

Preparation and Characterization of Conductive Poly(N-Ethyl Aniline)/Kaolinite Composite Material by Chemical Polymerization

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Abstract : Conductive composite materials obtained by physical or chemical mixing of two or more components having conducting and insulating properties have been increasingly attracted. Kaolinite in kaolin clays is one of silicates with two layers of molecular sheets of $(\text{Si}_2\text{O}_5)_2^-$ and $[\text{Al}_2(\text{OH})_4]^{2+}$ with the chemical composition $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$. The most abundant hydrophilic kaolinite is extensively used in industrial processes and therefore it is convenient for the preparation of organic/inorganic composites. In this study, conductive poly(N-ethylaniline)/kaolinite composite was prepared by chemical polymerization of N-ethyl aniline in the presence of kaolinite particles using ammonium persulfate as oxidant in aqueous acidic medium. Poly(N-ethylaniline) content and conductivity of composite prepared were systematically investigated as a function of polymerization conditions such as ammonium persulfate, N-ethyl aniline and HCl concentrations. Poly(N-ethylaniline) content and conductivity of composite increased with increasing oxidant and monomer concentrations up to 0.1 M and 0.2 M, respectively, and decreased at higher concentrations. The maximum yield of polymer in the composite (15.0%) and the highest conductivity value of the composite (5.0×10^{-5} S/cm) was achieved by polymerization for 2 hours at 20°C in HCl of 0.5 M. The structure, morphological analyses and thermal behaviours of poly(N-ethylaniline)/kaolinite composite were characterized by FTIR and XRD spectroscopy, SEM and TGA techniques.

Keywords : kaolinite, poly(N-ethylaniline), conductive composite, chemical polymerization

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