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Removal of methylene blue dye from aqueous medium by nano poly acrylonitrile particles

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ABSTRACT

This article concerns the removal of Methylene Blue (MB) dye using nano-poly Acrylonitrile (PAN) and hydroximated nano-poly Acrylonitrile (HPAN) particles prepared by precipitation polymerization technique. The effect of the process variables including contact time, pH, initial dye concentration and temperature on the adsorption characters for PAN and HPAN was studied. The removal percentage varied from 100% to 60% with MB concentration ranged from 5 to 50 ppm. A significant difference was observed at 15–20 ppm where the removal percentage was found 70% and 90% for PAN and HPAN, respectively. No significant effect was observed of variation adsorption temperature from 30°C to 70°C or pH variation from 5 to 9. On the other hand, the polymerization and hydroximation processes of Acrylonitrile were studied. The conversion yield (%) was affected significantly by initiator concentration and polymerization temperature and varied from 2% to 80%. Particle size increased from 130 to 210 nm as a result of hydroximation process. Additional proves for occurrence of hydroximation process was obtained from thermo gravimetric analysis (TGA) and infrared spectrometer analysis (FT-IR). Irregular shape of polymer particles was indicated by scanning electron microscope (SEM) photographs.

Keywords: Nano-polyacrylonitrile; Precipitation polymerization; Dye removal; Adsorption; Methylene blue; Polymer functionalization

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