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Removal of Heavy Metals by KOH Activated Diplotaxis harra Biomass: Experimental Design Optimization

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Abstract : The objective of this study was to produce high quality activated carbons from Diplotaxis harra biomass by potassium hydroxide activation and their application for heavy metals removal. To reduce the number of experiments, full factorial experimental design at two levels were carried out to occur optimal preparation conditions and better conditions for the removal of cadmium and cobalt ions from aqueous solutions. The influence of different variables during the activation process, such as carbonization temperature, activation temperature, activation time and impregnation ratio (g KOH/g carbon) have been investigated, and the best production conditions were determined. The experimental results showed that removal of cadmium and cobalt ions onto activated carbons was more sensitive to methylene blue index instead of iodine number. Although, the removal of cadmium and cobalt ions is more influenced by activation temperature with a negative effect followed by the impregnation ratio with a positive impact. Based on the statistical data, the best conditions for the removal of cadmium and cobalt by prepared activated carbons have been established. The maximum iodine number and methylene blue index obtained under these conditions and the greater sorption capacities for cadmium and cobalt were investigated. 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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