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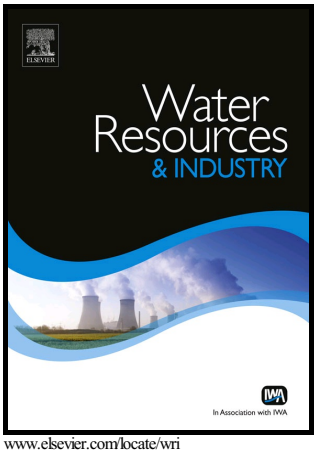

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Abstract: This study investigated the removal of chemical oxygen demand (COD) from electroplating industry wastewater via batch adsorption by purified and polymers functionalized carbon nanotubes (CNTs) as nano-adsorbents. Bimetallic Fe-Co supported on $CaCO_3$ was utilized to produce multi-walled carbon nanotubes (MWCNT) via the catalytic chemical vapor deposition (CCVD) technique. This was subsequently followed by the purification of the as-prepared MWCNTs by a mixture of HNO_3 and H_2SO_4 in order to remove the support and metal particles. The purified MWCNTs was further functionalized using known mass of the following polymers: Amino polyethylene glycol (PEG), polyhydroxylbutyrate (PHB) and amino polyethylene glycol with polyhydroxylbutyrate (PEG-PHB). The purified (P-CNTs) and functionalized CNTs coded PEG-CNTs; PHB-CNTs, and PEG-PHB-CNTs were characterized by HRSEM, HRTEM-EDS, BET, XRD and XPS. The electroplating wastewater was subjected to physicochemical characterization before and after treatment with various prepared nano-adsorbents using standard methods. The adsorption process under the influence of contact time, adsorbent dosage and temperature was measured using the chemical oxygen demand (COD) as indicator parameter. The HRSEM/XRD/BET confirmed that the purified and polymer functionalized CNTs were homogeneously dispersed; highly graphitic in nature with fewer impurities and of high surface area (>145 m^2/g). The order of maximum COD removal by the nano-adsorbents at equilibrium time of 70 minutes are as follows: PEG-CNTs (99.68%) > PHB-CNTs (97.89%) > P-CNTs (96.34%) > PEG/PHB-CNTs (95.42%). Equilibrium sorption data were better described by Freudlich isotherm with the correlation coefficient (R^2>0.92) than Langmuir isotherm. The adsorption kinetics for COD removal from electroplating wastewater fitted well to the pseudo-second-order model with rate constant in the range of $4 \times 10^{-5} - 1 \times 10^{-4}$ (g mg^{-1} min^{-1}). Thermodynamics analysis of the adsorption process revealed that the enthalpy (ΔH^0) of the reaction was positive and endothermic in nature. The Gibbs free energy (ΔG^0) was negative which showed the feasibility and spontaneity of adsorption process. The findings from this study support the potential use of PEG-functionalised CNTs as a nanoadsorbent to purify electroplating wastewater than others prepared sorbents.