

***Agave americana* AS A PROMISING GREEN BIOSORBENT FOR Ni(II)
REMEDICATION**

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The heavy metal content in the environment has been rising due to industrial advancement. Nickel (Ni) poses adverse health impacts, such as gastrointestinal distress, pulmonary fibrosis, and skin dermatitis, when present in excess, although it is a micronutrient essential for cellular functions. Excess Ni(II) concentrations can also induce ecological damage by disrupting the cellular functions of flora and fauna. Therefore, Ni remediation from industrial effluent is essential to safeguard human quality of life and ecosystem health. Fibrous biosorbents present promising green alternatives compared to other biosorbent types, offering advantages such as ease of surface modification to attract intended contaminants and simple removal. This study aimed to conduct a comprehensive investigation of the adsorption characteristics of Ni(II) on *Agave americana* fibres as a value-added product. Batch experiments were conducted under optimal parameters; 40 min shaking time, 20 min settling time, and ambient pH, which indicated a significant removal rate of 90.39% at an agitation speed of 150 rpm and room temperature with an optimum dosage of 20 g/L of the sorbent. Kinetic studies validated the pseudo-second-order model for the adsorption of Ni(II) on *Agave americana* fibre, with regression coefficients of 0.9968 and 0.9726 at ambient pH and initial solution pH of 4, respectively, suggesting that chemisorption is the rate-limiting factor in adsorption. Moreover, the fitting of kinetic data to the Weber-Morris intra-particle diffusion model at ambient pH and initial solution pH of 4 implied that both intra-particle diffusion and the boundary layer can affect the rate of adsorption. Further studies could expand the scope of Ni remediation from industrial effluent on a larger scale.

Keywords: Biosorbents, Intra-particle diffusion, Kinetic studies, Optimization