

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF LOADING AND H₂O WETNESS OF
HYDROGEL BIOCHAR DERIVED FROM EFB FOR
H₂S GAS SORPTION**

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ABSTRACT

Hydrogel biochar is the non-toxic, biocompatibility and both gas and water absorbent polymeric materials. The H_2S gas is very hazardous gas as it is produced from natural and human-made process. Due to its higher density than air, it become more dangerous to the atmosphere. This research aims to determine the characterization of hydrogel biochar derived from empty fruit bunch, HBC-EFB and to determine the ability of HBC-EFB in sorption of H_2S gas. In order to achieved these, the empty fruit bunch hydrogel biochar (HBC-EFB) was prepared. The EFB biochar from pyrolysis process were mixed with the solutions of acrylamide (AAm) as monomer, N-N'-methylenebisacrylamide (MBA) as crosslinker and ammonium persulfate as initiator. The HBC-EFB was characterized by using Thermogravimetric Analyzer (TGA), Elemental Analyzer (EA), Brunauer Emmet Teller (BET) and Scanning Electron Microscopy (SEM). The H_2S sorption of HBC-EFB was conducted by using Multi Layered Sorption Bed. The experimental data showed that the sorption rate of HBC-EFB was efficient when the bed was full up to three bed with under wet condition.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

Every year, Malaysia produce almost 1.8 million per day of biomass materials such as rice husk, palm kernel, sawdust, coconut shell and other biomass materials that can be reused to generate energy. And the fact that this amount of biomass materials being increasing every single day had flicked researcher's attention to discover the potential use of the waste. To generate energy, there are three types of solid waste thermal processing that have been introduced (Nur Zalikha Rebitanim W. A., 2013). Solid waste thermal processing is a conversion of solid waste into gaseous, liquid and solid conversion product after release of heat energy. The types of solid waste thermal processing are incineration system, pyrolysis system and gasification system. Pyrolysis is a process of thermal decomposition by the application of intense, indirect heat in the absence of oxygen. Via slow type of pyrolysis process, biochar will be produced as the main product (George Tchobanoglous, Thermal Conversion Technologies, 1993). In order to determine the chemical composition of the biochar, the source type and pyrolysis process condition need to be determined.

In slow pyrolysis, the biomass materials will be heated slowly and will be held at the highest treatment temperature for a few minutes to days. It depends on the feedstock, temperature and the size of particle. The vapors are released which can be condensed and separated into water-soluble fraction of acids and sugars. And also phenol compounds organic solvent-soluble fraction. Slow pyrolysis was widely used in the wood distillation industry to produce methanol, acetic acid and acetone. Currently, this process is used as the main process for charcoal production. The char produced by this process may contain 25% to 35% of the original feedstock weight and up to 50% of the original carbon (Mark R. Fuchs, 2014).