

Kinetic and thermodynamic study of nitrate adsorption from aqueous solution by lignocellulose-based anion resins

ABSTRACT

Nitrates are present in drinking water sources and pose serious health issues in many countries throughout the world. In this research, nitrate removal by palm kernel shell-based lignocellulose anion resins was studied under various nitrate concentrations, pH, and adsorbent dosages. The nitrate adsorption capacity demonstrated by the biomaterial-based resins was 53.18 mg/L. A pseudo-second order model and the Weber–Morris diffusion model were used to assess the adsorption process. The thermodynamic study predicted the exothermic nature of the process and the dominance of physical adsorption. Resins were characterized using elemental, proximate, and chemical analyses as well as by the pH at the point of zero charge. The lignocellulose-based adsorbent is a satisfactory material for nitrate removal from water and can be regenerated and reused.

Keyword: Adsorption; Nitrate; Palm kernel shell; Reaction kinetics; Thermodynamics