MODIFICATION OF ACTIVATED CARBON VARIATION OF RAW MATERIALS (BANANA WEEVIL, CORN COB, COCONUT HUSK, DURIAN PEEL) AND ITS COMPOSITES AS METAL IONS ADSORBENTS

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ABSTRACT

The research aimed to synthesize and characterize activated carbon. In addition, activated carbon was also modified, namely the manufacture of ion-imprinted carbon-chitosan composites and activated carbon-phosphate-chitosan composites. Furthermore, the adsorbent results of the synthesis were tested for their adsorption power against metal ions.

The research subjects were activated carbon synthesized and modified activated carbon (ionprinted carbon-chitosan composites and phosphate-activated carbon-chitosan composites). The object is the character and adsorptive properties of the adsorbent. The independent variables in this study were the type of activated carbon raw material, modification technique, metal ion concentration, and adsorbent and adsorbate contact time. The dependent variable was the adsorbent character, while the control variables were pH, temperature, stirring speed, adsorbent mass, and adsorbate volume. The research was carried out in 3 stages, namely the synthesis of activated charcoal, its characterization according to SNI 06-3730-1995 and the adsorption test for metal ions. Analysis using FTIR, SSA, SAA, SEM, and TEM. The data obtained will be analyzed descriptively including: determination of adsorption efficiency, adsorption capacity, adsorbent character including: water content, ash content, volatile substance content, and carbon content.

The characterization results showed that the activated carbon from the weevil of Kepok banana had the characters of water content, ash content, iodine absorption capacity that fulfilled SNI No. 06-3730-1995. Meanwhile, the character of volatile content, carbon content does not meet SNI No. 06-3730-1995. By FTIR, carbon-chitosan composites showed that the chitosan had been successfully crosslinked with glutaraldehyde, while the SEM result showed that the adsorbent that had been desorption was a larger cavity compared to the adsorbent before desorption. This indicates that there is an influence in the desorption process on the adsorbent cavity. Chitosan-phosphate-activated carbon composite have also been successfully synthesized according to the data of FTIR, SAA, and TEM. Morphologically, the beads are almost spherical, black in color and composed of the size of nanoparticles. Activated carbon from kapok banana weevil has an adsorption capacity of 24.3811 mg/g against Cr^{3+} with an efficiency of 24.3811%, while it againts the Cu^{2+} ion has an adsorption capacity of 0.3845 mg/g with an efficiency of 88.2353%. The carbon-chitosan composite with Cu(II) ion imprinted had a higher adsorption efficiency when compared to the carbon-chitosan without Cu(II) ion, with an adsorption capacity of 367.79 mg/g. Activated carbon-phosphate-chitosan beads had almost the same adsorption capacity against Pb^{2+} and Mg^{2+} ions, respectively 10.83 mg/g and 11.01 mg/g.

Kata Kunci: *activated carbon, composite, adsorbent, metal ion.*