

# SEPARATION OF B3 WASTE IN THE ENVIRONMENT WITH ADSORBEN ACTIVATED CHARCHOAL OF Sea Pandanus LEAVES FROM KULONPROGO

by Susila Kristianingrum, Endang Dwi Siswani, Annisa Fillaeli, Sulistyani, Nur Hasna , Siti Dewi Fatimah, Desi Fitri Pujiyastutik, Intan Fitriana Sari, Prisca Caesa Moneteringtyas

## ABSTRACT

It has been synthesized activated charcoal from sea *pandanus* leaves with 5%  $\text{HNO}_3$ , 1%  $\text{NaOH}$  and 5%  $\text{ZnCl}_2$ . The aim of this research is to know the character of activated charcoal, the power and the adsorption efficiency, and the type of activated charcoal adsorption isotherm on heavy metal ions Cd, Cu, Zn, Fe and Pb.

The subject of this study was activated charcoal which was synthesized from sea *pandanus* leaves obtained from the beach of TrisikKulonprogo Yogyakarta. The stages of making charcoal are drying, carbonation, chemical activation with 5%  $\text{HNO}_3$  solution, and physical activation at  $700^\circ\text{C}$  with  $\text{CO}_2$  gasification. Activated charcoal contact process and waste water with a batch system. Qualitative and quantitative analysis using the Atomic Absorption Spectrophotometer (AAS) instrument. Characterization of activated charcoal adsorbent is in accordance with SNI 06-3730-1995 and analysis of charcoal surface area with surface area analyzer (SAA) instrument. The same procedure was repeated for activation with 1%  $\text{NaOH}$  solution and 5%  $\text{ZnCl}_2$  solution.

Characterization results of activated charcoal by 5%  $\text{HNO}_3$ , 1%  $\text{NaOH}$  and 5%  $\text{ZnCl}_2$  showed better quality than charcoal before activation. Water content, ash content, and adsorption power of  $\text{I}_2$  have fulfilled the standards, while the volatile substances and bound carbon content have not fulfilled SNI 06-3730-1995. The SAA test results showed that activated charcoal of 5% activated  $\text{HNO}_3$  was micropore with a surface area of  $337.9532 \text{ m}^2/\text{g}$  and mesopore category for charcoal activated by 1%  $\text{NaOH}$  and 5%  $\text{ZnCl}_2$  with a surface area of  $19.667 \text{ m}^2/\text{g}$  and  $68.543 \text{ m}^2/\text{g}$  which was originally only  $3.7719 \text{ m}^2/\text{g}$ , resulting in an increase. The optimum adsorption capacity of 5%  $\text{HNO}_3$  activated charcoal was Cu  $0.6858 \text{ mg/g}$  and the optimum adsorption efficiency was Zn  $97.9811\%$ . The optimum adsorption of charcoal activated by 1%  $\text{NaOH}$  is Cu  $0.99616 \text{ mg/g}$  and optimum adsorption efficiency is Cu  $99.616\%$ . The optimum adsorption power of activated charcoal by 5%  $\text{ZnCl}_2$  was Cu  $2.9505 \text{ mg/g}$  and optimum adsorption efficiency was Cd  $99.9288\%$ . For Pb, Cd and Zn metal ions in adsorption with 1%  $\text{NaOH}$  activated charcoal it is still possible to have adsorption power greater than that value. The types of Cu, Zn, and Fe adsorption isotherms are likely to follow the Freundlich adsorption isotherm pattern which means that the adsorption process occurs at heterogeneous surface pores with multilayer surface layers.

Kata Kunci: *activeated charcoal, sea pandanus, adsorption isotherm, adsorption power, adsorption efficiency*