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EFFICIENT REMOVAL OF HEAVY METALS BY KOH ACTIVATED *Diplotaxis harra* BIOMASS: EXPERIMENTAL DESIGN OPTIMIZATION

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Abstract

The aim of this study was to produce high quality activated carbons from *Diplotaxis harra* biomass by potassium hydroxide activation and their application in heavy metals removal. To reduce the number of experiments, full factorial experimental design at two levels (2^4) was carried out to occur optimal preparation conditions for efficient removal of cadmium and cobalt ions from aqueous solutions. Different variables influencing activation process, such as carbonization temperature (500–600°C), activation temperature (400–500°C), activation time (1–2h) and impregnation ratio (g KOH/g carbon) (1–2) have been investigated and the best production conditions were determined. The experimental results showed that the carbonization temperature was the most significant factor that influences the iodine number of the activated carbons. The methylene blue index was more influenced by the activation temperature. The removal of cadmium and cobalt ions by activated carbons was more sensitive to methylene blue index instead of iodine number. Although, the removal of the both heavy metals is more influenced by activation temperature with a negative effect followed by the impregnation ratio with a positive impact. Based to the statistical data, the best conditions for the removal of cadmium and cobalt by the prepared activated carbons have been established. The maximum iodine number and methylene blue index obtained under these conditions were 696.84 mg/g and 235.64 mg/g respectively. The sorption capacities of optimized activated carbons were determined by isotherm study. The maximum capacities obtained with the application of the Langmuir model were 118.09 mg/g for cadmium sorption onto AC carbonized at 600°C, activated at 400°C during 1h with an impregnation ratio of 2 g/g, and 48.89 mg/g for cobalt sorption onto and AC carbonized at 600°C, activated at 500°C during 1h with an impregnation ratio of 2g/g respectively. These sorption capacities were greater than those of a commercial activated carbon used in water treatment.

Keywords: activated carbon, cadmium, cobalt, *Diplotaxis harra,* experimental design, potassium hydroxide

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