

ABSTRACT:

The removal of ammonium from aqueous solutions using zeolite NaY prepared from a local agricultural waste, rice husk ash waste was investigated and a naturally occurring zeolite mordenite in powdered and granulated forms was used as comparison. Zeolite NaY and mordenite were well characterized by powder X-ray diffraction (XRD), energy dispersive X-ray (EDX) analysis and the total cation exchange capacity (CEC). CEC of the zeolites were measured as 3.15, 1.46 and 1.34 meq g⁻¹ for zeolite Y, powdered mordenite and granular mordenite, respectively. Adsorption kinetics and equilibrium data for the removal of NH₄⁺ ions were examined by fitting the experimental data to various models. Kinetic studies showed that the adsorption followed a pseudo-second-order reaction. The equilibrium pattern fits well with the Langmuir isotherm compared to the other isotherms. The monolayer adsorption capacity for zeolite Y (42.37 mg/g) was found to be higher than that powdered mordenite (15.13 mg/g) and granular mordenite (14.56 mg/g). Thus, it can be concluded that the low cost and economical rice husk ash-synthesized zeolite NaY could be a better sorbent for ammonium removal due to its rapid adsorption rate and higher adsorption capacity compared to natural mordenite.