

CHEMICAL OXIDATIVE POLYMERIZATION OF *p*-PHENYLENEDIAMINE AND ITS DERIVATIVES

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ABSTRACT

A series of *p*-phenylenediamine (*p*PD), 2,5-dimethyl-*p*-phenylenediamine (dMe-*p*PD) and 2,3,5,6-tetramethyl-*p*-phenylenediamine (tMe-*p*PD) polymers, were synthesized by chemical oxidative polymerization in different polymerization conditions, using ammonium persulfate as an oxidant. Aluminium triflate (Al(OTf)₃) was used as a co-catalyst for various polymerization reactions. The poly(*p*-phenylenediamine) (P(*p*PD)), poly(2,5-dimethyl-*p*-phenylenediamine) (P(dMe-*p*PD)) and poly(2,3,5,6-tetramethyl-*p*-phenylenediamine) (P(tMe-*p*PD)) polymers obtained were characterized by FT-IR, UV-vis, ¹H and ¹³C NMR, WAXD, DSC and TGA. The addition of Al(OTf)₃ to the polymerization reaction improved the polymerization yield of some polymers. The solubility of P(dMe-*p*PD) and P(Me-*p*PD) polymers was significantly improved compared to the P(*p*PD) polymers in most solvents due to the effect of methyl side groups. Results obtained showed that the yield, solubility and structure of the polymers are significantly dependent on the polymerization conditions. DSC measurements indicated that the polymers exhibited melting and crystallization transitions. The TGA results revealed that P(*p*PD), P(dMe-*p*PD) and P(tMe-*p*PD) polymers have good thermal stability and decompose above 400 °C in nitrogen.

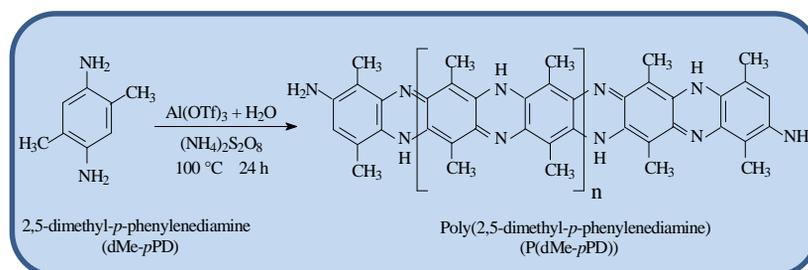


Fig. : Polymerization reaction of 2,5-dimethyl-*p*-phenylenediamine

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