UNIVERSITI TEKNOLOGI MARA

PYROLYSIS OF WASTE TYRE

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ABSTRACT

Millions of tyre were produced each and every year and end up as waste tyres because of developing population and fast industrialization. One of the method to convert waste tyre into a valuable product is pyrolysis. The aim of this study is to characterize the liquid product produced by pyrolysis of waste tyre and their characteristics under process parameter such as temperature. In this study, a series of tests were carried out at a various process temperature from 300°C to 500°C. The degaradation of the waste tyre used was identified by TGA analysis and the liquid oil produced were analysed through FTIR and GC-MS analyzer. The oil yield was found to decrease with increasing final pyrolysis temperature and the yield of the gas increased. The highest oil yield was found at 400°C which is 58.3wt.%. The pyrolysis of used tyre at atmospheric pressure commences at about 340°C and completes at around a temperature of 460°C. The influence of temperature showed an increase in the aromatic content of the oil with increasing temperature. However, the aliphatic content decreased. As the temperature was increased from 300°C to 500°C, it was observed that the amount of aliphatic fraction in the oil decreased from 7.8wt.% to 5.4wt.%. In the meantime, the amount of aromatic compounds increased from 37.4wt.% to 51.2wt.%. The main aromatic compounds were limonene, xylene, styrene, toluene, trimethylbenzene, ethylbenzene and benzene.

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INTRODUCTION

1.1. SUMMARY

Environmental degradation is the main problem that our world is facing nowadays. Millions of tyre were produced each and every year and end up as waste tyres because of developing population and fast industrialization. With strong and wide use of automobile, it is causing this problem to arise. The discharged of solid wastes are produced on ordinary basis. The waste tyre itself could pose a serious health hazard to human as it could be a place for breeding of mosquitoes. Burning of tyres could lead to air pollution by emitting large and thick black smoke that contains gases which are carcinogenic. The lifespan of a tyre in a landfill is seen as some place in the range between 80 to 100 years. How tyres are thermoset polymers suggest that tyres could not turns into a liquefied and isolated into their chemical components.

Since tyres are not biodegradable, many researches have been done to convert the waste into a valuable product. One of the method that caught attention is pyrolysis. Pyrolysis is a procedure that permits the decay of waste tyres into valuable products such as gas, liquid fuel and char. Every one of them are valuable product. The gas itself contains high calorific value and can be as the source of energy to the process. The liquid delivered is a blend of compound that can be utilized as fuel. The char produced also has a lot of uses such as a fuel, carbon black and as activated carbon. The composition of each fraction relies upon the conditions of the pyrolysis utilized and the composition of the tyre (González, Encinar, Canito, & Rodríguez, 2001). The objectives of this research are to produce liquid oil from waste tyre by using fix bed reactor and to characterize the produced liquid oil. The process is done in a fixed bed reactor with temperature from 300°C to 500°C.