial activities and high thermal stability. In this study, Poly(2-[[4-(dimethylamino)benzylidene]amino] phenol) P(2-DBAP), which is a Schiff base polymer, was synthesized by an oxidative polycondensation reaction of -[[4-(dimethylamino)benzylidene]amino]phenol (2-DBAP) with oxidants NaOCl, H_2O_2 and O_2 in various organic medium. At the end of the polymerizations carried out at various temperatures and time, maximum conversion of the monomer to the polymer could be obtained as around 93.7 %. The structures of the monomer and polymer were characterized by UV-Vis, FTIR and ^{1}HNMR techniques. Thermal analysis of the polymer was identified by TG-DTG and DTA techniques, and the thermal degradation behavior was supported by Thermo-IR spectra recorded in the temperature range of 25-800 °C. The number average molecular weight (Mn), weight average molecular weight (Mw) and polydispersity index (PDI) of the polymer were found to be 26337, 9860 g/mol 2.67, respectively. The change of electrical conductivity value of the P(2-DBAP) doped with iodine vapor at different temperatures and time was investigated its maximum was measured by increasing 10^{10} fold as 2 x10^{-4} Scm^{-1} after doping for 48 h at 60 °C. Antibacterial and antifungal activities of P(2-DBAP) Schiff base and its polymer were also investigated against Sarcina lutea, Enterobacter aerogenes, Escherichia coli, Enterococcus Faecalis, Klebsiella pneumoniae, Bacillus subtilis, and Candida albicans, Saccharomyces cerevisiae, respectively.

Keywords : conductive properties, polyazomethines, polycondensation reaction, Schiff base polymers, thermal stability
Conference Title : ICACCE 2016 : International Conference on Applied Chemistry and Chemical Engineering
Conference Location : Paris, France
Conference Dates : July 25-26, 2016