
INFLUENCE OF THE PYROLYSIS TEMPERATURE AND PRESSURE ON THE PROPERTIES OF BIOCHAR

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The aim of this work was to compare the yield, approximate composition, structure and surface morphology of biochar obtained from coniferous cones (SCP) at 400–700 °C at different pyrolysis pressures in the range of 0.1–2.0 MPa.

The main product of pyrolysis, biochar, has a number of advantages, namely, high calorific value, good thermal efficiency, high biodegradability, a large number of surface functional groups, and the possibility of convenient transportation and storage compared to untreated biomass. However, changes in the composition and structure of biochar obtained from lignocellulosic biomass during pyrolysis under different conditions, as well as the relationship between these properties and the content of the three main components, have not been studied in detail yet. In particular, the ash content, high calorific value (Q), content of functional groups and the mechanism of adsorption of the obtained biochar need further study in order to develop the basis for predicting the possibility of various applications of this product produced from different raw materials.

In this work, conifer cones were separately pyrolyzed in a fixed bed reactor under various conditions to further study the effect of biomass components and reaction conditions on biochar yield and properties. The combustion behavior and adsorptive capacity of biochar obtained from SHCP made at various temperatures and pressures was also investigated.

The results obtained show that increasing the pyrolysis temperature improves the highest calorific value of the biochar, and increasing the pyrolysis pressure improves the yield of the biochar and increases the amount of surface functional groups and combustion characteristics. For experiments to determine the adsorption capacity of biochar, Pb^{2+} was chosen due to its inability to biodegrade and high toxicity. The kinetic data for Pb^{2+} adsorption best fit a pseudo second order model indicating a chemisorption-controlled process. The maximum adsorption capacity for Pb^{2+} is 235.9 mg/g.

Keywords: biochar, interaction of components, pyrolysis conditions, combustion, adsorption of heavy metals.

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