

Pb(II) adsorption from aqueous solutions by raw and treated biomass of maize stover – A comparative study

Abstract

The potential to remove Pb(II) ion from wastewater treatment systems using raw and treated maize stover through adsorption was investigated in batch experiments. To achieve this, batch mode experiments were conducted choosing specific parameters such as pH (2–8), dosage concentration (2–30 g L⁻¹), contact time (5–180 min), temperature (20–45 °C) and metal ion concentrations (10–50 mg L⁻¹). Adsorption was pH-dependent showing a maximum at pH value 5. The equilibrium sorption capacities of raw and treated maize stover were 19.65 and 27.10 mg g⁻¹, respectively. The adsorption data fitted well to the Langmuir isotherm model. Kinetic studies revealed that the adsorption process followed pseudo-second-order model. The calculated thermodynamic parameters showed that the adsorption of Pb(II) was spontaneous and exothermic in nature. Consequently, this study demonstrated that both raw and treated maize stover could be used as adsorbents for the treatment of Pb(II) from industrial wastewaters.