Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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INVESTIGATION OF COBALT (II) ADSORPTION FROM AQUEOUS SOLUTION USING *GENISTA ALBIDA* AS A LOW-COST ADSORBENT: OPTIMIZATION BASED UPON RESPONSE SURFACE METHODOLOGY

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Abstract

Adsorption technology, which employs low-cost natural products, is a safe method of treating heavy metal-containing wastewater. The adsorption capacity of a natural-based *Genista albida* (GA) plant that has not been used as an adsorbent before was investigated in this study. The FT-IR, SEM-EDS, and zeta potential of GA plant were determined before and after adsorption, and the effect of GA surface properties on Co(II) removal efficiency was revealed. Fourier Transform Infrared spectroscopy revealed that the surface of the GA plant is rich in carboxyl and hydroxyl groups that can actively bind metal ions, whereas zeta potential results showed that the surface charge is negative. The SEM/EDS imaging method noticed that the main element distributions on the adsorbent surface were C, O, and Ca. The central composite design combined with the response surface method was used to investigate the dependency of adsorption efficiency on variables. The optimum conditions were found to be 3.57 g/L adsorbent dosage, 130.48 mg/L initial Co(II) concentration, and pH 7.08. The maximum adsorption capacity of GA was determined to be 1.57 mg/g under optimum conditions, with an adsorption efficiency of 83.27%. According to the R^2 (0.9975) value, the adsorption experimental data was determined to be suitable for the Langmuir isotherm model, with a maximum adsorption capacity value of 1.13 mg/g found for this model. The findings of this study demonstrated that GA is a cost-effective and efficient adsorbent for the treatment of cobalt-containing wastewater.

Key words: adsorption, bioadsorbent, central composite design, cobalt, *Genista albida*

Received: July, 2021; Revised final: January, 2022; Accepted: January, 2022

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