



Study of Chemical Activator in Preparation of Biochar Adsorbent from Patchouli Biomass for Removing Drug Contaminant

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Abstract: Biochar is a porous material prepared from pyrolysis of biomass. It has a potential application as adsorbent. In this research, biochar has been prepared from patchouli biomass. Purpose of the research is to study influence of activator types toward porosity and chemical surface of biochar prepared at relatively low pyrolysis temperature. Activated biochars were prepared using various activators ($ZnCl_2$, $CoCl_2$, $NiCl_2$, $CuCl_2$, $FeCl_3$, and $CrCl_3$) at pyrolysis temperature of $450\text{ }^\circ\text{C}$. Mass ratio of $ZnCl_2$ /patchouli is 1:1. The other activators were added in the same mol amount of $ZnCl_2$. The products were characterized using nitrogen sorption method, FTIR spectrophotometry, X-ray diffraction and SEM. Characterization of the activated biochars confirmed that $CoCl_2$ activator created the highest porosity of the activated biochar, including pore volume of $0.2\text{ cm}^3\text{ g}^{-1}$ and specific surface area of $946.86\text{ m}^2\text{ g}^{-1}$. All biochars showed $-OH$ and $C-O$ functional groups on their surfaces, except the biochars prepared using $CrCl_3$ and without activator also showed $C-H$ group of aliphatic hydrocarbon. The activated biochar has mixture of graphite and amorphous structures. The activated biochar revealed a surface morphology such as irregular squares separated by interstices. Adsorption test gave adsorption capacity of 131.890 mg/g (based on Dubinin – Radushkevich) with mechanism indicates physical adsorption.

Key words : biochar, patchouli, activator, physicochemistry, adsorption.

TutikSetianingsih et al/International Journal of ChemTech Research, 2017,10(6): 10-19.
