

Removal of Cu(II) ions from aqueous solution by activated carbon produced from banana fruit bunch (*Musa paradisiaca*)

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ABSTRACT

A low-cost adsorbent of activated carbon prepared from banana fruit bunch (*Musa paradisiaca*) was used for the removal of Cu(II) ion in aqueous solution. Preparation was carried out with different concentrations of sodium hydroxide (NaOH) and under low hydrothermal carbonization method. Experimental results showed that the maximum surface area was obtained at concentration 20% solution of NaOH $33.43 \text{ m}^2 \text{ g}^{-1}$. Surface morphology of activated carbon has the network cavities of mesopores structures with unsmooth surface and irregular size pores. The pores were closed by the fraction of carbon and other impurities such as silicon. Surface chemistry of activated carbon contains highly oxygen-functional groups relating with base properties. The adsorption capacity of Cu(II) was significantly affected by the initial pH of solution, concentration, contact time and mass of adsorbent. Investigation of equilibrium and kinetics adsorption showed the Freundlich isotherm and the pseudo-second-order with $R^2 > 0.9$, respectively. The result of this observation showed that banana fruit bunch is successfully converted to activated carbon and used as adsorbent for the removal of Cu(II) in aqueous solution.

Keywords: Banana fruit bunch; Activated carbon; Cu(II); Sodium hydroxide; Hydrothermal carbonization

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