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An Improved Method of Producing Adsorbent for Metal Removal Using Radiation Induced Graft Polymerization

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Vapour phase grafting of kenaf fiber with glycidyl methacrylate (GMA) using radiation-induced grafting were studied to develop an adsorbent for removal of metal from aqueous solution. The pre-irradiation of kenaf fiber was carried out at different doses from electron beam accelerator at various absorbed radiation doses (10 to 100 kGy). The grafting process was carried out in a chemical vapour deposition reactor operated at temperature of 40 ℃ and gauge pressure of 0 MPa to -0.1 MPa with time range of 15 to 90 minutes. The percentage of grafting, Pg (%) was calculated based on quantitative Fourier transform infra-red spectroscopy (FTIR) analysis. The grafted fiber were confirmed using FTIR and scanning electron microscopy. The optimal condition for enhancing Pg was obtained at irradiation dose of 50kGy, -0.025 MPa gauge pressure, and temperature and reaction time of 40 ℃ and 30 minutes, respectively. Optimization of these parameters will be a guide for subsequent development of grafted copolymer for further functionalization for preparation of adsorbent. The effect in thermal stability of polymeric material after the incorporation of GMA was also investigated. It was found that incorporation of GMA increased the thermal stability of kenaf fiber. The adsorption capacity was assessed to evaluate the efficiency of the adsorbent towards aluminium removal. It was found that the adsorbent could remove more than 99% aluminium with the highest adsorption capacity of 4.98 mg/g.

Country/Organization invited to participate

Malaysia

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