

PREPARATION OF BIODIESEL FROM WASTE COOKING
OIL AND REFINES BLEACHED DEODORIZED OIL USING
SINGLE STEP BATCH TRANSESTERIFICATION PROCESS
WITH THE AID OF KOH AS THE CATALYST

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DECLARATION

“I declare that this thesis entitled “PREPARATION OF BIODIESEL FROM WASTE COOKING OIL AND REFINES BLEACHED DEODORIZED OIL USING SINGLE STEP BATCH TRANSESTERIFICATION PROCESS WITH THE AID OF KOH AS THE CATALYST” is the result of my own research and findings except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree.

Signature :.....
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Date : 30th April 2009

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Wassalam

ABSTRACT

Biodiesel is a cleaner burning diesel replacement fuel processed from natural, renewable derived from biological sources such as waste cooking oil and refined bleached deodorized palm oil. The type of process that needs to be done to produce biodiesel is called transesterification. The transesterification of waste cooking oil and refined bleached deodorized palm oil with short-chain alcohols, in the presence of base-catalyst potassium hydroxide (KOH) and methanol as solvent, by means of single step batch transesterification process in order to obtain biodiesel fuel was studied. The reaction has been done in water bath. The process variables that been investigated are catalyst concentration and reaction time. The variables that are fixed throughout the whole experiment were molar ratio of methanol to raw oil with 6: 1, reaction temperature at 40°C and mixing degree of mechanical stirrer at 1300 rpm. This paper also studied the combustion characteristic which is the carbon monoxide emission between WCO and RBD to be compared with conventional diesel, and determined the optimal transesterification reaction conditions that produce the maximum methyl ester content or purity and biodiesel yield. The best result for highest yield and highest purity is at 60 minutes reaction time and using 1.5% catalyst concentration

ABSTRAK

Biodiesel adalah sumber minyak yang lebih bersih yang boleh menggantikan diesel dan boleh didapati dari sumber biologi yang semulajadi seperti minyak masak terpakai dan minyak masak kelapa sawit. Proses yang diperlukan untuk menghasilkan biodiesel dipanggil transesterifikasi. Proses transesterifikasi dijalankan untuk minyak masak terpakai dan juga minyak masak kelapa sawit dengan campuran pemangkin alkali iaitu Kalium Hidroksida (KOH) dan methanol sebagai pelarut. Tindakbalas ini di lakukan di dalam besen air. Proses ini dinamakan proses transesterifikasi langkah pertama untuk mendapatkan biodiesel. Faktor-faktor yang mempengaruhi transesterifikasi trigliserida adalah seperti kepekatan pemangkin dan tindakbalas masa akan dikaji. Factor-faktor yang telah ditetapkan sepanjang eksperimen adalah nisbah molar methanol kepada minyak iaitu 6:1, tindakbalas suhu pada 40°C dan juga darjah kacauan sebanyak 1300 rpm oleh pengacau mekanikal. Kertas kajian ini juga mengkaji ciri-ciri pembakaran iaitu pembebasan karbon monoksida antara minyak masak terpakai dan minyak sawit mentah dengan diesel. Selain itu, kondisi tindakbalas transesterifikasi yang optima yang menghasilkan kandungan kepekatan metal ester dan kadar hasilan biodiesel yang optima juga akan dikaji. Keputusan terbaik diperoleh pada masa tindakbalas 60 minit dan kepekatan pemangkin pada 1.5%.

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LIST OF ABBREVIATIONS

°C	Degree celcius
FFA	Free fatty acid
h	Hour
min	minutes
g	gram
kg	kilogram
L	Liter
ml	mililiter
ppm	parts per million
KOH	Potassium Hydroxide
WCO	Waste Cooking Oil
WVO	Waste Vegetable Oil
RBD	Refined Bleached Deodorized Oil
FAME	Fatty acid methyl ester
NO _x	Nitrogen Oxide
CO ₂	Carbon Dioxide
HC	Hydrocarbon

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