Feasibility study on decontamination of aged spent wash using activated carbon from *Limonia acidissima* shell

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ABSTRACT

Need for eco-friendly and economical treatment of distillery spent wash has been inspiring researchers to investigate decontamination potential using natural materials. In this study, activated carbon was prepared from wood apple (*Limonia acidicima*) shells by thermo-chemical treatment with sulfuric acid at 200°C for 2 h in the absence of air. From the batch experiments with aged spent wash samples, maximum adsorption capacity (46.6 mg/g) was observed at a pH of 5.5, owing to the initial high uptake rate of polar compounds from spent wash. Based on the results from batch kinetic studies, two-site series and parallel interface models were found to be appropriate for representing the multi-phase transitions in the mass transfer rate. Comparison between different linear forms of Langmuir and Redlich-Peterson (R-P) isotherms revealed that prediction of adsorption capacity term is considerably affected by the axial setting in the logarithmic form. In order to overcome the difficulty of linear regression fit, chi-square test was identified as the suitable alternative to make comparison of all isotherms on the same abscissa and ordinate. Results of the present study showed that R-P isotherm and two-site interface kinetic models were invariably best suited for explaining the equilibrium and kinetic sorption of spent wash.

Keywords: Activated carbon; Adsorption; Non-linear isotherm; Spent wash; Two-site kinetic model; Wood apple

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