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PRELIMINARY STUDY ON USE OF ACTIVATED COCONUT COIR AS ADSORBENT FOR REMOVAL OF CHLORIDE AND FLUORIDE IN WATER

H.K.M.S.N. Bandara[1], Nilwala Kottegoda[2,3] and A.D.L.C. Perera[1*]

[1]Department of Chemistry, University of Peradeniya, Sri Lanka
[2]Department of Chemistry, University of Sri Jayewardenepura, Sri Lanka
[3]Sri Lanka Institute of Nanotechnology, Centre for Excellence in Nanotechnology, Nanoscience and Technology Park, Homagama, Sri Lanka
[*]chandanip@pdn.ac.lk

Chlorine is a powerful germicide used in killing many disease-causing microorganisms in drinking water and reducing them to almost non-detectable levels. However, it can react with organic matter in the water and form dangerous, carcinogenic trihalomethanes if present in excess. Fluoride has beneficial effects on teeth at low concentrations in drinking-water, but excessive exposure to fluoride in drinking-water, or in combination with exposure to fluoride from other sources, can give rise to a number of adverse effects. This is a preliminary study to investigate the ability of activated coconut coir (ACC) to remove Cl^- and F^- anions in water. Coconut coir, a lignocellulosic polymer, was activated by treating with phosphoric acid followed by pyrolysis and used as an adsorbent for the removal of Cl^- and F^- anions from an aqueous solution. Activated product was characterized by Fourier Transform Infrared (FT-IR) Spectroscopy, Scanning Electron Microscope (SEM) and X-ray diffraction techniques and adsorption capacity was measured using methylene blue number. Chloride and fluoride ion removal ability of activated coconut coir was studied by using standard salt solutions of KCl and NaF, respectively. The concentration of Cl^- was determined using chloride ion selective electrode and that of F^-using SPADNS (sodium-2-(parasulfophenylazo)-1,8-dihydroxy-3,6-napthalene) reagent. After activation, coconut coir gains more porosity and adsorption capacity. This can be attributed by the high Methylene Blue (MB) number of 331.30 mg g^{-1}obtained for ACC. The FT-IR data indicates appearance of new functional groups such as carboxylate and phosphate after activation process. The Powder X-Ray Diffraction pattern of synthesized ACC sample showed a peak at an angle of $2\theta = 24°$ corresponding to the hexagonal graphitic carbon structure of *(002)* plane. The surface morphology and pore structures were analyzed using SEM; SEM images of activated product showed pores in the nanometer size scale. The Presence of nanometer size pores introduces higher adsorption capacity into the ACC. The maximum percent removal of Cl^-observed was 30% and that of F^- was 40% in single filtration. The equilibrium adsorption studies of Cl^- and F^- anions show that experimental data fits well to linear forms of both Freundlich and Langmuir isotherms implying homogenous and monolayer coverage. The Langmuir constant for Cl^- was 388.00 dm^3 g^{-1} and that for F^- was 420.00 dm^3 g^{-1}. The Freundlich constants for Cl^- and F^- were 0.022dm^3 g^{-1} and 0.012dm^3 g^{-1}, respectively. The phosphoric acid activated coconut coir has the potential to be used as low-cost adsorbent for the removal of Cl^- and F^- anions from water.