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FORMATION OF GREASE FROM WASTE LUBRICANT OIL

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ABSTRACT

Grease from the early Egyptian or Roman eras is thought to have been prepared by combine lime with olive oil. The lime saponifies some of the triglyceride that comprises oil to give calcium grease. In the middle of the 19th century, soaps were intentionally added as thickeners to oils. Over the centuries, all manner of material have been employed as greases, for example black slugs Arionater were used as axle grease to lubricate wooden axel trees or cars in Sweden.

Keywords –Additives, Apparent Viscosity, Consistency,Grease, Lubrication, Oil, Temperature, Saponify.

1. INTRODUCTION

Grease is a mixture of a fluid lubricant usually petroleum oil and a thickener (soap) dispersed in the oil. The base oil (petroleum) can be changed by using the used lubricant. Other then base oil, thickener may play an important role in the mixture. Soapthickeners are formed by reacting metallic hydroxide, or alkali, with a fat, fatty acid, or ester. Since the petroleum prices were increase each year, using used lubricant as base oil is the best solution to produce grease in the low cost at the same time it will decrease the water pollution. Three type of soap are used in this production that is aluminum soap, calcium soap and sodium soap. The viscosities of grease are test by change the spindle speed for each type of soap. The different percent of soap are used to know the effect of percent of soap to the viscosity of grease. In this experiment, grease was successfully produced from used lubricant. The best way to produce grease is with sodium soap, where sodium soap is the strongest thickener compare to anotherthickener. Using this type of soap, only small amount of this thickener needed compare to another type of soap.[6]

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2. TYPES OF MANUFACTURING PROCESS

Manufacturing of grease is carried out either in pressurized vessel or open cooking kettles. Grease can be made in either by following processes.

2.1 Batch Process 2.2 Continuous Process

3. TYPES OF GREASE

3.1 Lithium Grease 3.2 Calcium Grease

3.3 Sodium Grease 3.4.AluminumGrease

4. RAW MATERIAL

1. Used lubricating oil	150ml
2. Sodium soap (stearate)	1.471/gm.
3. Graphite powder	1.471/gm.
4. Phenol	1.471/gm.

5. GREASE CHARACTERSTICS [06]

5.1 Apparent Viscosity: At start-up, grease has a resistance to motion, implying a high viscosity. However, as grease is sheared between wearing surfaces and moves faster, its resistance to flow reduces. Its viscosity decreases as the rate of shear increases. By contrast, oil at constant temperature would have the same viscosity at start-up as it has when it is moving.

5.2Water Resistance: This is the ability of grease to withstand the effects of water with no change in its ability to lubricate. Soap/water lather may suspend the oil in the grease, forming an emulsion that can wash away or, to a lesser extent, reduce lubricity by diluting and changing grease consistency and texture.

5.3 Dropping Point: Dropping point is an indicator of the heat resistance of grease. As grease temperature increases, penetration increases until the grease liquefies and the desired consistency is lost. The dropping point is the temp which grease becomes fluid enough to drip. The dropping point indicates the upper temperature limit at which grease retains its structure, not the max temperature at which grease may be used.

5.4High Temperature Effect: High temperatures harm greases more than they harm oils. Grease, by its nature, cannot dissipate heat by convection like circulating oil. Consequently, without the ability to transfer away heat, excessive temperatures result in accelerated oxidation or even carbonization where grease hardens or forms a crust. Effective grease lubrication depends on the grease's consistency. High temperatures induce softening and bleeding, causing grease to flow away from needed areas. The mineral oil in grease can flash, burn or evaporate at temperatures greater than 177°C.

5.5LowTemperature Effect: If the temperature of grease is lowered enough, it will become so viscous that it can be classified as hard grease. Pump ability suffers and machinery operation may become impossible due to torque limitations and power requirements. As a guideline, the base oil's pour point is considered the low-temperature limit of grease.

5.6Corrosion and Rust Resistance: This is the ability of grease to protect metal parts from chemical attack. The natural resistance of grease depends upon the thickener type. Corrosion resistance can be enhanced by corrosion and rust inhibitor.

5.7Texture: Texture is observed when a small sample of grease is pressed between thumb and index finger and slowly drawn apart. Texture can be described as:

I. Brittle: the grease ruptures or crumbles when compressed.
II. Buttery: the grease separates in short peaks with no visible fibers.
III. Long fiber: the grease stretches or strings out into a single bundle of fibers.
IV. Resilient: the grease can withstand moderate compression without permanent deformation or rupture.
V. Short fiber: the grease shows short break off with evidence of fibers.
VI. Stringy: the grease stretches or strings out into long, fine threads, but with no visible evidence of fiber structure.

6. EXPERIMENTAL WORK

The experiment was carried out according to the standard procedure. The procedure was divided into two parts. The first part is to prepare the samples of grease by using used lubricant as base oil. For production of grease, soap is used as a thickener for the base oil.[7]

Experimental procedure:

1. Add amount of 150 ml used lubricating oil in a beaker.
2. Start heating the oil to the reaction temperature at 120˚C.

3. Add additives such as sodium soap and graphite powder.
4. Runs the mixture on a certain speed (100 rpm).
5. Leave the mixture for 120 min.
6. Finally leave the mixture for 48 hrs.for cooling.

Chemical reaction $C_{17}H_{35}COOH + NaOH \longrightarrow C_{17}H_{35}CooNa + H_2O$ [06]

7. ADVANTAGES & DISADVANTAGE

7.1 Advantages

1.The Method is easily carried out.

2. within the 2 hrs. We get the Final finished product.

3. The requirement of the material and equipment are get very easily.

4. We get the better productivity and yield.

7.2 Disadvantages

1. The temperature should not maintain very easily.

2. More difficult to set the stirrer and the heating equipment.

3. The time required for the cooling is more**.**

8. Observation Table

Time (Minute)	Temperature (˚C)
0	0
10	5
20	15
30	40
40	50
50	60
60	70
70	80
80	90
90	100

100	105
110	110
120	120

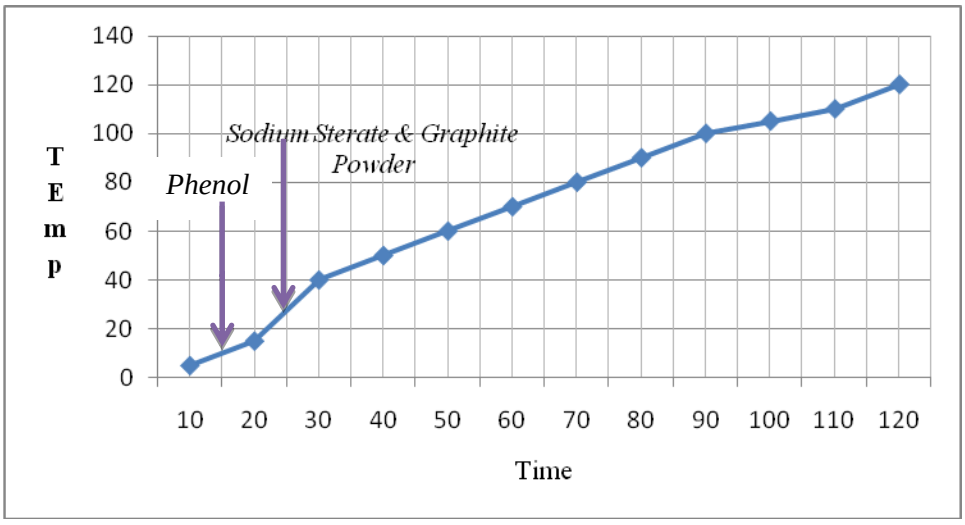

Fig. 1. Time V/S Temperature With Addition Of Chemical

9. RESULT & DISCUSSION

We obtained grease from used lubricant is by simple mixing & heating batch process. We obtained 127 gm. of grease from 150 ml of oil. Boiling point is 120°C; dropping point is 163°; Appearance is smooth to fibrous.

1. According to a first graph Fig(1) at the temperature of 15˚C we added the phenol at low temperature it reacts easily and at a temperature 25˚C there is addition of sodium stearate and graphite powder but at a certain temperature we get the good consistency of the oil and the product will be obtained.

2. According to the second graph Fig(1) of time v/s temperature, temperature increases with respect to time.

3. From our experimentation, we have found that the lowest value of temperature is 5˚C is at 10 min and as the time goes on increasing the temperature also increases. This increase in graph is not exactly linear in nature. In specific interval it shows linearity between time values on 30-90 mints. The solution attains is maximum value that is its boiling point at time 120 mints.

7. CONCLUSION

1. The process is easy &cost efficient.
2. Raw materials are easily available.
3. Efficientprocess.
4. No losses of any material.

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