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Synthesis, vibrational spectrometry and thermal characterizations of coordination polymers derived from divalent metal ions and hydroxyl terminated polyurethane as ligand

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Abstract

A series of novel coordination polyurethanes [HTPU-M, where M= Mn(II) ' d^5 ', Ni(II) ' d^8 ', and Zn(II) ' d^{10} '] have been synthesized to investigate the effect of divalent metal ions coordination on structure, thermal and adsorption properties of low molecular weight hydroxyl terminated polyurethane (HTPU). HTPU-M have been synthesized *in situ* where, -OH group of HTPU (synthesized by the condensation polymerization reaction of ethylene glycol (EG) and toluene diisocyanate (TDI) in presence of catalyst) on condensation polymerization with metal acetate in presence of acid catalyst synthesized HTPU-M followed by coordination of metal ions with hetero atoms. The structure, composition and geometry of HTPU-M have been confirmed by vibrational spectrometry (FTIR), ^1H -NMR, elemental analysis and UV-Visible spectroscopy. Morphological structures of HTPU-M were analyzed by X-Ray Diffraction analysis (XRD), Field Emission Scanning Electron Microscope (FE-SEM) with Energy Dispersive X-ray spectroscopy (EDX) and High Resolution Transmission Electron Microscope (HR-TEM) techniques. The thermal degradation pattern and thermal stability of HTPU-M in comparison to HTPU was investigated by thermal-gravimetric (TG)/differential thermal (DT), analyses along with Integral procedure decomposition temperature (IPDT) by Doyle method. The molecular weight of HTPU was determined by gel permeation chromatography (GPC). The preliminary adsorption/desorption studies of HTPU-M for Congo red (CR) was studied by batch adsorption techniques.

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