Review on Study of Waste Edible Oil as A Biofuel on Diesel Engine.

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ABSTRACT

Considering the present situation in the world regarding the shortage of oil and its other effects on the environment, it has become necessary to study and develop an alternative fuel. Rather than importing oils from other countries at very high prices, we can use our own living resources to generate power and energy. Producing biofuels will reduce foreign exchange and that money can be utilized for other resources like health, education and other basic needs for humans. Biofuels are environmental friendly and the main objective is to reduce the emissions of carbon monoxide and other toxic materials. Biodiesel can reduce the emissions of CO2 up to some extent and even zero in some cases. Hence this will lead in reducing the Global warming.

The utilization of liquid fuels such as biodiesel produced from waste cooking oil by Tran's esterification process represents one of the most promising options for the use of conventional fossil fuels. However, as the Biodiesel is produced from vegetable oils and animal fats, there are concerns that Biodiesel feedstock may compete with food supply in the long-term. Hence, the recent focus on using waste cooking as the substantial feedstock's for biodiesel production.

Keywords: Biofuels, emissions, carbon monoxide, Tran's esterification

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1. INTRODUCTION

Fossil fuels are nonrenewable sources of energy. Also when it is burned, there is a generation of carbon dioxide which is one of the leading factors in global climate change. Hence it is necessary to generate a fuel which will be long lasting and will cause minimum impact on environment. In this paper we have tried to study the use of waste cooking oil for the application of diesel engine. The waste oil used is edible soya bean oil. Waste cooking oil is very cheap and has less impact on food chain; hence it can be used for the preparation of biodiesel. The most important stage in the preparation is Transesterifiaction. Methanol (CH3OH), Sodium Hydroxide (NaOH) or Potassium hydroxide (KOH) as a base catalyst is mostly used in this process because of their low cost and high reaction rate. The byproduct formed in the process is Glycerol which can be used for soap applications. [5]

2. METHODS AND EXPERIMENT

We have seen distinctive papers on ranch of seed plants, generation of vegetable seed oil utilization of this oil for various applications, execution and emanation of vegetable seed oil, impact of this oil on engine. Be that as it may, we are worried with

execution examination and emanation testing. Taking after are a few papers and their outcomes and ventures we have considered for our reference.

In this paper entitle with "Production of Biodiesel using Alkaline based catalyst from waste cooking oil : A case study ", investigation of cost adequacy compound, base impetus and cost of response process. Chemicals utilized are methanol (CH3OH) and sodium hydroxide (NaOH). The cost of chemicals can be additionally limited by reusing of CH3OH and NaOH in this SST procedure. The conceivable 35-40% CH3OH and 80-90% NaOH recuperations were considered for a liquor to oil molar proportion of 5:1 of the reactants. It is found from the review that a little scale handling plant could be created with reactant recuperation units for delivering biodiesel to supplement diesel fuel expected to run the generators. The month to month investment funds was equal to just 4% of the diesel taken a toll for standby power, with a payback time of around one year. However this can increment up to half of the fuel cost and under six months of payback period if the cost of dumping WCO in considered. The review uncovers that even on account of a FFR where WCO is accessible at no cost; the preparing taken a toll for biodiesel does not make it exceptionally attainable unless the cost related with legitimately dumping the WCO is sufficiently high.

From market review, it is found that the least expensive chemicals that can be utilized are methanol and NaOH. In table 3, volume of methanol necessity in various methanol-to-oil molar proportions depends on the atomic weight (0.90-0.92 kg/mole) of WCO. Keeping in mind the end goal to limit cost for handling the biodiesel, 5:1 methanol-to-oil molar proportion was chosen for utilize. At 5:1 methanol-to-oil molar proportion, around 16 litres of methanol is required to respond with 80 litres of WCO with the assistance of 0.52 kg soluble impetus so as to mix biodiesel (B5) for the diesel engine. In table the aggregate material cost is the total of the WCO, methanol (Tk 100/Lt) and NaOH (Tk 1100/kg) cost which can deliver 70 litres of Biodiesel (B100). The cost of Biodiesel created (B100) is Tk 31/litre, though the diesel cost is Tk 68/litre. Henceforth the cost of the required Biodiesel (B5) progresses toward becoming Tk 66/litre.

In the fast food restaurant (FFR) at Dhaka, the fuel utilization was accounted for to be 180-200 litres/day and the aggregate diesel required was accounted for KO to be 3000 L/month. Utilizing 320 litres WCO considering 87.5% yield of Biodiesel could deliver 280 litres of Biodiesel (B100) in the FFR in a month. The diesel sparing can be up to 280 L/month from the aggregate diesel utilization of 3000 L/month. The extra month to month sparing = (Diesel Cost Saving – Methanol and NaOH Cost + Methanol and NaOH Recoveries + Dumping Cost – Disposal Cost of Sediments – Processing Unit Cost)

The specialized plausibility and cost adequacy of biodiesel generation for a diesel plant of a Fast Food Restaurant in Dhaka utilizing antacid based impetus from waste cooking oil. The investigation completed depends on the data provided by the FFR administration. The biodiesel could supplement the diesel use in generators of the same FFR at Dhaka amid extend periods of time of load shedding, coming about sparing in fuel costs. The extra month to month sparing must be in the request of 4% of the fuel cost if there is no cost of dumping WCO in a domain cordial way, making little effect on these plant financial matters. The cost of the least expensive chemicals (methanol and NaOH) along their recuperation units are essential variables impacting the cost and possibility. Higher diesel cost and lower stack shedding can expand the extra month to month reserve funds up to half if dumping cost related is high.

Another standard paper “Biodiesel production from used vegetable oil collected from shops selling fritters in Kolkata” By Nabanita Banerjee, Ritica Ramkrishnan, Tushar Jash mentioned that they collected waste edible oil from restaurants to use as a material for production of biodiesel. In this method they first filtered oil using cotton by keeping it on the mouth of the funnel to remove impurities like pieces of fried batter and vegetables from oil. After that oil was passed through the beaker to remove final carbon particles. For further process Methanol and sodium hydroxide was used with purity of 99 % and 97% respectively.

In this paper they used trans esterification process to produce biodiesel by firstly dissolving 0.69g of NaOH in quantity measured of 77ml CH3OH without heating the mixture. 100g of oil was added to this mixture after complete dissolving and reaction was carried out for 90 minutes under the temperature of 55 degree Celsius with maintaining rpm of 1000 and molar ratio of oil to methanol was 1:15. for this process reaction was carried out using 500ml conical flask fitted with the reflux condenser over a magnetic stirrer to prevent the escaping of methanol from the mixture. After the reaction was completed the reaction mixture was kept aside overnight to settle down in separating funnel. In this reaction two different layers was formed in which upper layer was biodiesel (methyl ester) and lower layer of by-product glycerol and other impurities. Both biodiesel and glycerol was collected separately and volume was measured. Biodiesel was washed with hot distilled water (80 degree Celsius) . the volume of distilled water was doubled than biodiesel we got. After that this mixture was kept for half hour in the separating flask and again two layers was formed. Upper layer was showing biodiesel and lower layer was distilled water as its volume was higher than biodiesel. Both layers was separated in different funnels. The pH of water was checked with pH strip till the colour of strip get green indicating the pH of water as 7 which means complete removal of NaOH has been done. After this process the biodiesel was heated to remove any moisture present. This experiment was carried by varying molar ratio of oil to alcohol as 1:3,1:6,1:12,and 1:15.

3. RESULT AND DISCUSSION

Density of the oil is very important as it affects on the efficiency of the IC engine. Density of the biodiesel produced is 0.87 g/cm^3 . Flash point of the biodiesel is higher than the petrol-diesel which can give an advantage for transportation. which is found as the 179 degree Celsius. The calorific value of the biodiesel is 7816 kcal/kg. Kinematic viscosity of biodiesel is 5.9 centistokes at 30 degree Celsius.

The result shows that trans esterification process improves the properties of oils and get close to the properties of diesel. Waste vegetable oil easily available with cheap cost. Hence disposal problem of used vegetable oil can be solved by recycling it for preparation of biodiesel.

4. CONCLUSION

- Used vegetable oil can be collected from shops selling street foods and can be used for production of biodiesel as it is not source and is generally wasted.
- Maximum yield of biodiesel prepared form used vegetable oil was 94%.
- Used vegetable oil has good potential as an alternative fuel. But cannot be used directly in engine due to high viscosity and low volatility.
- The present experimental study has shown that methyl esters from used vegetable oil can be successfully used as diesel.
- The cost of production of biodiesel is higher as compared to conventional fossil fuel. This is due to the fact that biodiesel is produced from refined vegetable oil. The cost can be reduced if low cost feedstock is used such as used cooking oil from shops selling street foods and hotels.

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