

**STUDY OF THE CATALYST DEACTIVATION OF ACTIVATED CARBON
LOADED WITH METAL CATALYST IN TAR REFORMING**

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ABSTRACT

Biomass is a promising source of fuel if it treated efficiently. It can be treated through multiple type of treatment in obtaining the fuel such as thermal conversion, anaerobic digestion and fermentation. In thermal conversion, the biomass is treated through combustion, gasification and pyrolyzation. Gasification is a process that uses heat in limited supply of oxygen to treat the biomass to form synthesis gas. However, along with the syngas, there are impurities that have high potential to be a major problem if not treated the impurities effectively. One of the most problematic impurities from the gasification process is tar. The focus of tar treatment through the catalytic cracking is concerned. However, the catalyst used in catalytic can undergo catalyst deactivation. The most popular catalyst deactivation that happen to the carbon based process is coking. Thus, the main objectives of this paper are to regenerate the catalyst by removing the coke and to determine the characteristics of the fresh and regenerated catalyst. Prior to the study, the synthesized catalyst will undergo gasification process first then the tar will be treated in the tar reforming where the catalyst had been loaded. Then, the catalyst will undergo regeneration process by combustion. The catalysts are analyzed to determine the physical characteristics such as surface area, pore volume and pore size. The analysis shows that the surface area, pore volume and pore size for both catalyst have reduced in a moderate manner.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

Biomass is an organic matter that store some sort of energy that can be transferred to useful fuels either in gaseous or liquid form. Biomass can be obtained in many forms such as agricultural waste, municipal solid waste (MSW), waste from industry and etc. The stored energy can be converting to another form of energy by the thermochemical conversion method (Asadullah, 2014). Biomass has become a promising source of fuels which can replace fossil fuels for transportation and power generation.

The fossil fuel is a non-renewable energy that is actually produced from the living things. It need over millions of years to form the fossil fuels from the remaining of the dead organism ("BBC - GCSE Bitesize: Fossil fuels," 2014). Due to the reasons that they cannot be renewed, the source is always limited and supposed to be exhausted in next 50 – 100 years. Therefore the alternative energy sources are needed to be developed.

The society's demand in energy; energy in the form of electricity, vehicle fuel, heat and many more has rapidly increased in demand as the society has been expanding in economy, industry and social. Nowadays, fossil fuels are main sources of energy that