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RESEARCH ARTICLE

EFFECT OF COCONUT SHELL BIOCHAR AMOUNT ON ADSORPTION OF 4-CHLOROPHENOXYACETIC ACID

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ABSTRACT

The effect of coconut shell biochar (CSB) amount on adsorption of 4-chlorophenoxyacetic acid (4-CPA) was investigated. The optimum amount of CSB was 40 mg. Therefore, CSB can be applied to the adsorption of contaminants in environment.

Key words:

Coconut shell Biochar;
4-CPA; Adsorption.

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INTRODUCTION

In recent years, biochar from biomass residues such as coconut shell, banana straw and so on is used as the sorbents for various contaminants. Coconut shell biochar (CSB) as one kind of green, environmentally friendly material can also be used as an excellent adsorbent for removal of dyes, heavy metals and pollutants (Kim *et al.* 2020). In this study, CSB was applied to adsorb 4-chlorophenoxyacetic acid (4-CPA). The amount of CSB was investigated.

EXPERIMENTAL

Chemicals and Materials: 4-CPA was purchased from Sigma-Aldrich (Steinheim, Germany), high performance liquid chromatography-grade methanol (MeOH) and acetonitrile (ACN) were provided by J&K Chemical (Beijing, China). NaH₂PO₄, H₃PO₄, NaOH, and other affiliated chemicals were all obtained from Sinopharm Chemical Reagent Co. Ltd. (Shanghai, China). All solvents and chemicals were of analytical grade and used without further purification unless otherwise specified.

HPLC-grade water was obtained by purifying demineralized water in a Milli-Q system (Millipore, Bedford, MA, USA), and was used throughout the work.

Apparatus, software and standard preparation: All the apparatus, software and standards preparation were the same as used in our previous work (Wen, 2023).

Adsorptive performance experiment: All the adsorption experiments were performed according to our previous work (Niu *et al.* 2022). The impact of CSB amount on 4-CPA adsorption efficiency were conducted by adding 5-50 mg CSB into each 4-CPA solution (80 µg/mL, pH= 1, 5 mL) with ultrasonic bath assisting for 0.5 h.

RESULTS AND DISCUSSION

Amount of CSB: The effect of CSB amount on adsorption was shown in Figure 1. The adsorption capacity (Q) decreased as the CSB amount increasing from 5 to 50 mg. However, the adsorption reached an equilibrium when the CSB amount was

40 mg. Therefore, there was a good adsorption between CSB and 4-CPA.

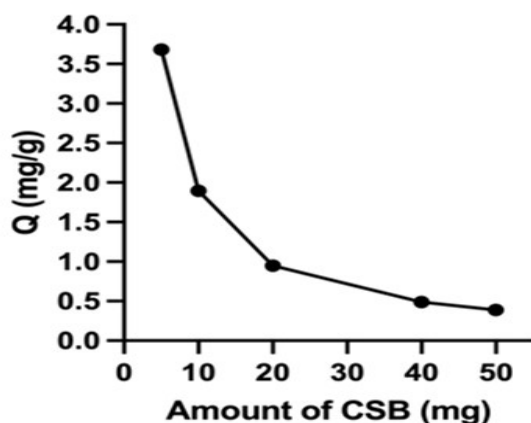


Figure 1. Effect of sample solution pH on adsorption

CONCLUSION

In conclusion, a green, environmental-friendly adsorbent was supplied to the 4-CPA adsorption. Compared with the traditional material such as C18 and nanomaterials, CSB was cheap, recyclable and cost-saving, which could be a candidate to adsorb contaminants in environment in the future.

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