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PROCESS FOR TREATING HYDROCARBONS

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This invention relates to a process for preventing or delaying the formation of solid wax in hydrocarbon oils, such as mineral oils, petroleum residues, lubricating oil distillates, coal tar, coal tar oils, shale oils and the like at temperatures which are either above or below the pour point.

Hydrocarbon oils which contain waxy constituents often lose their limpidity because of the separation of particles of solid wax. This separated wax appears either in the form of a cloud within the oil or as a more or less crystalline precipitate which may remain dispersed throughout the oil. Frequently, the separated wax will collect on the walls of the container, especially near the surface of the oil, or will rise to the oil surface. Such separation of wax often occurs at temperatures which are substantially above the congealing temperature of pour point of the oil, with the result that small constrictions in a lubricating system may become obstructed. The lack of clarity is in itself undesirable, because of the unattractive appearance of the oil. This separation of solid wax is manifested both in the formation of clouds of dispersed more or less crystalline precipitates and in the formation of surface wax.

It is one object of my invention to provide a process for reducing, delaying or preventing the separation of such particles of wax by the addition of certain innocuous substances to the oil, which are hereinafter referred to as "wax suppressors". Other objects of my invention will be apparent from a reading of this specification.

I have found that the above stated objects can be realized by the addition to a wax bearing oil of small quantities of a natural non-paraffinic wax or of mixtures of these waxes. The waxes which fall within the scope of the present invention are characterized by the large content of high molecular weight fatty acids and/or esters of said fatty acids with mono- or poly-hydroxy alcohols, said acid or acid radical generally containing between ten and thirty-five carbon atoms.

The natural waxes which may be used in accordance with the present invention are white beeswax, yellow beeswax, spermaceti (cetaceum), wool wax, bayberry wax, candelilla wax, carnauba wax, Chinese wax, cocoa wax, cottonseed wax, Japan wax and montan wax. Other natural waxes may also be used, the specific waxes recited having been selected because of their availability at low cost as commercial waxes. The most satisfactory results have been obtained with beeswax, carnauba wax, montan wax, and

with mixtures of beeswax and carnauba wax and mixtures of beeswax and montan wax, and these constitute a preferred embodiment of my invention.

The waxes may be dissolved in the oil either singly or in combination with one another. The effective quantity of wax suppressors required for inhibiting wax formation in different oils varies with the different wax suppressors and also depends upon the quantity and nature of the hydrocarbon wax in the oil and upon the temperature to which the oil is to be cooled. I have found that the effective quantities usually lie between 0.005% and 1.0% of the oil treated, although under certain conditions as much as 1.5% may be desirable.

I have found that the above described waxes are also effective to reduce the pour point or congealing temperature of hydrocarbon oils. When used for this purpose somewhat larger quantities of natural wax are generally desirable, usually not exceeding 2%.

Such quantities of wax suppressors, as are used according to this invention to suppress the separation of wax, may have no significant effect upon the pour point of the oil, but have a marked effect in preventing or retarding the separation of solid wax. When used in larger concentration these natural waxes exhibit pour point reducing properties. Many of the waxes may be increased in their effectiveness as wax suppressors and as pour point reducers by the saponification of their acid constituents. Thus, beeswax may be treated with lead carbonate or calcium oxide to convert the acidic constituents into lead and calcium soaps. The beeswax, thus treated, had a greater power for suppressing wax than the original beeswax.

The natural waxes may be added to the oils either at ordinary or at elevated temperatures. If the oil being treated contains particles of separated solid paraffinic wax it is generally desirable to warm the oil to dissolve this paraffinic wax prior to its treatment. It was found, moreover, that the time required for dissolving the natural wax in the oil can be decreased greatly by warming and agitating the mixtures. For example, it was found that solid beeswax dissolved very slowly in oil maintained at 150° F., but when finely broken solid wax was added to oil properly agitated at 175° F., 0.1% of beeswax was dissolved in two minutes.

In large scale operations it is often desirable to dissolve a large amount of wax in a small quantity of oil and then to add this concentrated oil-

natural wax solution to the main body of oil. Alternatively, the natural wax can be conveniently dissolved in the oil by placing fragments of the wax in a perforated container which is suspended in the oil. In this manner, 0.1% of beeswax was dissolved in oil agitated at 175° F. in thirty minutes, when working with a 238 barrel batch.

To illustrate the use and effect of my wax suppressors, the following examples are presented, it being understood that my invention is not limited to the particular waxes, temperatures, concentrations and details contained therein.

Example I

An Edeleanu raffinate from San Joaquin lubricating oil stock conforming to S. A. E. 50 viscosity specification formed a haze over night when stored at 45° F. The addition of 0.01% and 0.03% of beeswax delayed the separation of visible wax particles for 9 and 15 days, respectively. A third sample containing 0.07% of beeswax remained limpid after five months' storage at 45° F., which was the duration of the test.

Example II

A sample of the oil described in Example I, containing 0.03% carnauba wax remained clear after four days' storage at 45° F., the duration of the test.

Example III

Samples of the oil described in Example I containing amounts of montan wax varying between 0.03% and 0.07% remained clear after five months' storage at 45° F., the duration of the test.

Example IV

Samples of the oil described in Example I were treated with different blends of natural waxes and stored at 45° F. They each remained clear for the duration of the test as shown in the following table:

Material added	Duration of test, days
0.01% beeswax + 0.02% carnauba wax.....	137
0.02% beeswax + 0.01% carnauba wax.....	137
0.10% beeswax + 0.03% carnauba wax.....	145
0.05% beeswax + 0.01% montan wax.....	136
0.05% beeswax + 0.03% montan wax.....	138
0.015% Japan wax + 0.015% carnauba wax.....	136
0.022% Japan wax + 0.008% carnauba wax.....	136

Example V

Blended western motor oils conforming to S. A. E. 30, 40, 50, 60 and 70 viscosity specifications each formed an appreciable haze when stored over night at 45° F. Different samples from each of these oils stored at 45° F. remained clear for over three weeks, the duration of the tests, after the addition of my wax suppressors in the following amounts: 0.05% to 0.10% of beeswax, 0.01% to 0.05% of carnauba wax, 0.02% to 0.05% of a blend of three parts of beeswax and one part of carnauba wax.

Example VI

Edeleanu raffinates from San Joaquin lubricating oil stock conforming to S. A. E. 30, 40 and 50 viscosity specifications each formed a haze when stored overnight at 0° F. Samples of each of these oils stored at 0° F. remained clear for over six weeks, the duration of the tests, after the addition of 0.05% to 0.10% of beeswax.

Example VII

An Edeleanu raffinate from San Joaquin lubricating oil stock conforming to S. A. E. 50 specification formed a haze when stored overnight at 70° F. The addition of 0.10% of beeswax prevented wax separation during a period of more than eleven weeks, the duration of the test.

As used in the present specification and claims, the expression "suppression of wax" means the prevention, reduction or retardation of the formation of solid wax in oil.

I claim as my invention:

1. A limpid normally liquid oil composition comprising a hydrocarbon oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and dissolved therein a quantity less than 2% of a natural non-paraffinic wax from the group consisting of beeswax, spermaceti, bayberry wax, candelilla wax, carnauba wax, Chinese wax, cocoa wax, cotton seed wax, Japan wax and montan wax said quantity being sufficient to suppress the separation of visible paraffin wax above the pour point of the hydrocarbon oil.

2. A limpid normally liquid oil composition comprising a hydrocarbon oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and dissolved therein a quantity less than 2% of beeswax said quantity being sufficient to suppress separation of visible paraffin wax above the pour point of the hydrocarbon oil.

3. A limpid normally liquid oil composition comprising a hydrocarbon oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and dissolved therein a quantity less than 2% of a mixture of beeswax and a substance from the group consisting of montan wax and carnauba wax said quantity being sufficient to suppress separation of visible paraffin wax above the pour point of the hydrocarbon oil.

4. A limpid normally liquid oil composition comprising a mineral oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and between 0.005% and 1.5% of a substance from the group consisting of beeswax, spermaceti, bayberry wax, candelilla wax, carnauba wax, Chinese wax, cocoa wax, cotton seed wax, Japan wax, and montan wax for suppressing wax in hydrocarbon oil.

5. A limpid normally liquid oil composition comprising a mineral oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and between 0.005% and 1.5% of beeswax.

6. A limpid normally liquid oil composition comprising a mineral oil containing paraffin wax in amount sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor and between 0.005% and 1.5% of a mixture of beeswax and a substance from the group consisting of montan wax and carnauba wax.

7. A limpid normally liquid oil composition, comprising a hydrocarbon oil containing paraffin wax in amounts sufficient to impart an undesirably high cloud point to said oil in the absence of a wax suppressor, and dissolved therein a quantity less than 2% of a natural non-paraffinic wax containing lead soaps resulting from con-

verting its free fatty acid components to lead
soaps, said wax being selected from the group
consisting of beeswax, spermaceti, bayberry wax,
candelilla wax, carnauba wax, Chinese wax, cocoa
5 wax, cotton seed wax, Japan wax, and montan
wax, said quantity being sufficient to suppress
the separation of visible paraffin wax from the
hydrocarbon oil.

- 10 8. A limpid normally liquid oil composition,
comprising a hydrocarbon oil containing paraffin
wax in amounts sufficient to impart an undesir-
ably high cloud point to said oil in the absence

of a wax suppressor, and dissolved therein a
quantity less than 2% of a natural non-paraffinic
wax containing calcium soaps resulting from
converting its free fatty acid components to cal-
cium soaps, said wax being selected from the 5
group consisting of beeswax, spermaceti, bayberry
wax, candelilla wax, carnauba wax, Chinese wax,
cocoa wax, cotton seed wax, Japan wax, and
montan wax, said quantity being sufficient to
suppress the separation of visible paraffin wax 10
from the hydrocarbon oil.

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