Influence of EFB-based biochar on complete removal of TSS and decolorization of palm-oil-mill-effluent (POME)

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ABSTRACT

Treatment of Palm Oil Mill Effluent (POME) after the anaerobic digestion process has been carried out using biochar as an adsorbent to reduce its initial color intensity, and the total suspended solids (TSS). Biochars derived from empty oil palm fruit bunches (EFBs) were produced through pyrolysis at 700°C. About 95% color reduction and 100% TSS removal were observed after 24 h of contact time with 5 g biochar/50 ml POME. It has been observed that the pH and the duration of treatment played an important role in the adsorption process. The equilibrium adsorption data were best represented by the Langmuir isotherm. The kinetics of adsorption of suspended solids and color on the biochars were found to correlate with the pseudo-second-order model, with a correlation coefficient of $R^2>0.99$. Considering the high efficiency of the adsorbent in decreasing the color and TSS concentration, the EFB-based biosorbent is an environmentally-friendly biomass material that may be encouraged for use in waste management for resource and reuse.

Keywords: Pyrolysis; POME; Biochar; EFB; Adsorption; Isotherms; Kinetics

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