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LUBRICANT

Daniel E. Bergen, Phillips, Tex., assignor to Phillips Petroleum Company, a corporation of Delaware

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This invention relates to lubricants and more particularly it relates to the addition of acylated amines of sulfur heterocyclic compounds to lubricants to increase the wear resisting properties and to increase the stability of the so treated lubricants towards oxidation and sludge formation.

It is known that certain oiliness or film strengthening agents added to the lubricating oil decrease wear during the starting and operating of cold motors, lower bearing temperature, tend to prevent ring sticking and scoring, and to reduce internal friction in some cases. Many of these film strengthening agents, while having the mentioned beneficial effects, have deleterious effects such as affecting adversely the corrosiveness, oxygen stability and resistance to sludge formation of the oil.

It is known that heterocyclic sulfur compounds when added to petroleum oils have little or no beneficial effect upon the oils. On the contrary, free amines of heterocyclic sulfur compounds will decrease the susceptibility of oils to oxidation. However, such amines are usually so unstable toward oxidation and polymerization in themselves as to make their manufacture and use impractical. For example, amino thiophene is oxidized and polymerized to an insoluble solid in a few minutes time by light and oxygen. By converting such amines to amides of organic acids, for example, by acylation, the resulting compounds are then relatively stable, and are effective in improving the oiliness or film strength, resistance to oxidation and sludge formation properties of oils.

An object of this invention is to provide a lubricant having improved properties such as improved oiliness or film strength, a decreased tendency toward corrosiveness, oxidation, and sludge formation.

An object of this invention is to provide a method for increasing the film strength or oiliness as well as reducing the tendency towards corrosiveness, oxidation and sludge formation of lubricating oils.

Other objects and advantages will be apparent to those skilled in the art from a study of the following disclosure.

I have found that the acid amide derivatives of sulfur containing heterocyclic compounds when added to petroleum oils in amounts generally less than 2%, will decrease the susceptibility of such oils to oxidation and sludge formation, as well as increase their film strength or oiliness. Such amides, or more specifically acid

amides, may be prepared by acylation with an organic acid, acid anhydride or acid chloride according to known methods. The resulting acid amides are a relatively stable group of compounds and I have found them to be effective in improving the quality of lubricating oils as herein described.

Aceto thiophenide, which is the acetyl derivative of the relatively unstable amino thiophene and acetic acid, is quite stable. This material when added to a lubricating oil materially improves the properties thereof. This improvement in quality of a so treated oil is evidenced by the following example which tabulates results of Stephens' consistometer tests, as follows:

Example I

Percent aceto thiophenide additive	Transition point temperature	Saybolt Universal viscosity at transition temperature
	°F.	Seconds
Oil, no additive.....	300	39.8
Oil+0.025% additive.....	311	38.7
Oil+0.05% additive.....	320	32.9

The shift of 11° F. and 20° F. in the transition point temperature, and the decrease in viscosity at the transition point indicates a considerable increase in film strength, oiliness or lubricating properties.

The Stephens consistometer, previously manufactured by Stephens Consistometer Corporation, 332 South Michigan Avenue, Chicago, Illinois, is a device for use in the testing of lubricants. The device consists of two circular metal plates, one of which is rotated at a constant speed, and to the other plate is attached a recording indicator. These two circular plates are immersed in a bath of the lubricant under test, one plate rotated at constant speed and the drag on the second plate indicated by the recorder. The oil being tested is warmed slowly and as the temperature increases the drag on the second plate decreases due to the thinning of the oil until a temperature is reached at which the oil film breaks and seizure occurs. This temperature is recorded as the transition point temperature. It will be observed from the above data that the oil treated with the very small quantities of aceto thiophenide became tenacious and adhered strongly to the metallic surface and withstood appreciably higher temperatures before failure, and it will be understood by those skilled in the art that transi-

tion point temperature increases such as these recorded above are very desirable.

In this same example, it will be noted that the Saybolt Universal viscosity of the treated oil decreased from 39.8 seconds at 300° F. to 32.9 seconds at 320° F. Modern automotive engines require thinner or less viscous oils than heretofore, hence by using my acid amide addition agents, thinner oils may be used and yet possess satisfactory film strength and lubricating properties at operating temperatures. Thus, the oil treated with 0.05% aceto thiophenide would exhibit superior lubricating qualities at 315° F. to the oil with no addition agent at the lower temperature of 300° F.

Example II

When aceto thiophenide is added to an unstable light neutral oil which had formed 38 milligrams of sludge per 10 grams of oil in 18 hours in an Indiana oxidation test, only 22 milligrams of sludge formed in this same period of time.

Aceto thiophenide and its hydro-, nitro-, halogen and hydroxy derivatives function equally well for improving the film strength and reducing the oxidation and sludge forming tendencies of lubricating oils. Sulfur heterocyclics whose amines are suitable for the preparation of the amide addition agents herein disclosed, include those such as thiophene, benzo thiophene, thiophanthrene, thianthrene, thiopyrylium, thiazole, thioxane, and the like, together with their alkyl, aryl, aryl-alkyl homologues and their hydro-, nitro-, halogen and hydroxy derivatives. Acids suitable for acylation include aliphatic acids as acetic, butyric, and the like, aromatic acids as benzoic, toluic, phthalic and the like. The acylation may be accomplished by use of the acids directly, their anhydrides or acid halides.

I do not wish to be restricted by any theories

as to the reasons for the beneficial results obtained by using the acylated amines of sulfur heterocyclic compounds in lubricating oil, but only by the limitation of the following claims.

I claim:

1. An improved lubricant comprising a mineral lubricating oil having incorporated therein less than 2 per cent of an acylated derivative of an amino heterocyclic sulfur compound containing the sulfur in the ring and the amino group as a side chain having the general formula $X-NH-OC-R$ in which X is a heterocyclic radical containing sulfur in the ring, and R is selected from a group consisting of alkyl, aryl and aryl-alkyl radicals, together with their hydro-, nitro-, halogen and hydroxy derivatives, to improve the properties of the so treated oil.
2. An improved lubricant comprising a mineral lubricating oil having incorporated therein less than 2 per cent of aceto thiophenide, to improve the properties of the so treated oil.
3. An improved lubricant comprising a mineral lubricating oil having incorporated therein less than 2 per cent of an addition agent selected from a group consisting of the hydro-, nitro-, halogen and hydroxy derivatives of aceto thiophenide, to improve the properties of the so treated oil.
4. An improved lubricant comprising a mineral lubricating oil having incorporated therein less than 2 per cent of aceto thiophenide to increase the film strength of the so treated oil.
5. An improved lubricant comprising a mineral lubricating oil having incorporated therein less than 2 per cent of an addition agent selected from a group consisting of the hydro-, nitro-, halogen, and hydroxy derivatives of aceto thiophenide, to increase the film strength of the so treated oil.

DANIEL E. BERGEN.