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INVESTIGATION OF ISOTHERMAL AND FIXED-BED COLUMN SORPTION OF Cu (II) ONTO ALMOND SHELL

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Abstract

The present study reports the efficiency of almond shell as a cheap and available material for the removal of Cu (II) from contaminated aqueous solutions. The equilibrium experiments indicated that Cu (II) sorption obeyed the Langmuir isotherm at 26, 40 and 55°C. The highest value of the maximum uptake (Q^0) from the Langmuir equation was found 6.783 mg g⁻¹ at 40°C. The various thermodynamic parameters such as ΔG^0 , ΔH^0 and ΔS^0 were also calculated. The values of ΔG^0 varied from -20.24 to -23.70 kJ mol⁻¹ in the temperature range of 26-55°C. The values of ΔH^0 and ΔS^0 were 15.44 kJ mol⁻¹ and 118.76 J mol⁻¹ K⁻¹, respectively. In the fixed bed column experiments, the breakpoint time was increased from approximately 20 to 150 min with increasing the bed height from 7.5 to 15 cm. Also, the results showed that the Bohart-Adams model was suitable for description of initial part of dynamic behavior diagram of the almond shell column. The sorption capacity of the column, q_0 , was found 0.456 and 0.653 mg g⁻¹ for column heights of 7.5 and 15 cm, respectively.

Key words: almond shell, breakthrough curve modeling, copper, isotherm, sorption

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