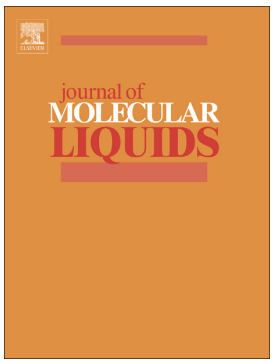

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Islam Ali, Saddam A. AL-Hammadi, Tawfik A. Saleh

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Simultaneous sorption of dyes and toxic metals from waters using synthesized titania- incorporated polyamide

Islam Ali [1], Saddam A. AL-Hammadi [2], Tawfik A. Saleh [1 *]

Department of Chemistry, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia

Department of Chemical Engineering, King Fahd University of Petroleum & Minerals, Dhahran 31261, Saudi Arabia

*Correspondence to: E-mail address: tawfik@kfupm.edu.sa ; tawfikas@hotmail.com

Fax: (966) 13 860 4277

Phone # (966) 13 860 1734

Home Page: http://faculty.kfupm.edu.sa/CHEM/tawfik/publications.html

Abstract

Interfacial polymerization of trimesoyl chloride (TMC) and 1,3- phenylene diamine (MPD) was simultaneously combined with the in-situ formation of TiO_2 from $TiCl_4$ using urea. The titania-polyamide nanocomposite (TPN) was characterized by using X-ray diffraction, Fourier transform infrared spectroscopy, N_2-physisorption analysis and a scanning electron microscope equipped with energy-dispersive X-ray spectroscopy. The TPN was evaluated as an adsorbent for the removal of dyes. It showed high efficiency for the removal of several dyes in the order: methylene blue > bromo phenol > methyl orange > congo red > rhodamine B. The dosage, contact time, and temperature which are the main factors that affect adsorption efficiency, were optimized. Among isotherm models, the experimental adsorption results fitted well with the Langmuir model with a maximum adsorption capacity of 43 mg/g. Kinetic experiments were conducted to describe the equilibrium rate. The model of the pseudo-second-order adequately fitted the experimental data with a correlation coefficient R^2 of 0.998. Thermodynamic studies were performed to evaluate the performance of TPN at various temperatures. Thus, parameters including free energy (ΔG^o),