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EFFECT OF SORBENT WEIGHT ON HYDROGEN SULPHIDE (H_2S) REMOVAL BY BIOCHAR AND HYDROGEL BIOCHAR DERIVED FROM RICE HUSK

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ABSTRACT

Biochar has received great attention recently as it has the potential to be alternative absorbent beside the long existence, activated carbon. In this study, biochar was produced from rice husk by slow pyrolysis at temperature of 450°C. To increase the performance of the biochar in absorbing H_2S, hydrogel biochar was produced by performing polymerization. The characteristics analysis in elemental analysis, functional group, surface area, pore volume and pore size had been done on rice husk, biochar and hydrogel biochar. In this study, the percentage of carbon is increase when the rice husk undergo pyrolysis on order to obtain biochar and the percentage is decrease when the biochar being polymerize into hydrogel biochar. The biochar lost some functional group compare to rice husk as the the pyrolysis remove the volatile matter from the rice husk and the polymerization add new functional group to the sample. Biochar has the highest amount of pore volume compare to both rice husk and hydrogel biochar as the vacant space available as volatile matter remove during pyrolysis and the monomer filled up the pore during the polymerization.Then, the absorption of H_2S with sorbent weight as parameter has been performed on biochar and hydrogel biochar. The result of H_2S absorption by biochar showed that the mass of H_2S per weight of sorbent increase as the sorbent weight increase. However, the hydrogel biochar unable to perform the result that being predicted. From the past study, the water content may affect the capability of the hydrogel biochar to absorb H_2S.

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CHAPTER 1
INTRODUCTION

1.1 Research Background

Rice husk is available in abundantly from agriculture industries that typically been treated using traditional methods such as composting and incineration (Heo et al., 2010). (Heo et al., 2010) also indicated that these organic solid waste is not suitable for those process as small concentration of nitrogen contain inside them for composting and during incineration, smoke being generate by considerable amount of solid grain into the environment. Carbonaceous material can produce with rice husk as raw material as it presence with large amount of hydrocarbon such as cellulose and lignin content, which form complex porous structures (Mohanta, Kumar, & Parkash, 2012). Hence, biochar is proven can be derive from abundant source of biomass, namely rice husk.

Biochar is carbon-rich product when biomass, such as rice husk heated in closed container with little or no available air (Nartey & Zhao, 2014). (Nartey & Zhao, 2014) also mention that in technical term, biochar is produced by thermal decomposition of organic material at relatively low temperature with limited supply of oxygen. In chemical point of view, the organic portion of biochar has a high carbon content, which mainly compromise so-called aromatic compounds characterized by rings of six carbon atoms linked together without oxygen or hydrogen, the otherwise more abundant atoms in living organic matter (Lehmann & Joseph, 2009). From study of (Kambo & Dutta, 2015), a list of potential applications for biochar involving energy production, agricultural industries, carbon sequestration, activated carbon adsorbent and bio-refinery.

Industrial pollution and degradation of urban environment is the cost that Malaysia has to pay for the associated rapid economic growth and to achieve the goal of industrial status by the year 2020 (Afroz, Hassan, & Ibrahim, 2003). (Afroz et al., 2003) also stated that among the industrial pollution, air pollution is the major issue that has been affecting human health, agricultural crops, forest species and ecosystems. One of the contributor to the air pollution is the notorious Hydrogen Sulphide (H_2S).