Kinetic study of copper (II) removal from aqueous solution onto unmodified kenaf fibre

ABSTRACT

Adsorption has been proven as an excellent method for industrial wastewater treatment. Therefore, there is a need to explore new sources of alternative and inexpensive adsorbent for elimination of heavy metals. In this study, a series of batch experiments was conducted to study the adsorption potential of kenaf as an adsorbent for Cu (II) removal from aqueous solutions. The specific objectives are to obtain kinetics determination and measure the adsorption capacity in batch system. The single adsorption kinetics was carried out at a constant temperature of $30\pm1°C$ using an incubator shaker operated at 200 rpm. The results showed that the equilibrium time for removal of Cu (II) was 3 h at pH 5.0. The pseudo first-order and pseudo second-order models were used to describe adsorption kinetics of Cu (II). It was observed that the adsorption kinetics of Cu (II) ions onto kenaf followed pseudo second-order model. This suggests that the chemisorption mechanism is the rate-limiting step in the adsorption uptake. This study established the feasibility of kenaf as an effective adsorbent for removing Cu (II) from aqueous solution.

Keyword: Kinetic study; Copper (II); Kenaf fibre; Pseudo first and second-order models; Adsorbent