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Effect of Calcination Temperature on Structural Properties of Biochar-MCl_n Composite from Patchouli Biomass and It's Application for Drug Adsorption

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Abstract : Patchouli biomass is a abundant and potensial plant waste to produce biochar by pyrolisis. Biochar is a porous black carbon. It is useful for adsorbent of organic substances due to it's porosity. In this research, biochar - ZnCl₂ and biochar - CrCl₃ composites are synthesized to study influence of both calcination temperature and metal type on structural properties and drug adsorption of the composites. Paracetamol was used as adsorbate model. Research was performed at some steps, i.e pyrolisis of patchouli biomass using CoCl₂ activator, impregnation of biochar using metal chloride solutions, calcination of the biochar - metal chloride composites at various temperatures (400, 600, 800 °C), characterization of the composites using X-ray diffraction and FTIR spectrophotometry, and adsorption test at various concentration of paracetamol. Paracetamol concentration was determined using UV-Vis spectrophotometry at 243 nm. Langmuir and Dubinin-Radushkevich models were used to determine adsorption capacity, whereas Freundlich model was used to determine adsorption intensity. Result of this research showed that temperature of 600 and 800 °C gave change of impregnant structure for each metal types. Temperature of 600 and 800 °C gave the highest adsorption capacities for each composite using CrCl₃ and ZnCl₂, respectively with adsorption intensities indicating the favourable adsorptions.

Keywords: biochar, patchouli biomass, metal chloride, pyrolisis, impregnation, adsorption.

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