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Optimization of Electron Beam-Induced Synthesis of Polypropylene-g-poly(Glycidyl Methacrylate) for Cr(VI) and Cd(II) Adsorption Using Full Factorial Design

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Graft copolymerization is an efficient and attractive method to impart a variety of functional groups to commercially available polymers. This method allows the development of new materials that cannot be synthesized using conventional processes. In this work, carboxylic acid- and amine-type adsorbents were developed from polypropylene nonwoven fabric (PP NWF) using the emulsion phase radiation-induced graft polymerization (RIGP) technique. The set of optimum parameters (e.g. absorbed dose, reaction time, monomer concentration) for grafting glycidyl methacrylate (GMA) on PP trunk polymer was determined using full factorial design. Post-grafting reactions of the poly(glycidyl methacrylate) (PGMA) grafted on PP NWF with ethylenediamine (EDA) and iminodiacetic acid (IDA) imparted approximately 3.0 and 1.2 mmol functional groups per gram-adsorbent, respectively. These covalently bonded chemical groups serve as active sites in the removal of Cr(VI) and Pb(II) from aqueous solutions. Preliminary data suggest that the EDA and IDA functionalized PP has high affinity for Cr(VI) and Cd(II) ions, respectively.

Country/Organization invited to participate

Philippines

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