

ACTIVATION OF BIOCHAR OBTAINED FROM SLOW PYROLYSIS OF THE MACAUBA COCONUT RESIDUE FOR REMOVING URANIUM FROM AQUEOUS SOLUTIONS

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Macauba (*Acrocomiaaculeata*) is a palm tree native to the savannah-like area of Central Brazil. As a result of the oil extraction from its coconuts, a dark stiff residue, the “endocarp”, rich in lignin content, has a potential for being exploited as feedstock for biochar production. This study investigates the activation of biochar obtained from slow pyrolysis of the macauba coconut residue in order to remove uranium from aqueous solutions. The non-activated biochar, referred to as “BC350”, is produced at a pyrolytic temperature of 350°C under Ar atmosphere and a 1-hour residence time. The activated biochar was produced the same way and was further subjected to activation via physical route using CO₂ at 850°C for 120 min. The product of this treatment was named “BC350-A”. Both biochars were characterized by specific surface area. The surface area increased from 0.832 (untreated biochar) to 643.12 m² g⁻¹, confirming the improvement of the porosity. The removal efficiency for uranyl ions (U(VI)) increased from 80.5 (untreated biochar) to 99.2% for 5 mg L⁻¹ initial concentration solution adjusted to pH 3 using a 10 g L⁻¹ dosage. Adsorption isotherms were employed to represent the results of the U adsorption onto the BC350-A. An estimation of the best fit was performed by calculating different deviation equations, also called error functions. The Redlich-Peterson isotherm model was the most appropriate for fitting the experimental data. This hybrid model incorporates both Langmuir and Freundlich’s isotherm functionalities. These results demonstrate that a value-added material can be produced, encouraging the exploration of thermochemical conversion of lignocellulosic biomasses.