Kinetics and Equilibrium Studies For Adsorption of Lead (Ii) Ions on Treated Maize Stalk Charcoal

Rutto Evans Toroitich

B134/12101/2015

Abstract

The deliberate release of heavy metal-containing effluents into water bodies and the ecosystem has been one of the most ambiguous and widespread environmental hazard to human health. Rapid industrialization in most parts of Kenya has worsened the situation as a result of the mass production and deliberate discharge of industrial effluent into the waterways. Due to this, great attention was given to emerging technologies for doctoring of industrial effluents, such as biosorption. Various biological adsorbents had been investigated with a considerable degree of success. For instance, grass biomass, bone charcoal, charcoal dust, rice husk ash, spent bleaching earth and water hyacinth has been used to remove lead ions (Pb^{2+}). The current study assessed the feasibility of using treated maize stalk charcoal as a cheap biosorbent to remove Lead (II) ions .The effects of parameters such as pH, temperature, initial ion concentration and contact time were investigated. The adsorption followed first order kinetics and the pseudo second order equation. To understand and proof the nature of the interaction that occurs between aqueous lead (II) and the active sites of the biosorbent, the data obtained was fitted into Langmuir model.

Kinetics, equilibrium isotherms and thermodynamic parameters were evaluated. The FT-IR analysis was used to show the likely functional groups responsible for the adsorption of lead (II) ions.