



Development of highly porous carbon nanocomposites derived from coconut shell and its in vitro efficacy of ochratoxin A detoxification

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ABSTRACT

The current study involves the preparation of highly porous carbon based nanocomposites from coconut shell in specially designed chamber. The prepared adsorbent was characterized through SEM, XRD, TG/DTA, SAA and FTIR. The adsorbent exhibited high surface area (217.06 m²/g) and the presence of magnetic iron oxide in the composite structure was evident from SEM, FTIR, EDX and XRD images. Freundlich and Langmuir isotherms were used for determining adsorption parameter of the prepared adsorbent. The equilibrium time for ochratoxin A adsorption on prepared adsorbent from coconut shell at pH 7 was 240 min. The value of ΔS° (82 KJ·mol⁻¹·deg⁻¹) was positive while the values of ΔH° (–21 KJ·mol⁻¹) and ΔG° (–2.75, –3.57, –4.39 and –5.21 KJ·mol⁻¹ at 30, 40, 50 and 60°C correspondingly) were negative. The negative value ΔH° shows that the adsorption process is exothermic and increased negative values of ΔG° with temperature demonstrated that the adsorption process was favorable at high temperature.

Keywords: Ochratoxin A; Characterization; Adsorption parameters; Coconut shell

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