Coconut Shell Fuel Extraction from Pyrolysis method

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***Abstract*: Today Oils were produced from coconut shell via fast pyrolysis process without and with HZSM-5 zeolite catalyst which carried out in a fixed-bed reactor with heating rate 30 °C/min under nitrogen atmosphere. This research was investigated the effect of pyrolysis parameters amount catalyst by a response surface methodology (RSM) experimental design. The products of pyrolysis are produced bio-oil, char and gas. The results show that flow rate of nitrogen was not significant independent variable on bio-oil product for pyrolysis. The maximum yield of bio-oil, 38.93 wt%, was obtained at temperature of 491.57 °C, particle size of coconut shell of 12.5 mm and weight of catalyst of 0.5 g with flow rate of nitrogen of 5 ml/min.**

***Keywords*: Energy conservation, Machine, Kinetic energy, Harnessing, Battery.**

1 INTRODUCTION

In this present the world is facing a serious problem on the price of fuels getting higher. This is caused by the rapid decrease in the world reserve of fossil fuels, which is using up in near future [1]. As a renewable energy source, biomass is the largest global contributor of primary energy supply, can be convent to bio-oil by pyrolysis and has some advantages compared with conventional fossil fuel [2]. In Thailand, agricultural producer is a major with abundant agricultural resources and their by product could be used as biomass energy which are characterized into processing industry (such as rice husk from the rice mill, sugarcane bagasse, palm shell, coconut shell and corn cob), is mostly used for heat and electricity for the industry, and agricultural residues (such as sugarcane tops and leaves, rice straw, soybean stalk, cassava stalk and oil palm residues).

The heating value of heat available in bio-oil is one of the most important characteristics. The standard measurement of the energy content of heating values can be reported as higher heating value (HHV) and lower heating value (LHV). The difference between HHV and LHV is equal to the heat of vaporization of water formed by combustion of the fuel [3]. Table I shown that a data for HHV of representative of biomass. Pyrolysis is the thermal degradation in the absence of oxidizing agent at 300 – 500 °C for converting biomass into bio-oil, gas and char.

The bio-oil is liquid product from biomass by very quick exposure to heated particles in reactor. The char and gases produced are combusted to supply heat to the reactor. Bio-oil is one of the pyrolysis products, known as pyrolysis liquid, bio-fuel-oil, pyrolysis oil, wood liquids wood oil. Generally, it is a dark-brown organic liquid and strong acrid smell [4]. The bio-oil contains more than a hundreds of organic compounds that belong to alkanes, phenols, aromatic hydrocarbon, acids, aldehydes, ketones, alcohols, esters, furans. The catalytic hydrogenation is important to select a catalyst with higher activity. Catalytic pyrolysis derived from pyrolysis of biomass is that oxygen containing bio-oils are catalytically decomposed to hydrocarbons with the removal of oxygenated groups. The zeolite catalyst, HZSM-5 has three-dimensional frameworks regular pore system that known as crystalline microporousaluminosilicates

In this study, coconut shell was used to produce bio-oils based on pyrolysis process using a fixed-bed reactor amount catalyst (with HZSM-5) to optimize the bio-oil yield. The influence of several operating parameters such as temperature, flow rate of N2, particle size of coconut shell and weight of catalyst.

2 CONCEPTUAL MODEL

The part drawings that are used to manufacture the pyrolysis process machine are drawn by using the software solid works (2012). The conceptual model of pyrolysis process machine for power generation is shown in the below figure.

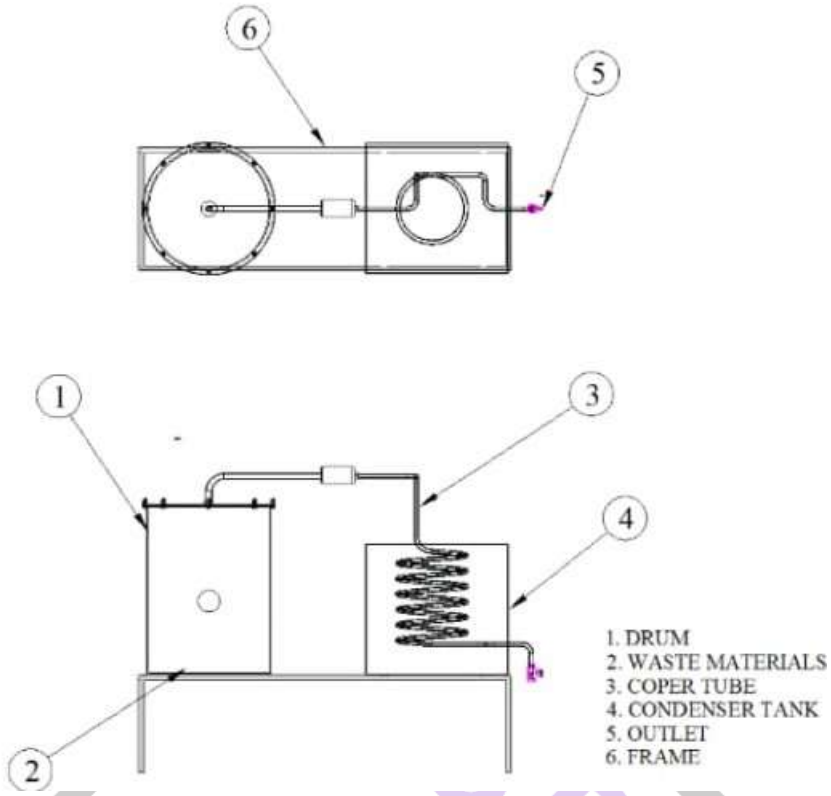

Fig-1 Conceptual model

3 LITERATURE REVIEW

Biomass is biological material derived from living, or recently living organisms. In the context of biomass for energy this is often used to mean plant based material, but biomass can equally apply to both animal and vegetable derived material. Biomass is no fossilized and biodegradable organic material originating from plants, animals and micro-organisms. This includes the products, byproducts, residues and wastes from agriculture, forestry, industrial and municipal wastes. Biomass also includes gases and liquids recovered from the decomposition of no fossilized and biodegradable organic materials. Categories of Biomass Materials There are five basic categories of material depending upon source and utilities Virgin wood, from forestry, arboricultural activities or from wood processing. Energy crops, high yield crops grown specifically for energy applications. Agricultural residues, residues from agriculture harvesting or processing .Food waste, from food and drink manufacture, preparation and processing, and post-consumer waste .Industrial waste and co-products, from manufacturing and industrial processes.

4 FABRICATED MODEL

The fabricated model of the pyrolysis process machine for powermachine is shown in the fig.6 and power generating unit is clearly shown in the fig 2

Fig-2 Fabricated Model

In this project consist of frame, condenser, drum and copper tube. Pyrolysis is chemical reactions in which large molecules are broken down into smaller molecules. Pyrolysis technology is the industrial process of breaking down large molecules of plastic into smaller molecules of oil, gas and carbon black. Pyrolysis of waste plastic takes place in absence of oxygen, at about 350-550 degree C and reaction time is about 15-90 minute.In our project, commercialized available shredded plastic were procured and washed before pyrolysis. One of the most favorable and effective disposing method is pyrolysis, which is environmental friendly and efficient way. Pyrolysis is the thermal degradation of solid wastes at high temperatures (300-900nC) in the absence of air (and oxygen). As the structure of products and their yields can be considerably modified by catalysts, results of pyrolysis in the absence of catalyst were presented. Pyrolysis of waste plastic was carried out in an indigenously designed and fabricated reactor Waste plastic had been procured form the commercial source and stored in a raw material storage unit. Raw material was then fed in the reactor and heated by means of electrical energy. The yield commenced at a temperature of 350^0C. The gaseous products resulting from the pyrolysis of the plastic wastes is supplied to the catalyst. Then the burned plastic gas condensed in a water cooled condenser to liquid fuel and collected for several use after the pyrolysis.

5 ADVANTAGE, DIS ADVANTAGE AND APPLICATION

5.1 ADVANTAGE

- Corrosion is less.
- No need of engine modification.
- Residue can be used as paraffin wax.
- Less amount of residue and large amount of product.
- Plastic wastes can be reduced.
- A proper solution for energy crisis.
- Can reduce the problems due to plastic wastes.

5.2 DISADVANTAGES

- Initial Cost is high.
- It may radiate heat.

5.3 APPLICATIONS

- Hot water generator
- Heavy Industrial boiler
- Brick Factory
- Glass factory
- Steel factory

6 RESULTS

The above analysis gives the properties of the pyrolysis oil taken from the coconut shell is shown inn table 1

Property	Unit	Value
C	wt%	46
H	wt%	7
N	wt%	< 0.01
O (Balance)	wt%	47
Water content	wt%	25
Ash content	wt%	0.02
Solids content	wt%	0.04
Density	kg/Ltr	1,2
LHV	MJ/kg	16
LHV	MJ/Ltr	19
pH	-	2.9
Kinematic viscosity (40 °C)	cSt	13
Viscosity at (40^0 C)	Mm^2/s	2.200
Sulphur content	Mg/Kg	40
IBP	^{0}C	130
10%	^{0}C	200
50%	^{0}C	280
90%	^{0}C	340
Ash content	Wt%	<0.005
Water content	Mg/Kg	50
Calorific value	MJ/Kg	10
Gross value	MJ/Kg	46
Net value	MJ/Kg	43

7 CONCLUSION

A strong multidiscipline team with a good engineering base is necessary for the Development and refinement of advanced computer programming, editing techniques, diagnostic Software, algorithms for the dynamic exchange of informational different levels of hierarchy.

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project workWe are proud that we have completed the work with the limited time successfully. The **"**FUEL EXTRACTION FROM COCONUT SHELL BY PYROLYSIS METHOD" is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality.

We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work.Thus we have developed a **"**FUEL EXTRACTION FROM COCONUT SHELL BY PYROLYSIS METHOD**"**. By using more techniques, they can be modified and developed according to the applications.

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