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STABILIZERS FOR OILS

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The present invention relates to hydrocarbon oils such as petroleum oils which may be used as fuel or furnace oils or as lubricating oils. Fuel oils are generally prepared by cracking certain fractions of hydrocarbon oils with the result that certain amounts of suspended carbon, asphaltic and resinous matter, and sulfur are contained in the final product. Some fuel oils, on the other hand, consist of blends of comparatively light petroleum oil fractions and tarry fractions, the latter also containing some solid particles. Lubricating oils when used, for instance, in internal combustion or other types of engines tend to deposit a film of so-called varnish on surfaces in the engine.

In the case of fuel oils the solid matter presents serious problems since it tends to settle out in storage tanks and consequently clog outlet pipes. Also the solid matter collects at the nozzles of burners and eventually clogs the nozzles. In addition, small amounts of water with which fuel oil may become contaminated in the course of handling and storage, settle out and cause irregular burning of the oil.

A fuel oil which gives a deposit of 1.0% or more is considered unstable while a deposit of less than 1.0% is considered stable. This is, of course, a somewhat arbitrary classification but does correspond generally with the amount of deposit beyond which serious difficulties are encountered.

Various ways have been suggested for overcoming these disadvantages, one of which is the addition of an emulsion breaker to cause the deposits and water to settle out more quickly than usual so they can be removed from the oil more easily.

I have found that certain compounds when added to the oil will stabilize the oil not only by preventing the deposition of the particles and water for greatly extended periods of time but also by causing a dispersion of a deposit which has already settled out. This latter feature is, of course, highly desirable since the stabilizing compounds may be merely added without agitation to oils which have been standing for some time and have already accumulated a deposit.

It is customary in some types of furnaces to heat the fuel oil before it is ignited. This is usually carried out in a "preheater" and the solid matter in the oil tends to deposit therein. The stabilizing compounds according to my invention prevent or minimize these preheater deposits.

While lubricating oils do not contain solid matter initially, such solid matter develops during use of the lubricating oil. This solid matter finally adheres to various metal surfaces causing a "varnish" film and other deposits in the engine. The stabilizers according to the present invention prevent this adherence to the metal surfaces and keep the engine clean.

Although I have described the effect of the stabilizers with reference to fuel oils and lubricating oils, it will be clear that the dispersion of solid particles and water by the use of my stabilizing compound will be effective in other oils as well.

It is an object of the present invention to stabilize petroleum oils by dispersing any solid matter contained therein or subsequently formed therein or contaminated therewith, by the addition of small amounts of stabilizing agents.

A further object is to prevent varnish deposits on metal surfaces caused by deterioration of lubricating oil.

Another object of my invention is to prevent bottom settlings in fuel oils which may cause serious trouble in the operation of fuel oil furnaces.

Still another object is to provide fuel oils which will not clog feed lines, nozzles of burners and the like and will not leave deposits in preheaters.

According to my invention certain oil-soluble metal soaps together with certain organic promoters are used as stabilizing agents.

The metallic soap may be the stearate, oleate, palmitate, recinoleate or other radical of a fatty material or naphthenate of a metal such as iron, aluminum, chromium, or nickel, although I prefer to use iron or aluminum naphthenate. The organic promoter may be one or more alkylamines, arylamines, as well as soaps of organic amines such as diphenylamine, diphenylamine oleate, ethylene diamine oleate, triamylamine oleate, diphenylamine naphthenate or the like. The metallic soap may comprise 10% to 90% of the addition mixture although equal amounts of the metallic soap and organic promoter are preferred. The metallic soap is the active agent in the stabilizer, and the function of the promoter is to enhance the stabilizing action and to render the stabilizing action of the soap permanent. The addition of about 0.05% to about 0.5% of the above stabilizers decreases the sediment to an amount corresponding to a highly stable fuel oil, and thus will change an unsalable oil into a satisfactory oil. Obviously, this small amount of metal soap will produce substantially no thickening of the oil. I have found that about 0.1% of stabilizer gives the most satisfactory results, bearing in mind the question of cost. The terms "alkylamines" and "arylamines" as used herein and in the claims are intended to refer to those amines in which the hydrocarbon alkyl or aryl groups are attached directly to the amino nitrogen.

When "preheater" deposit is of especial consideration, I have found that the addition of a

small amount of beta-naphthol or the like together with the metal soap and organic promoter greatly reduces such deposit.

Although anyone of the aforementioned metal soaps may be used with advantage, I have found that iron and aluminum naphthenate give the best results. It has also been found that diphenylamine oleate and ethylene diamine oleate are very satisfactory as promoters. It is to be noted that more than one of the promoters may be used at the same time if desired.

In Table I, which follows, four examples of stabilizing agents are given, each of which has given excellent results as can be seen from Tables II, III and IV. Table II shows the effect that Examples 1 and 2 have on freshly prepared fuel oil in preventing sediment. Table III, on the other hand, shows the dispersion effect of Example 3 on a fuel oil which has already accumulated a sediment. Table V shows how Examples 1 and 4 reduce preheater deposit.

Table I

	Iron naphthenate	Aluminum naphthenate	Diphenylamine oleate	Ethylene diamine oleate	B-naphthol
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Example 1	50		50		
Example 2		50		50	
Example 3		50	25	25	
Example 4		50	30	10	10

Table II

	Example 1	Example 2	Control
Quantity of stabilizer added per cent	0.2	0.1	0
Days standing	Sediment content		
	Per cent	*Per cent*	
7	0.4		2.0
63		0.8	
167	0.9		
191			3.0+
200			
223	0.8		

Table III

	Example 3
Quantity added per cent	0.2
Days standing	Sediment content
	Per cent
1	1.8
2	1.1
6	0.8
8	0.5
9	0.6
34	0.1
60	0.1

Table IV

	Example 1	Example 4	Control
Quantity added per cent	0.5	0.1	0
Preheater deposit grams	0.218	0.173	0.687

Although the foregoing description has referred to several specific embodiments of the present invention, it is to be understood that the present invention is not limited thereby but is only limited by the scope of the appended claims.

Having now described my invention and the manner of carrying the same into effect, what I claim is:

1. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil and a small amount of at least one compound selected from the group consisting of alkylamines, arylamines and soaps of organic amines, whereby the formation of sediment is greatly reduced.

2. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil and a small amount of at least one compound selected from the group consisting of alkylamines, arylamines and soaps thereof, whereby the formation of sediment is greatly reduced.

3. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil and a small amount of at least one aliphatic amine oleate, whereby the formation of sediment is greatly reduced.

4. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil and a small amount of at least one aromatic amine soap, whereby the formation of sediment is greatly reduced.

5. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap of a fatty material, the metal being selected from the group consisting of iron, aluminum, chromium and nickel, the amount of said metal soap being insufficient to cause any substantial thickening of the oil, and a small amount of at least one compound selected from the group consisting of diphenylamine, diphenylamine oleate, and ethylene diamine oleate, whereby the formation of sediment is greatly reduced.

6. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, a metal naphthenate in an amount insufficient to cause any substantial thickening of the oil, and a small amount of an organic amine soap, whereby the formation of sediment is greatly reduced.

7. A fuel oil composition as claimed in claim 6 and further containing a small amount of beta naphthol.

8. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an iron naphthenate in an amount insufficient to cause any substantial thickening of the oil, and a small amount of an organic amine soap, whereby the formation of sediment is greatly reduced.

9. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an aluminum naphthenate in an amount insufficient to cause any substantial thickening of the oil, and a small amount of an organic amine soap,

whereby the formation of sediment is greatly reduced.

10. A fuel oil composition containing a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil soluble metal soap in an amount insufficient to cause any substantial thickening of the oil, and a small amount of diphenylamine oleate, whereby the formation of sediment is greatly reduced.

11. A fuel oil composition as claimed in claim 10 wherein the composition contains from about 0.01% to about 0.1% of the metal soap and from about 0.01% to about 0.1% of diphenylamine oleate.

12. A compound for reducing the formation of sediment in mineral oils having fuel oil characteristics and normally tending to form such a sediment consisting of from about 10% to about 90% of an oil-soluble metal soap and the balance a promoter selected from the group consisting of diphenylamine, diphenylamine oleate, and ethylene diamine oleate.

13. A stabilized fuel oil containing a mineral oil having fuel oil characteristics and a small amount of a stabilizer consisting of about 50% iron naphthenate and about 50% diphenylamine oleate.

14. A stabilized fuel oil containing a mineral oil having fuel oil characteristics and a small amount of a stabilizer consisting of about 50% aluminum naphthenate and about 50% ethylene diamine oleate.

15. A stabilized fuel oil containing a mineral oil having fuel oil characteristics and a small amount of a stabilizer consisting of about 50% aluminum naphthenate, about 30% diphenylamine oleate, about 10% ethylene diamine oleate, and about 10% beta naphthol.

16. A fuel oil composition containing a large amount of a mineral oil having fuel oil characteristics and normally tending to form a sediment, an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil, and a small amount of the reaction product of at least one aromatic amine with a fatty acid.

17. A method of reducing the formation of sediment in a fuel oil normally tending to form such a sediment comprising incorporating therewith an oil-soluble metal soap in an amount insufficient to cause any substantial thickening of the oil and a small amount of at least one compound selected from the group consisting of alkylamines, arylamines and soaps of organic amines.

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