

Hydrogel biochar composite for arsenic removal from wastewater

ABSTRACT

Arsenic contaminated water is an environmental issue due to their toxicity. Acute arsenic poisoning has claimed the lives of many and causes adverse health risk to millions of people in several countries such as Bangladesh, India, and China. Effective removal of this contaminant can be obtained by adsorbing them onto low-cost adsorbents. In this study, hydrogel-biochar composite (HBC-RH) was successfully synthesized by embedding rice husk biochar into poly(acrylamide) hydrogel with N,N'-methylenebisacrylamide (MBA) as crosslinker. The synthesized HBC-RHs were characterized and utilized for the removal of arsenic from wastewater. The experimental parameters that influence the sorption process were investigated. The results obtained revealed that the effective removal of arsenic was found to be dependent on solution pH, sorbent dosage, initial contaminant concentration, and contact time. HBC-RH maximum monolayer sorption capacity for arsenic was 28.32 mg g⁻¹ and the experimental data suggested that the arsenic sorption was best fitted by pseudo-second-order kinetic mode. Above all, HBC-RH can easily be separated from aqueous solution after accomplishing its mission, avoiding separation complications faced by powder adsorbents in aqueous media.

Keyword: Arsenic; Biochar; Hydrogel; Isotherm; Kinetics; Wastewater