Alternative Energy

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IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

A.K.M. Mohiuddin and Asif Hoda
Alternative Energy
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Include index
Bibliography: p.

ISBN 978-967-418-158-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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Waste Cooking Oil Utilization for Biodiesel Production

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INTRODUCTION

Vehicular emission effect has been targeted to be reduced by 2012 for most ASEAN countries as a result of fossil fuel. This, along with other ecological, political and economic concerns over fossil fuel, which is the single largest industry in terms of dollar value on earth, are factors shifting biodiesel production as an alternative energy source for automobile. The comparative advantage of biodiesel is as a result of the similarity in vegetable physio-chemical characteristic. Consequently, growth rate of plantations for vegetable oil is expanding, as much as 5% per year from palm oil. The growth of the oleo-chemical industry has also resulted in exponential growth and demand, creating an entire value chain to become one of the world's most valued crops. It has been suggested using food-oils for biodiesel/ biofuel production will have a negative consequence for human. Hence a reconsideration of the use of food-grade oil is being undertaken, particularly as the cost of biodiesel is about 70–75% of the total cost of raw material. Of the available sustainable raw materials been pursued for biodiesel production, waste cooking oil is seen as more versatile and less prone to high cost and scarcity. This work presents the use of WCO to produce high quality biodiesel by varying physical internal configuration of the reactor.

MATERIALS AND METHODS

WCO Characterization and Evaluation of FFA

Analysis of WCO for fatty acid and glycerides was carried out using reference standards of FAMEs containing C16:0, C18:0, C18:1, C18:2 FAMEs (2 to 4% relative concentrations = 0.2 to 0.4 mg/mL per FAME). The Triglyceride (T), Diglycerides (DG), Monoglyceride (MG) and free glycerin (G) were quantified using GC MS biodiesel (MSTFA derivatization kit, 10 x 1 mL ampoule) kit containing glycerin, monoolein, diolein, triolein (ASTM D6548 solutions), butanetriol and tricaprin (internal standard #1 &2 #, 44918U) at concentrations specified according to ASTM D6584/ 6751. Laboratory grade Potassium hydroxide (KOH), Isopropyl alcohol and phenolphthalein were used for the FFA