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Activated carbons from plum stones as efficient adsorbents for the removal of phenol and bisphenol A from aqueous solutions

Beata Doczekalska[a,*], Monika Bartkowiak[a], Krzysztof Kuśmierek[b], Andrzej Świątkowski[b]

[a]*Faculty of Forestry and Wood Technology, Department of Chemical Wood Technology, Poznań University of Life Sciences, Poznan, Poland, emails: beata.doczekalska@up.poznan.pl (B. Doczekalska), monika.bartkowiak@up.poznan.pl (M. Bartkowiak)*
[b]*Faculty of Advanced Technologies and Chemistry, Institute of Chemistry, Military University of Technology, Warsaw, Poland, emails: krzysztof.kusmierek@wat.edu.pl (K. Kuśmierek), a.swiatkowski@wp.pl (A. Świątkowski)*

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ABSTRACT

Activated carbons (ACs) were prepared from plum stones in a two-step process. Crushed stones were carbonized at 600°C, 700°C, or 800°C, and then chemical activation was carried out at a weight ratio of 1:4 (carbonizate to KOH), at 150°C higher than the carbonization temperature. The parameters of the porous structure and the content of surface oxygen groups were determined. The plum stone-derived activated carbons were tested as adsorbents for the removal of phenol (Ph) and bisphenol A (BPA) from aqueous solutions. The adsorption kinetics, adsorption isotherms as well as the effect of solution pH were investigated. It was observed that the adsorption was strongly pH-dependent. Adsorption was favored in the acidic pH range of 2–7 and decreased with further pH increases. The adsorption kinetics followed the pseudo-second-order model and was controlled by the film diffusion step. The Langmuir isotherm provided the best correlation for the adsorption of Ph and BPA on all of the activated carbons, and the adsorption efficiency of both the adsorbates was correlated with the specific surface area of the activated carbons. The results indicate that the ACs prepared from plum stones are efficient adsorbents for the removal of phenol and bisphenol A from aqueous solutions.

Keywords: Activated carbon; Plum stones; Adsorption; Phenol; Bisphenol A

* Corresponding author.

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