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ADDITION OF MICROCRYSTALLINE WAX TO LUBRICATING OILS TO PREVENT WAX FLOCCULATION

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This invention relates to a method for preventing or retarding the formation of flocculent deposits which appear in many refined lubricating oils with standing, said deposits being attributable to the presence in the oil of small amounts of residual paraffin waxes.

The problem of wax flocculation is one which occurs with a variety of refined petroleum oils, including those obtained from waxy crudes as well as from the so-called wax-free naphthenic crudes. While these deposits, which form as the oil is allowed to stand for a number of days at ambient temperatures, are technically of little importance insofar as concerns the lubricating function of the oil (the wax content involved frequently being as little as 0.01% by weight of the oil), nevertheless, their occurrence is to be avoided for marketing reasons due to customer preference for a limpid product.

It has heretofore been proposed to prevent the formation of the flocculent precipitates described above by adding to the oil of a small amount of one or more of various waxes such as carnauba wax, montan wax, beeswax or an extract of montan wax. While such additives, or combinations thereof, may prove effective with some oils, they are entirely without benefit in others as evidenced by the data presented below in Table I. It is, therefore, an object of this invention to provide a flocc-inhibiting method which is of general application with refined lubricating oils containing small or even trace amounts of paraffin wax components.

The present invention is based on the discovery that the foregoing object is achieved and the desired flocc-inhibiting function achieved by dissolving in the oil a small amount of a micro-crystalline wax.

The microcrystalline wax additives of the present invention, which are sometimes referred to as amorphous wax materials, are obtained from waxy crudes and comprise the wax fraction remaining after the generally lower melting paraffin waxes have been removed. Residual wax products of this nature embrace a wide range of properties, depending on the nature of the base stock, the extraction method employed and the amount of high melting paraffin wax coexisting in the residual fraction. However, all these waxes consist of crystals which are of microscopic size and have melting points ranging from about 140° F. to 190° F. These waxes may be added to the refined lubricating oils in accordance with the present invention, either in the relatively oil-free state (by which is meant a wax containing less than about 5% oil), or in the form of slack wax bottoms, such bottoms

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normally containing from about 20 to 40% oil and being the portion remaining after the waxy portion of the crude has been substantially freed of paraffin wax constituents. For the purposes of the present invention, however, slack wax bottoms are only about half as effective as the separated, microcrystalline wax component, a result which is apparently attributable to the fact that said bottoms contain a larger proportion of the relatively lower melting microcrystalline waxes. Accordingly, to make up for this lessened flocc-inhibiting activity, the amount of slack wax bottoms (including the weight of the oil present) employed in a practice of this invention is preferably about twice that used when an oil-free microcrystalline wax is used.

The amount of microcrystalline wax to be employed varies somewhat depending on the nature of the oil being treated and the paraffin wax content thereof. In general, however, good results are had by adding the microcrystalline wax or slack wax bottoms in an amount of from about 0.02 to 1%, based on the weight of the oil. A preferred range for the oil-free microcrystalline wax is from 0.04 to 0.15%, while a range of from 0.1 to 0.3% is preferred when the wax is employed in the form of slack wax bottoms.

A wide variety of refined lubricating oils which otherwise evidence wax flocculating characteristics on standing can be substantially freed of this undesirable characteristic by the addition of the indicated amounts of microcrystalline wax. Such oils include the various paraffinic type stocks, as well as midcontinent and California-type crudes, whether of paraffinic or asphaltic character. Particularly good results have been achieved, however, with solvent refined, lubricating oils of naphthenic-type and California origin and having a viscosity above about 1200 SSU at 100° F. The benefits obtained with oils of the latter character are evidenced by the data presented in the following examples which are illustrative of the present invention.

EXAMPLE I

In this operation, the refined lubricating oil employed was obtained from a California (Midway Special) crude of a naphthenic type, the particular fraction employed having been obtained by vacuum distilling the bottoms obtained from the crude topping still. The fraction selected from the vacuum distillation column was relatively heavy and had a viscosity of 145–150 SSU at 210° F. This fraction was thereafter solvent extracted with phenol and then acid treated, followed by other treatments with sodium naphthenate and with a final filtering through clay, the finished oil having a viscosity of 88 SSU at 210° F. and 1705 SSU at 100° F. As evidenced from the data presented in the following table, this oil, which contained a residue of about 0.2% paraffin wax components, exhibited serious wax flocculating tendencies after being stored but a few days. Further, addition of beeswax, carnauba wax, paraffin wax, or various combinations of said waxes, was without effect, though microcrystalline wax was effective to inhibit undesired wax flocc. In all cases, the wax was either added to the hot oil at a temperature above the melting point of the wax, or else the wax was dispersed in the oil and the resulting mixture heated to insure solution of the wax in the oil.

WAX FLOC INHIBITION TEST

Material Added	Days Stored at 70° F.	Appearance of Oil After Storage
None.....	7	Wax Floc.
Beeswax:		
0.05% by wt.....	14	Do.
0.10% by wt.....	21	Do.
Carnauba Wax:		
0.01% by wt.....	14	Do.
0.03% by wt.....	14	Do.
Beeswax, 0.01% by wt.....	14	Do.
Carnauba Wax, 0.02% by wt.....	14	Do.
Beeswax, 0.02% by wt.....	14	Do.
Carnauba Wax, 0.01% by wt.....	14	Do.
Beeswax, 0.02% by wt.....	14	Do.
Carnauba Wax, 0.02% by wt.....	14	Do.
125-130 Paraffin Wax, 0.05% by wt.....	14	Do.
143-150 Paraffin Wax, 0.05% by wt.....	14	Do.
150-155 Paraffin Wax, 0.05% by wt.....	14	Do.
160-165 Paraffin Wax, 0.05% by wt.....	14	Do.
125-130 Soft Wax, 0.05% by wt.....	14	Do.
143-150 Soft Wax, 0.05% by wt.....	14	Do.
150-155 Soft Wax, 0.05% by wt.....	14	Do.
Microwax, 0.01% by wt.....	12	Do.
Microwax, 0.05% by wt.....	40	No Floc.
Slack Wax Bottoms, ¹ 0.10% by wt.....	30	Very Slight Floc.
Slack Wax Bottoms, ¹ 0.20% by wt.....	30	No Floc.

¹ Oil content approx. 30%.

We claim:

1. A method of preventing flocculation in refined petroleum lubricating oils of naphthenic origin and having a viscosity above about 1200 SSU at 100° F., which comprises dissolving in the oil from about 0.02 to 1% by weight of a microcrystalline wax.
2. A lubricating oil composition produced by the method of claim 1.
3. A method of preventing flocculation in refined petroleum lubricating oils of naphthenic origin and having a viscosity above about 1200 SSU at 100° F., which comprises dissolving in the oil from about 0.04 to 0.15% by weight of an oil-free microcrystalline wax.
4. A method of preventing flocculation in refined petroleum lubricating oils of naphthenic origin and having a viscosity above about 1200 SSU at 100° F., which comprises dissolving in the oil from about 0.1 to 0.3% by weight of slack wax bottoms.

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