UNIVERSITI TEKNOLOGI MARA

CHARACTERISTICS OF PYROLYTIC LIQUID FROM AUTOMOTIVE PAINT SLUDGE

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ABSTRACT

Automotive companies and customers are usually concerned about the environmental and safety impacts of the use of automobiles. However, the waste produce in automotive manufacture which known as automotive paint sludge (APS) in large quantity same as their production. This APS usually sent to the Quality Alam who responsible to treating the waste before it ending at landfill. Besides, automotive industry or manufacturing need to pay the cost of treatment which is highly cost since APS is categorise as hazardous waste. APS is categories as hazardous waste because of the high content volatile matter. In order to reduce the cost of treating APS, microwave assisted pyrolysis was introduced to recoverable the sludge by removing highly water content. The APS was characterized by proximate analysis using thermogravimetric analyser (TGA) and ultimate analysis using CHNS Elemental analyser (EA). Automotive paint sludge was taken in the second largest automotive manufacturing in Malaysia. There are three types of product produced by pyrolysis process which is solid (char), liquid (fuel), and gas. The focus of the project is on the liquid product produced by pyrolysis process at temperature 500, 600 and 700W at 30, 40 and 50 minutes respectively. The pure oil was analysed in term of it physical properties and chemical properties. Functional groups by using FTIR and GCMS to identify its composition hence, functional group in the samples consist of monoaromatics compounds, heavy oxygenated hydrocarbon, nitrogenated compounds, aliphatic compounds and polycyclic aromatic hydrocarbons. The highest density of the pyrolytic liquid is 939.7 kg/m^3 and the highest calorific value of pyrolytic liquid is 38, 274 kJ/kg. These liquid product had potential for alternative fuel based on the properties obtained in this study and it is potential to replace non-renewable fuel.

Keyword: Hazardous waste, pyrolysis, Automotive Paint Sludge, Microwave Assisted Pyrolysis

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CHAPTER 1
INTRODUCTION

1.1 BACKGROUND STUDY

1.1.1 Automotive Manufacturer

Automotive is refer on motor vehicles industry where the production of cars, lorry, truck and others transportation. Based on the study, about 50% of painting to paint the cars from the automotive manufacturing become sludge or waste due to the several factors. These amounts of the paint sludge or waste increasing as the number of the production and become a problem for the manufacture to paid the cost of treatment paint sludge. A review was conducted on paint sludge from automotive industries in Turkey. From the review done by Salihoglu and Salihoglu (2016) they reported on the hazardous waste generation, painting in automotive industry, paint sludge characteristic and management. The automotive paint sludge containing high volatile organic compound which comes from the paint.

Furthermore, other study was done on the automotive paint sludge by (Januri Z. , Rahman, Idris, Matali, & Manaf, 2015) on the characterisation of automotive paint sludge for chemical/energy recovery via microwave assisted pyrolysis. From the study, three types of sample use in the research to characterize the chemical/energy recovery from different moisture content in the sample. Since that, the APS consists of aliphatic ester, $C_3 – C_{13}$ hydrocarbon and composite compound they introduce one method by using microwave assisted pyrolysis (MAP).