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Adsorption of organic pollutants by nano-conducting polymers

composites: Effect of the supporting nano-oxide type

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Abstract:

Nano-composites of polyaniline (PANI) are prepared by the chemical polymerization method in the presence of different nano-supporting oxides, SiO₂, TiO₂, Al₂O₃, and Fe₃O₄. XRD and TEM reveal the formation of cubic phases of PANI/Al₂O₃ and PANI/Fe₃O₄ composites and orthorhombic and hexagonal phases of PANI/TiO₂ and PANI/SiO₂ composites with average particle size values of 13.1, 7.5, 7.9, and 16.0 nm, respectively. TGA confirms that the thermal stability of PANI is increased by forming nano-composites with different nano-oxides. All prepared PANI composites are applied as sorbents for congo red removal from aqueous solutions. Several factors affecting the adsorption process such as pH, contact time, initial dye concentration, temperature, and the sorbent dose are optimized and explained in terms of the supporting oxide type. Adsorption follows pseudo second order kinetics and Langmuir isotherm. Calculated thermodynamic parameters confirm chemisorption mode. The performance of nano-PANI composites in real sample analysis gives a satisfactory result.

Keywords: Conducting polymers; Nano-Composites; Adsorption; Organic Dyes.

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