

## Kinetic and Thermodynamic Study of Nitrates Removal by Sorption on Biochar

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**Abstract :** The aim of this work is to monitor the process adsorption of nitrates by the biochar via studying the influence of various parameters on the adsorption of this pollutant by biochar in a synthetic aqueous solution. The results which obtained indicate that the 4g/L biochar dose is the most efficient in terms of nitrates removal in aqueous solution. The biochar exhibited a good affinity for nitrates after 1hour of contact. The yield of removal of nitrate by the biochar decreases with the increase of pH of the solution and increases with increasing temperature ( $60^{\circ}\text{C}>40^{\circ}\text{C}>20^{\circ}\text{C}$ ). The best removal yield is about 80% of the initial concentration introduced (25mg/L) obtained at pH=2, T= $60^{\circ}\text{C}$ , and dose of biochar=4g/L. The second order model fit the nitrate adsorption kinetics of biochar with a high coefficient of determination ( $R^2\geq 0.997$ ); and a new equation correlating the rate constant of the reaction with temperature and pH was built. Freundlich isotherms performed well to fit the nitrate adsorption data by biochar ( $R^2>0.96$ ) compared to Langmuir isotherms. The thermodynamic parameters ( $\Delta H^{\circ}$ ,  $\Delta G^{\circ}$ ,  $\Delta S^{\circ}$ ) have been calculated for predicting the nature of adsorption.

**Keywords :** pollution, biochar, nitrate, adsorption

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