ABSTRACT

Metal cutting fluids are liquid used in machines in the form of emulsified oil for cutting, cooling and lubrication operations. Spent metal cutting fluids in the emulsified form are liberated in the environment through machining waste water which become contaminated by microorganism and produce drastic problem of water pollution. To reduce its polluting and health hazard potential, adsorption tests were performed with metal cutting fluids. Cheaper agro-residues are gaining importance for removal of various hazardous chemicals. Pomegranate peel activated carbon, Pumpkin seed waste and de-oiled mustard cake were successfully utilized in removing waste metal cutting oil from machining water way stream. These activated carbons were prepared by chemical activation with concentrated H₂SO₄. The FTIR, SEM and XRD techniques were used for qualitative analysis of adsorption of waste metal cutting oil on all the three activated carbons. Column adsorption studies were performed by varying adsorbate concentration, influent flow rate and adsorbent bed height. It was found that low adsorbate concentration, pH 8-9, long fixed bed length of adsorbent and low flow rate (25ml/min) of waste metal cutting oil favored its removal from machining waste water in significant amount. It was observed that the experimental and equilibrium data as obtained followed the Langmuir and Freundlich isotherm. It indicates the homogeneous and heterogeneous both type adsorption take place at adsorbent surface. The adsorption on these surfaces is thus complex and involved with more than one mechanism. Thermo-gravimetric analysis shows endothermic type of desorption of oil from adsorbents.