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Optimization study for preparation of activated carbon from Iraqi date palm fronds using response surface methodology on removal of phenolic compounds from aqueous solution

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Palm oil fronds were used to prepare activated carbon using physiochemical activation method, which consisted of potassium hydroxide (KOH) treatment and carbon dioxide CO₂ gasification. The effects of variable parameters activation temperature, activation time and chemical impregnation ratios (KOH: char by weight) on the preparation of activated carbon and for removal of pesticides: bentazon, carbofuran and 2, 4-dichlorophenoxyacetic acid (2, 4-D) were investigated. Based on the central composite design (CCD), two factor interaction (2FI) and quadratic models were respectively employed to correlate the effect of variable parameters on the preparation of activated carbon used for removal of pesticides with carbon yield. From the analysis of variance (ANOVA), the most influential factor on each experimental design response was identified. The optimum conditions for preparing activated carbon from oil palm fronds were found as follows: activation temperature of 750°C, activation time of 2H and chemical impregnation ratio of 2.38. The percentage error between predicted and experimental results for removal of bentazon, carbofuran and 2, 4-D was 8.2, 1.3 and 9.2%, respectively and for the yield of palm oil fronds activated carbon was 5.6.

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