

Fruit waste adsorbent for ammonia nitrogen removal from synthetic solution: isotherms and kinetics

Abstract

In this study, four types of watermelon rind (WR) adsorbents; fresh WR, modified WR with sodium hydroxide (NaOH), potassium hydroxide (KOH) and sulphuric acid (H₂SO₄) were used as a potential low-cost adsorbent to remove NH₃-N from solution. The adsorption data were fitted with the adsorption isotherm and kinetic models to predict the mechanisms and kinetic characteristics of the adsorption process. The equilibrium data agreed well with Langmuir isotherm model with highest correlation ($R^2=1.00$). As for kinetic modelling, the adsorption process follows pseudo-second order for all four types of adsorbents which has R^2 value of 1.0 and calculated adsorption capacity, Q_e of 1.2148mg/g. The calculated Q_e for pseudo-second order has the smallest difference with the experimental Q_e and thus suggest that this adsorption process is mainly governed by chemical process involving cations sharing or exchange between WR adsorbent and NH₃-N in the solution.