CHARACTERIZATION OF PYROLYTIC OIL FROM CATALYTIC PYROLYSIS OF WASTE TYRE AND EMPTY FRUIT BUNCH

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TABLE OF CONTENTS

ABSTRACT

CHARACTERIZATION OF PYROLYTIC OIL PRODUCED FROM CATALYTIC PYROLYSIS OF WASTE TIRE AND EMPTY FRUIT BUNCH

Co-pyrolysis was discovered as a new technology to dispose solid waste with valuable yield. In this study, co-pyrolysis of waste tire and empty fruit bunches (EFB) was investigated using fixed bed rector at 500 ^{o}C. The effects of the catalyst on the yields of the products were investigated. The products obtained from pyrolysis of waste tire and EFB were 42.8% of liquid oil, 33.2% of char and 24% of gas fraction. The calorific value, ash, moisture content, volatile matter, fixed carbon and elemental analysis of raw sample were determined. The oil yield was found to be increased from 42.8% to 57.06% after the addition of 1:1 ratio of cobalt catalyst impregnated into the empty fruit bunch, where as no significant increment on the residue (char). The properties of the oil were determined by gas chromatography mass spectrometer (GCMS). Limonene was identified as a major compound of the oils representing 18.41% of peak areas. Significant quantities of light aromatic hydrocarbon such as benzene, toluene, xylene, and styrene were also found.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

Malaysia is blessed with natural resources, particularly crude oil and natural gas, which are the main sources of energy. However, these are depleting energy resources and increasing demand has made it necessary for the Government to embark on alternative energy sources. Rising crude oil prices have led to higher government expenditures on subsidies to keep retail fuel prices at relatively low levels.

Today, various forms of biomass are consumed all over the world for energy generation. Biomass is mainly derived from the agriculture or forestry sector. Biomass provides a clean, renewable energy source that could dramatically improve the environment, economy and energy security. One of the indigenous biomass resources in Southeast Asia is derived from the oil palm. The oil palm empty fruit bunches, fiber and shell which are generally considered as 'waste' are generated every year in Malaysian, with an annual increment of 5% (Yang *et al.*, 2006). Malaysia is the largest producer of palm oil in the world generates a significant amount of oil palm wastes. This is true in the cases of some other Asean countries as well. According to a study by Yatim (1996),