

Removal of Lead Ions from Aqueous Medium Using Devised Column Filters Packed with Chitosan from Trash Crab Shells: A Characterization Study

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Abstract : Chitosan is a promising biopolymer commonly found in crustacean shells that has plausible effects in water purification and wastewater treatment. It is a primary derivative of chitin and considered second of the most abundant biopolymer prior to cellulose. Morphological analysis had been done using Scanning Electron Microscopy with Energy Dispersive Microscopy (SEM/EDS), and due to its porous nature, it showcases a certain degree of porosity, hence, larger adsorption site of heavy metal. The Energy Dispersive Spectroscopy of the chitosan and 'lead-bound' chitosan, shows a relative increase of percent abundance of lead cation from 1.44% to 2.08% hence, adsorption occurs. Chitosan, as a nitrogenous polysaccharide, subjected to Fourier transform infrared spectroscopy (FTIR) analysis shows amide bands ranging from 1635.36 cm^{-1} for amide 1 band and 1558.40 cm^{-1} for amide 2 band with NH stretching. For 'lead-bound' chitosan, the FT-IR analysis shows a change in peaks upon adsorption of Pb(II) cation. The spectrum shows broadening of OH and NH stretching band. Such observation can be attributed to the probability that the attachment of Pb(II) ions is in these functional groups. A column filter was devised with lead-bound chitosan to determine the zero point charge (pHzpc) of the biopolymer. The results show that at pH 8.34, below than the zpc level of literatures cited for lead which ranges from pH 4 to 7, favors the adsorption site of chitosan and its capability to adsorb traces amount of aqueous lead.

Keywords : chitosan, biopolymer, FT-IR, SEM, zero-point charge, heavy metal, lead ions

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