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EFFECT OF 'COCOA ASH' METHOXIDE AND SODIUM METHOXIDE ON THE YIELD OF BIODIESEL FROM USED VEGETABLE OIL.

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ABSTRACT

Today's diesel engines require a clean-burning stable fuel that performs well under a variety of operating conditions. Biodiesel is the only alternative fuel that can be used directly is any existing, unmodified diesel engine. Because it has similar properties to petro- diesel fuel, biodiesel can be blended in any ratio with petroleum diesel fuel. Many federal and state fleet vehicles in USA are already using biodiesel blends in their diesel engines. Biodiesel is produced through a process known as tranesterification, this can be acid catalyzed or alkali catalyzed. This is a chemical process where by an ester is reacted with an alcohol to form another ester and alcohol. Ash- derived alkalis offer cheap alternates to imported ones. Agricultural waste materials contain a good percentage of potash. These materials include palm bunch, waste cocoa pod , plantain peels, banana leaves, maize cob, waste wood beet and many others. When these materials are burnt in air, the resulting ashes contain oxides of potassium and sodium which when dissolved in water yield the corresponding hydroxide. The paper compares the yield of Biodiesel from two streams, one from Sodium Methoxide while the other was Cocoa Pod Ash. The Cocoa Pod Ash has the highest yield of 17.33% for 40gof ash(equivalent to 2mls of 0.812M of crude potassium Methoxide) while the lest was 1.6% for 10g of ash (equivalent to 2.5mls of 0.203M crude Potassium Methoxide'). The yield of the biodiesel did not follow either an arithmetic or geometric order along the column or across row .Each concentration in terms of mass of ash and volume of methoxide is unique with that particular concentration under consideration. Similarly, Sodium Methoxide has the highest yield of 14.48% for 4.5mls of 0.2M of Sodium Methoxide while the lest yield was 1.3% for 0.1M of 5mls Sodium Methoxide. And concentration of Sodium Methoxide from 0.4M and above did not give any biodiesel. While the yield of biodiesel along the column and across the rows did not follow an arithmetic or geometric order. Lastly, it could be seen that the yield of Cocoa pod is higher than that of sodium hydroxide.

Keywords: Biodiesel, Concentration, Sodium Methoxide, Geometric, Arithmetic, Alkali, Engine Agricultural waste and Transesterification.

INTRODUCTION

Biodiesel has become the focus of great interest by everyone from Government of Myanmar to Willie Nelson due to its potential as renewable, clean fuel .Still biodiesel production still lags well behind ethanol production .Many countries have enacted target or mandates for blending of renewable fuels. However, Biodiesel is only as sustainable as the systems used to produce the feedstock for example, 90% of the world's palm oil comes from Indonesia and Malaysia (Malaysian Biodiesel Board, 2006) which are also home to some of the largest rainforests and greatest areas of biodiversity left on earth. There is concerned that rainforest are being cleared to create oil palm plantations have led some in European commission to call for a ban on palm oil imports for Biodiesel. The use of fuel of food oils to produce fuel also has concerned many people. Countries like India, which has a demand for edible oils greater than supply is worried for edible oils greater than supply is worried about food vs fuel conflicts and is focusing on non-edible oil like Jathropha (www.bioenergywiki.net /biodiesel) An estimated 50,000tons of used frying oils both vegetable oils and animal fats are disposed off yearly in Malaysia without treatment as wastes. This creates a negative impact on the environment these wastes can be used if they are purified there has been several attempts to convert used oil to biodiesel (Nye etal, 1983; Mittelbach and Tritthart, 1988). Biodiesel production is a very modern and technological area for researchers due to the relevance that is wining everyday because of the increase in the petroleum and its environmental advantage. Different study have been carried out using different oil as raw materials, different alcohol (methyl or ethanol) as well as different catalyst such as homogenous one like sodium hydroxide (NaOH), potassium hydroxide (KOH), sulphuric acid (H_2SO_4). Super-critical fluid and, heterogeneous one such as lipases and currently, research has shown that agricultural waste such as plantain ash is a good catalyst for biodiesel production. (**www.biodiesel.org**) For

third world countries, biodiesel sources that use marginal land could make more sense e.g. honge oil nots grown along roads or jathropha grown along rail lines. More recent studies using a species of algae with up to 50% oil content have concluded that only 28,000km^2 or 0.3% of the land area of the US could be utilized to produce enough biodiesel to replace all transportation fuel the country currently utilizes. Furthermore, otherwise unused desert land (which receives high solar radiation) could be most effective for growing the algae, and the algae could utilize farm waste and excess Co_2 from factories to help speed the growth of the algae. In tropical regions, such as Malaysia and Indonesia, oil palm is being planted of a rapid pace to supply growing biodiesel demand in Europe and other markets. It has been estimated in Germany that palm oil biodiesel has less 1/3 the production costs of rape seed biodiesel (www.enwikipedia.org/wiki/Biodiesel).

MATERIALS AND METHODS

Materials

The used oil was gotten from Mr. Biggs, Minna. Also, Sodium Hydroxide, and methanol of Analytical graded were gotten from Nashom Chemical store in Minna. The Cocoa pod was gotten froM Idanre in Ondo State

Methods

The Cocoa pod were re-dried for 2 weeks and later placed in an open metallic container and ashed locally by setting it on fire. Different concentration of crude Cocoa Potassium Methoxide were prepared by weighing 10g ,20g 30g ,40g, 50g and 60 g ash and were dissolved in turns in 1L of Methanol their equivalent concentration were determined by dissolving respective masses in 1L of distill water and Hcl was used titrimetrically against each solution of crude potassium hydroxide. Also, different concentration of Sodium Methoxides were prepared, ranges from 0.0125M to 7M i.e. for 1M 40g of sodium Hydroxide was dissolved in 1000mls of Methanol to give 1M of sodium Methoxide. In a similar way other concentration of Methoxides were prepared, 2mls, 3mls, 4mls, 4.5cm 5ml of Methoxide were added to 10ml of feed stock of used oil. . The Methoxide concentration and volume that gave the highest yield was noted and chosen as recipe and used to produce biodiesel which was later characterized.

Results

Table 1 Effect of Cocoa pod Ash Methoxide Concentrations on the Yield of Biodiesel Using used Vegetable Oil as Feed stocks

Methoxide Concentrations Volume	10g of Ash 0.202M and Yield %	20g of Ash 0.406M and Yield	30g of Ash 0.609M and Yield	40g of Ash 0.812M and Yield	50g of Ash 1.015M and Yield	60g of Ash 1.218M and Yield
10ml.Oil+ 2M Methoxide	4.16	15.00	7.50	9.40	5.00	11.0
10ml.Oil+ 2.5M Methoxide	1.60	4.16	3.33	4.16	9.6	6.4
10ml.Oil+ 3M Methoxide	7.7	9..25	7.7	7.7	10.76	9.23
10ml.Oil+ 3.5M Methoxide	6.67	9.60	8.8	11.85	7.4	8..89
10ml.Oil+ 4M Methoxide	7.86	7.14	8.57	9.28	7.86	12.14

10ml.Oil+ 4.5M Methoxide	8.28	6.90	9.66	11.03	14.48	12.14
10ml.Oil+ 5.0M Methoxide	12.00	10.60	13.33	17.33	12.00	10.00

Source: Experimental 2008

Table 2: Methoxide Concentrations on the Yield of Biodiesel Using used Vegetable Oil as Feed stock

Methoxide Concentrations / Volume	0.0125M and Yield %	0.025 M and Yield %	0.05 M And Yield %	0.1M And Yield %	0.2M And Yield %	0.3M And Yield %	0.4M And Yield %	0.5M And Yield %	0.6M And Yield %	0.7M And Yield %	0.8M And Yield %	0.9M and Yield %	1M and Yield %	2M and Yield %	3M and Yield %	4M and Yield %	5M And Yield %	6M and Yield %	7M and Yield %
10ml Oil+ 2M Methoxide	4.17	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 2.5M Methoxide	1.60	0.00	1.6	0.00	3.20	11.2	2.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 3M Methoxide	7.60	0.00	0.00	3..08	3.08	78.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 3.5M Methoxide	1..48	0.00	7.40	2..96	1.48	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 4M Methoxide	11.29	9.29	0.00	9..29	11.43	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 4.5M Methoxide	4.83	3.45	2.76	13.79	14.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10ml Oil+ 5.0M Methoxide	8.00	7.33	2.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Experimental 2008

DISCUSSION OF RESULT

In table 1.0 it shows effect of Cocoa Pod Ash Methoxide on yield of biodiesel using used oil as feed stock. Constant volume of 10mls of the oil was used.When 2mls of Sodium Methoxide was used, the yield did not increase as the Molar concentration of Cocoa pod Ash Methoxide increased. 0.406M has the highest yield of 15.0% followed by 1.218M which has a yield of 11.67%. When 2.5mls of Cocoa Methoxide was used 1.015M has the higest yield while 0.203 M has the least yield of 1.6% .For 3mls of Cocoa methoxide the highest yield was 10.0% while that of 3.5mls was 11.5%. Also, when 4mls was used 1.218M has the highest yield of 12.14% while that of 4.5mls was 14.48% for 1.015M.Lastly, for Cocoa methoxide 5mls has the highest yield of 17.33% for 0.812M while the least yield for this 0.812M was 10.6%. Similarly, when 2.0mls of Sodium Methoxide were added to 10mls of used oil, the yield for different concentration did not increase as molar concentration increased.0.2M of 4mls has the highest yield of 14.48% while 0.0125M has the least yield and the methoxide concentration from 0.3M to 7M gave to no yield .Other mills of Sodium Methoxide from 2ml-3.5mls and 5mls has yield very low compared with that of 0.2M of 4mls of Sodium methoxide. However, for most concentrations 0.4M-7M did give any yield the product caked.

CONCLUSION

Concentration and volume of Cocca Pod Methoxide and Sodium Methoxide have effect on the yield of Biodiesel. And there is need to find the optimum Concentration and volumes of methoxide needed. Catalyst can also be said to affect the yield of biodisel

RECOMMENDATION

(1) There should be more awareness Campaign for the production and use of biofuels, especially Biodiesel.
(2) Research should be done on effect of Ethoxide or yield of biodiesel
(3) There should be public/private partnership in sponsoring biofuel and bio-energy research.

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