

不同合成條件對聚苯胺形態影響之研究

英文摘要

Polyaniline (PANi) were synthesized by polymerization at 25°C in various acid solutions (such as, hydrochloric acid, formic acid, acetic acid, butyric acid and hexanoic acid). Effects of acidic structure, acidic concentration and reaction time on the morphology of polyaniline were investigated by scanning electron microscopy (SEM), transmission electron microscopy (TEM), UV-Vis spectrophotometer (UV-Vis), Fourier transform infrared spectrometer (FT-IR), electron spectroscopy for chemical analysis (ESCA), 4-Probes milliohm meter, and Ubbelohde viscometers. Results showed that the nano- sized and fibrous PANi are prepared in different concentration of hydrochloric acid, with an average diameter of 20-50 nm, suggesting the independence of hydrochloric acid concentration and reaction time. The viscosity average molecular weight and conductivity of PANi nanofibers increased with hydrochloric acid concentration. Micro- and nano-sized polyaniline are also formed in different concentration of fatty acid solutions, revealing a wide distribution of rods, tubes, fibers, spheres, and granular species are dispersed in the matrix, the diameter of rods are not significantly related to alkyl chain lengths of fatty acids. In formic acid solution, aniline monomer first oxidation to produce a hydrophobic phenazine unit of ortho-coupled anilines due to at higher pH condition, the other side of phenazine unit is then exhibited a hydrophilic characteristic followed by decreasing in pH value, and leading a tubular morphology of PANi is formed. The external diameter of the nanotube is about 100 - 200 nm, the inter cavity is ca. 10-120 nm, and the length extended to several micrometers, tubular morphology can be gradually converted to a rod-like morphology as the reaction proceeding. The viscosity average molecular weight and conductivity of PANi obtained from fatty acid solutions are markedly

lower than that of PANi is synthesized in hydrochloric acid solution.