

Heart Oil Used as Bio Lubricant in Diesel Engine

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Abstract: Lubrication plays vital role in an engine for its efficient performance and working. The conventional lubricant needs to be replaced by bio based lubricants as there is scarcity or less availability of it in the future. There is need to find an alternative renewable bio based lubricants which will be better substitution, aid to bloom the economy and emphasize on great concerns of environment and pollution. Bio based lubricants has a potential for future lubricant as it is renewable, biodegradable, less toxic, and has net zero green house gases. Also it possesses greater physical, chemical and thermal properties. Research has been done to improve the properties with effect of use of bio based lubricant and yet so much left to done. Presently there is necessity to conduct experimental investigation and different studies to come up with modified bio based lubricant which will fulfil all desire requisites.

Keywords: Bio lubricant, Non edible vegetable oils, Biodegradability, cottonseed oil as alternative lubricants, Properties, function, application, etc.

1. INTRODUCTION

Annually 50 million tonnes of lubricants are consumed worldwide, to be used in everything from car engine to machines. The most common type of lubricant is petroleum derived as source of lubricant. Bio based lubricant have been the most promising as they useful physical properties, but they also have undesirable physical properties that make petro based lubricant the provable alternative. Currently much research is done to improve physical properties, and these modified bio based lubricants need to use and find experimentally viability of them. Currently there are Collaboration of government support, agriculture, industry and research. [1]

Demand of lubrication rising due to more development in many countries, and petroleum products are depleting, so we must have a substitute to petro based products. There are many petro lubricant substitutes available, such as synthetic fat lubricants, but lubricants obtained from vegetable oil have received the most tended due to their useful physical properties. Bio based lubricants having higher lubricity and thus a much lower coefficient of dissonance when used when] compared to petro based lubricants. Secondly, bio based lubricants have higher flash points, which makes them highly effective. The world cannot completely deduction to bio based lubricants, it must be an inclined process requiring the Bio based (e.g. cotton seed) oil lubricant of the present research is derived primarily from plants. It is readily biodegradable and is non toxic to flora and fauna. The research is suitable for internal combustion engine. The research (experimentation) is designed as a total composition for its application and is not as additives to petroleum lubricants. [2]

2. LUBRICANTS AND LUBRICATION

Lubricant is a substance used to reduce friction between moving faces. It may also have the function of put down foreign particles. The property of decreasing friction is known as lubricity.

Generally lubricants contain 90% base oil and less than 10% supplemental. Bio lubricants or synthetic liquids properties such as hydrogenated polyolefin, silicones, fluorocarbons and many others are sometimes used as base oils. [3]

2.1. Properties of Lubricant:-

A good lubricant possesses the following properties:

1. High boiling point
2. Low freezing point
3. High resistance to oxidation.
4. Thermal stability
5. High viscosity index.

2.2. Function of lubricants:-

1. Prevent corrosion
2. Keep moving parts apart
3. Transfer heat
4. Reduce friction
5. Carry away contaminants
6. Protect against wear

3. BIO LUBRICANTS

Bio-lubricants are primarily triglyceride esters derived from plants and animals. The plant derived materials are preferred. Bio-lubricants provide environmental and health benefits over petroleum-based products.

Now a day's Vegetable oil is the one of the part of bio lubricants i.e. Jatropha oil, cottonseed oil, castor oil, moringa oil. [2]

3.1Castor oil: - It can be used in many industrial and other applications such as: agriculture, plastics and rubber paint, textile chemicals, lubricants because of it high flash point castor oil is useful in the field where high temperature occurs. It also has high oxy-rich property it will be beneficial in the vehicle engine and gear box as a lubricant. [7]

3.2 Cottonseed Oil

Cottonseed contains kernel as well as hull. The hull produces fibre and linters. The kernel contains oil, protein, sterols etc. Cottonseed oil is removed from cottonseed kernel. Cottonseed oil, also termed as "Heart Oil" in most used edible oils. Some polyunsaturated oils can be used for cooking purposes.

Cotton seed oil is generally cleaved with a light golden colour. Cottonseed oil's light non oily consistency and smoke point makes it more desirable. The cottonseed oil has most desirable properties of lubrication. [6]

3.3. Biodegradation of bio lubricants: -

Biodegradability is the capability of a material to be decay by microorganisms. A lubricant is classified as biodegradable if its percentage of degradation reaches up to a certain marked level. Vegetable oil exhibit higher biodegradability than mineral oils. [4]



Fig.(1) cottonseed oil-bio based lubricants. [4]

4. APPLICATION OF BIO LUBRICANTS

Bio lubricants can be used in sensitive environments and prevent pollution at higher level.

Bio lubricants can be used in various industrial and maintenance applications.

Bio lubricant can be used in diesel engine. [5]

5. RESULTS

a) Results of testing:

Sr No	TEST	SAE40	COTTON SEED OIL
1	Viscosity	0.8 CM ² /SEC	0.75 CM ² /SEC
2	Kinematic Viscosity	12.8 CST	20.6 CST
3	Dynamic Viscosity	121.6 CST @30 °C	50 CST @30°C
4	Viscosity index	100.	
5	Flash Point	216°C	234°C
6	Sulphur Test	1.2gm	0.8gm
7	Moisture Content	0.4gm	0.23gm
8	Ph Test	4	5.5
9	Cloud Point	-1°C	1.7°C
10	Pour Point	-13°C	-15°C

11	Freezing Point	-30°C	-6°C
12	Fire Point	300°C	230°C
13	Density	836kg/m ³	850kg/m ³
14	Colour	Red	Pale Yellow
15	Litmus Test	Reddish Brown	No Change

b) Anti-wear property of lubricant:

Wear Scar Diameter (micron)→ Lubricants↓	First ball	Second ball	Third ball	Average
SAE 20w40	363	433	418	404.36
Cottonseed oil	672	654	632	652.66

6. CONCLUSION

We got some similar properties of cottonseed with mineral oil as well as base oil. This will shows the research in the area of bio lubricants i.e. cotton seed oil is good alternative source of lubricant for lubrication. Benefits of bio lubricants:-

- Higher lubricity
- Lower volatility
- Higher viscosity index
- Higher boiling temperatures
- Rapid biodegradation
- Better skin compatibility

7. FUTURE SCOPE

Non edible and edible vegetable oil based lubricants are renewable and biodegradable in nature and do not interfere with the country's food consumption demands.

Lubricants based on vegetable oils still covers narrow market segment. Lubricants used in open applications like two stroke engines, chainsaws, forestry etc. which can have direct exposure to soil and water bodies have started to be replaced by such eco-friendly lubricants. Bio lubricants are future alternative lubricants for automobile applications.

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