



Characterization of pine-sawdust pyrolytic char activated by phosphoric acid through microwave irradiation and adsorption property toward CDNB in batch mode

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ABSTRACT

In this research, pine-sawdust pyrolytic char (PyC) was activated by phosphoric acid through microwave irradiation and activated PyC (APC) was obtained. The characterization of APC was presented, such as scanning electron microscope, pH_{pzc} , Brunauer–Emmett–Teller surface area, surface functional group, etc. Surface area of APC was $683 \text{ m}^2 \text{ g}^{-1}$ while average radius of pore was 1.5 nm. Then, APC was used as adsorbent to remove 4-chloro-2,5-dimethoxy nitrobenzene (CDNB) from aqueous solution in batch mode. Several experimental factors like initial pH, NaCl concentration, contact time, solution temperature were evaluated. Solution pH within 2–5 was in favor of adsorption and common salts had no effect on adsorption quantity. The adsorption capacity from experiment was up to 220.8 mg g^{-1} at 297 K. Langmuir model and Freundlich model were used to fit the adsorption equilibrium data and both can better predict the process. The kinetic process was better fitted by pseudo-second-order kinetic model and the process was controlled by film diffusion process. CDNB-loaded APC can be regenerated by 70% ethanol and adsorption capacity decreased after regeneration. It was concluded that APC be good adsorbent to remove CDNB from solution.

Keywords: Activated pyrolytic char; Adsorption; CDNB; Regeneration

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