

Production of Bio Diesel from Rice Bran Oil Using Acetone Additives

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ABSTRACT: An experimental investigation was performed to find out the change in properties of rice bran oil by blending of acetone in fuel. The additives is a liquid which is add in the fuel to improve their properties which is responsible for combustion engine. The additive improve fuels burn rate, increase surface area, prevent corrosive effect and increase the efficiency of engine. The main objective of experiment to find effect of acetone on properties of fuel acetone is readily available chemical added in rice bran oil. To improve the fuels ability to vaporize completely by reducing the surface tension it increase the mileage, increase power, engine life and performance less unburned fuel going past rings keeps the rings and engine oil in for better condition. It can stop the block smoke when the rack is all the way at fall throttle it can reduce hydrocarbon emission. It can reduce the formation of water ice crystals in below zero weather which can damage the fuels filter. From the experimental it's found that the kinematic viscosity, surface tension and HC emission is reduced by blending acetone in rice bran oil. But the only one thing is increase that is mileage of vehicle.

KEYWORDS: Rice bran oil, Viscosity, Blending, Flash and Fire point,

I. INTRODUCTION

Oryza Sativa, it is believed, is associated with wet, humid climate, though it is not a tropical plant. It is probably a descendent of wild grass that was most likely cultivated in the foothills of the far Eastern Himalayas. Another school of thought believes that the rice plant may have originated in southern India, then spread to the north of the country and then onwards to China. It then arrived in Korea, the Philippines (about 2000 B. C.) and then Japan and Indonesia (about 1000 B. C.). When Alexander the Great invaded India in 327 B. C., it is believed that he took rice back to Greece. Arab travelers took it to Egypt, Morocco and Spain and that is how it travelled all across Europe. Portugal and Netherlands took rice to their colonies in West Africa and then it travelled to America through the "Columbian Exchange" of natural resources. But as is traditionally known, rice is a slow starter and this is also true to the fact that it took close to two centuries after the voyages of Columbus for rice to take root in the Americas. Thereafter the journey of rice continues with the Moors taking it to Spain in 700 A. D. and then the Spanish brought rice to South America at the beginning of 17th century. The journey of rice around the world has been slow, but once it took root it stayed and became major agriculture and economic product for the people. In the Indian subcontinent more than a quarter of the cultivated land is given to rice (20011-12). It is a very essential part of the daily meal in the southern and eastern parts of India. In the northern and central parts of the subcontinent, where wheat is frequently eaten, rice holds its own and is cooked daily as well as on festivals and special occasions.

II.PREPARE IN BIO DIESEL

2.1.VISCOSITY REDUCTION TECHNIQUES

High viscosity of vegetable oils has been reported by almost all researches as the major bottleneck in their use as fuel. To overcome this problem, various techniques have been successfully tried and the advances in this area are summarized below.

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2.2.PREHEATING

Since high viscosity is a major problem with vegetable oils, one possible solution is to heat the oils in order to reduce their viscosity or to heat the intake air in order to accelerate the evaporation of the vegetable oil in the engine. The oil viscosity was determined by using a redwood viscometer and density of the oil was calculated by a hydrometer.

2.3.BLENDING

Blending refers to mixing of vegetable oil with other low viscosity fuels like Diesel, alcohol and others (additives) and it results in the reduction of the viscosity of the blends.

2.4.MICRO EMULSIFICATION

Micro emulsification is a system consisting of a liquid dispersed in an immiscible liquid usually in droplets larger than colloidal size. The droplet size varying from 0.01 to 0.2µm are generally considered as microemulsifications. Microemulsification conversion requires no chemical reaction and tends to be rapid. These are transport and thermodynamically stable colloidal dispersions. Micro emulsification formation depends upon interactions among molecules of constituents.

Micro emulsification shows considerable promise for providing low viscosity fuel blends. However, they have low cetane number and low heating value as compared to diesel.

2.5.TRANSESTERIFICATION

Transesterification is most commonly used and important method to reduce the viscosity of vegetable oils. In this process triglycerides of five non-edible oils react with three molecules of alcohol in the presence of a catalyst producing a mixture of fatty acids, alkyl ester and glycerol. The process of removal of all the glycerol and the fatty acids from

the vegetable oil in the presence of a catalyst is called esterification. This esterified vegetable oil is called bio-diesel. Biodiesel properties are similar to diesel fuel. After esterification of the vegetable oils its density, viscosity, cetane number, calorific values are improved more. So these improved properties give good performance in CI engine. Physical and chemical properties are more improved in esterified vegetable oil because esterified vegetable oil contains more cetane number than diesel fuel.

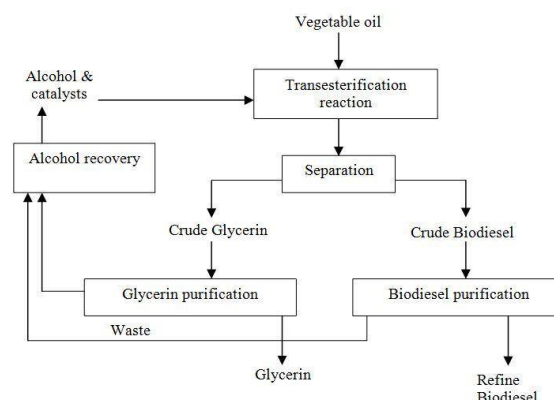


Fig.2.1. Transesterification

III.EXPERIMENTAL METHODOLOGY

Most of the alternative bio fuels identified today is proved to be a partial substitute for existing one due to its undesirable fuel characteristics. However, the various admission techniques experimented earlier are giving good

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solution to apply larger fraction of replacing fuel in the existing engine. This chapter deals the methodology of some suitable techniques to apply large fraction of Rice bran oil in the existing CI diesel engine

3.1. RICE BRAN OIL

Vegetable oil in neat form is one of the best substitutes for the diesel fuel, better lubricity and abundant availability. However studies conducted with vegetable oil showed that, vegetable oil in neat form are not suitable for long term engine application due to its high viscosity, poor volatility and high molecular weight. Hence, the vegetable oils are admitted into the engine either in the form of blended vegetable oil (diesel and alcohol) or esterified vegetable oil (biodiesel). The former is simple and cheap and latter is cumbersome and expensive. Vegetable oil is not a complete solution for the fossil fuel replacement. In addition, alcohol vegetable oil possesses fewer disadvantages like cetane suppression, phase separation and sedimentation. Hence in this work new agent cotton seed oil is considered for reducing viscosity of vegetable oil as it hold good fuel properties. An equal proportional of cotton seed oil and diesel is prepared on volume basis and admitted into the engine through regular diesel injection system to study the feasibility, performance and emission characteristics of 100% bio fuel operation.

3.2. EXPERIMENTAL PROCEDURE

The various steps involved in carrying out this project work are listed below. Preparation of Rice bran oil

- Performance test on engine using mineral diesel at constant speed of 1500 rpm under natural aspirated condition.
- Performance test on the same engine using bio diesel of Rice bran oil and blends consisting of 20%, 40%, 80% of Rice bran oil and diesel respectively. Comparison of these three performance using graphs.

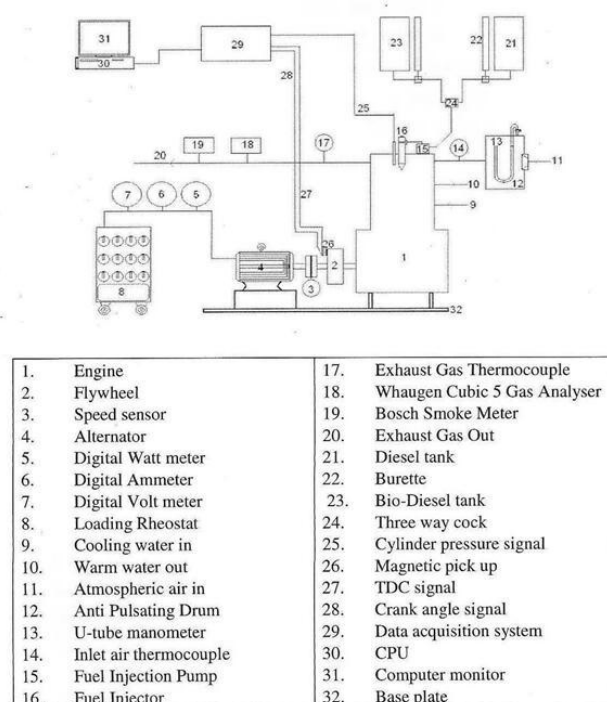


Fig.3.0. Experimental setup

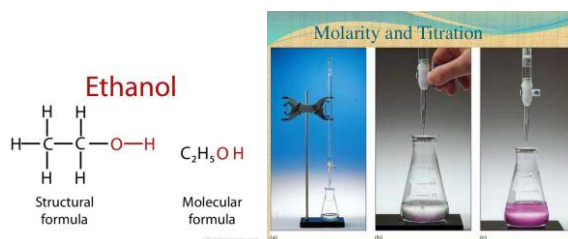
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The compression ratio used for diesel engines lie in the range of 12 to 24, much higher than that of Spark Ignited engines. The compression ratio employed also depends on whether the engine is turbocharged, supercharged or naturally aspirated. Air at around atmospheric pressure is induced in the cylinder and is then compressed in compression stroke to reach a pressure of 4 MPa and temperature of around 800K. At about 1520 degrees before the Top Dead Centre (TDC), the fuel injection begins. When the liquid fuel comes in contact with hot compressed air, the fuel evaporates and mixes with air. The air inside the combustion chamber is well above the ignition temperature of the fuel which atomizes the fuel in small drops. The ignition of air fuel mixture begins after a small delay period and thus the combustion process starts. The flame spreads rapidly through the mixture and the evaporation proceeds. After the expansion stroke, the exhaust process takes place where most of the burnt gases are driven out of the combustion chamber. The cycle starts again after the exhaust stroke.



polluted gases like SO_x, CO and particulate matter in atmosphere.



A)



B)



C)

A) biodiesel, B) mixing additives, C) pre heating in rice bran oil

Fig3.1,3.2,3.3 bio diesel prepare in rice bran oil

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IV.RESULTS AND DISCUSSION

ACETONE-PROPERTIES	
Molecular Formula	C ₃ H ₆ O
Molar Mass	58.08g/mol
Appearance	Colourless liquid
Density	0.7925g/cc
Melting Point	-94.9 ⁰ c
Boiling Point	56.53 ⁰ c
Molecular Shape	Trigonal planer at C=O

3.3.INDIAN SCENARIO OF OIL CONSUMPTION

India's demand for petroleum products is likely to rise from 97.7 million tonnes in 2001-02 to around 139.95 million tonnes in 2012-13, according to projections of the Tenth Five-Year Plan.

The plan document puts compound annual growth rate (CAGR) at 3.6 % during the plan period. Domestic crude oil production is likely to rise marginally from 32.03 million tonnes in 2001-02 to 33.97 million tonnes by the end of the 10th plan period (2012-13). India's self sufficiency in oil has consistently declined from 60% in the 50s to 30% currently. Same is expected to go down to 8% by 2020. As shown in the figure 1.8, around 92% of India's total oil demand by 2020 has to be met by imports.

India is projected to become the third largest consumer of transportation fuel in 2020, after the USA and China, with consumption growing at an annual rate of 6.8% from 1999 to 2020. India's economy has often been unsettled by its need to import about 70% of its petroleum demand from the highly unstable and volatile world oil market (India,

2013). The acid rain, global warming and health hazards are the results of ill effects of increased

Liquid	Density Kg/ m ³	Specific gravity	Kinemat ic viscosity m ² /s	Absolu te viscosit y cpa	Flas h poin t °c	Fire poin t °c
Diesel	820	0.880	6-11.75	10.575	52	63
Rice bran oil	910. 61	0.991	6.365	5.728	280	320
B100%	289. 83	0.289	18.77	16.645	120	130
B30%	864	0.864	17.18	15.462	115	125
B20%	457	0.457	18.44	16.596	119	128

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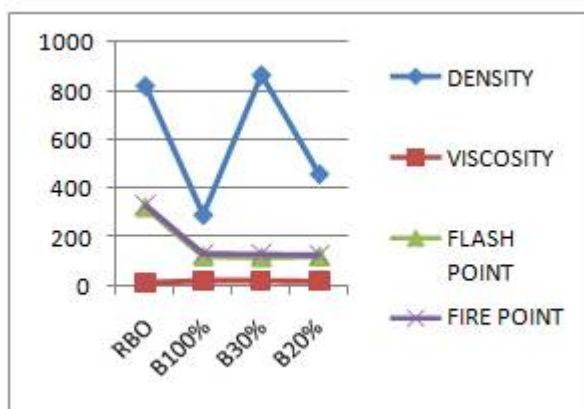
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V.CONCLUSION

The main aim of the present in prepare bio diesel to that of convent fuel to make it suitable for use in injection diesel engine .the Rice bran oil from rice bran oil is blend with diesel at varying proportions (B20%,B30%,B100%) and Acetone additives is blend with (B80%) rice bran oil. Going to observed the various properties calculated.

Future work: Performance test and various load conditions...

GRAPH



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