

ADSORPTION STUDY OF NITRATE FROM INTITIAL WASTEWATER OF BIOGAS BY WATER HYACINTH (*Eichhornia crassipes*) BIOCHARS FOLLOW THE LANGMUIR AND FREUNDLICH ISOTHERMS

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Summary

The present study evaluated the adsorption capacity of nitrate (NO_3^-) ions from intitial wastewater of biogas onto biochars produced from water hyacinth (*Eichhornia crassipes*) follow the Langmuir and Freundlich isotherms. The optimal conditions of the variables: pH, adsorbent dosage, initial NO_3^- concentration, and contact time were evaluated. The kinetics of NO_3^- sorption from the solution onto biochars have been explored through the pseudo-first-order model and the pseudo-second-order model. Experimental data were also applied to the Langmuir and Freundlich sorption isotherms, using the linear equations form. The optimal removal of NO_3^- 50 mg L⁻¹ with biochars (around 12 mg g⁻¹) was obtained at pH 4.0, 0.5 g adsorbent dosage, and the equilibrium reached after 120 min of contact time. The removal of NO_3^- fitted both the pseudo-first-order and pseudo-second-order kinetic models for the materials. Equilibrium Langmuir isotherm, which indicated a heterogeneous process, gave a better conformity than the Freundlich model. The water hyacinth biochars, in conclusion, can be used as effective, low-cost and environmentally friendly adsorbents for nitrate ions.

Keywords: Adsorption, Freundlich, Langmuir, NO_3^- , water hyacinth biochar.