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Preparation of agriculture residue based adsorbents for heavy metal removal

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ABSTRACT

Guava seeds, a byproduct produced during guava juice processing, are currently of no economic value. In the present work two different types of adsorbents have been prepared from raw guava seeds, namely chemically activated guava seed carbon (AGSC) using zinc chloride and chemically modified guava seeds (MGS) through graft co-polymerization reaction. The adsorption capacity of both adsorbents towards Ni(II) has been investigated. It has been found that the equilibrium adsorption capacity is a function of initial pH, contact time, initial nickel(II) concentration, and adsorbent dosage. The optimum pH for both adsorbents was found to be 6. Both Langmuir and Freundlich models best describe the equilibrium experimental data. The maximum adsorption capacities for AGSC and MGS are 18.05 and 32.05 mg/g respectively. The kinetic experimental data were fitted well by the second-order model. The natures of the main functional groups which may be present on raw guava seeds and MGS have been investigated by infrared (IR) studies.

Keywords: Agriculture residues; Nickel ions removal; Adsorption; Chemically modified adsorbents; Activated carbon; Wastewater treatment

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