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## DEWAXING HYDROCARBON OIL

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5 Claims. (Cl. 196—19)

This invention relates to dewaxing hydrocarbon oil and more particularly to dewaxing wax-bearing mineral lubricating oil.

Broadly the invention contemplates a process for dewaxing hydrocarbon oil wherein the oil is mixed with a selective solvent liquid mixture which remains homogeneous and completely miscible with the liquid hydrocarbons at temperatures of 0° F. and below, and which exerts substantially complete solvent action upon the liquid hydrocarbons at such temperatures, but substantially no solvent action on the solid hydrocarbons. The resulting mixture of oil and solvent liquid is then cooled to precipitate the wax constitutents which are removed from the cooled mixture in solid form.

More specifically the invention contemplates dewaxing with a selective solvent mixture of the character of acetone and benzol and containing an added solvent such as toluol as a third component present in the mixture in proportions sufficient to prevent separation of oil as well as solvent liquid constituents of the mixture from solution at the low temperatures prevailing during dewaxing. Accordingly, my invention contemplates dewaxing with a solvent liquid mixture comprising toluol mixed with benzol and an aliphatic ketone such as acetone or methyl ethyl ketone.

In my U. S. Patent No. 1,802,942, I have disclosed a process for dewaxing oil with a selective solvent having a selective action as between solid hydrocarbon and liquid hydrocarbon constituents of wax-bearing oil at temperatues of the order of 0° F. and below. In the aforesaid patent, I have disclosed, as a specific example, dewaxing oil with a mixture of acetone and benzol. My present invention comprises a modification of the process described therein.

I have discovered that the addition of substantial amounts of toluol to an acetone-benzol dewaxing solvent mixture provides a solvent mixture which is particularly adapted to the dewaxing of oil at temperatures substantially below 0° F. It also provides a solvent mixture which is particularly suitable for the dewaxing of relatively heavy and viscous wax-bearing oils including either distillate cylinder stocks or residual cylinder stocks.

The addition of toluol to an acetone-benzol dewaxing solvent mixture prevents the separation of benzol in crystalline form, from the solution at relatively low temperatures such as around —20° F., and below. The presence of toluol in the solvent mixture also increases its solubility effect upon the liquid constituents of heavy viscous wax-bearing oil at low temperatures. Thus with toluol present, the solvent mixture exerts substantially complete solvent action on the liquid constituents of such oil and therefore prevents separation of oil from the solution during dewaxing operations at relatively low temperatures, with the result that a more effective separation between the wax constituents of the oil and the liquid constituents thereof is effected.

Heavy viscous stocks including heavy residual fractions apparently contain certain liquid constituents which tend to separate at the usual dewaxing temperature from a solvent mixture consisting of 35% acetone and 65% benzol, for example, at a higher temperature than the benzol will precipitate from the mixture. By using large ratios of this acetone-benzol solvent to the oil, separation of liquid oil constituents may be avoided but in such cases the dewaxed oil production of a given plant would be materially reduced. However, by the use of my present improvement the separation of heavy liquid oil constituents at low temperatures may be avoided even with the use of relatively low ratios of solvent to oil. Thus it has been found that when dewaxing with a mixture comprising acetone, benzol and toluol in proper proportions, such a mixture exerts substantially complete solvent action on all of the liquid constituents of such stocks at temperatures of the order of —10° F. and below.

A dewaxing solvent which contains a substantial proportion of toluol also possesses an important advantage with respect to filtering rates. I have found that such a solvent mixture containing toluol when mixed with wax-bearing oil, filters quite rapidly at dewaxing temperatures.

As previously indicated, the proportion of toluol required in the solvent mixture will depend upon the nature of the oil to be dewaxed. For example, it has been found that a wax-bearing distillate oil having a viscosity of around 100 to 150 Saybolt Universal seconds at 210° F., may be dewaxed at —10° F., to produce a lubricating oil having a pour test of around 0° F., by mixing it with a solvent mixture consisting of about 35% acetone, 52% benzol and from 10 to 15% toluol by volume. In this instance the oil may be mixed with a solvent mixture in the proportion of about one part of oil to about four parts of solvent liquid mixture.

Relatively less viscous oils than the foregoing may require correspondingly less proportions of

toluol in the dewaxing solvent; for example, around 5% by volume of the solvent liquid mixture. On the other hand, in the case of relatively more viscous and residual oils a correspondingly larger proportion of toluol may be required, as for example, around 30%, so that sufficient toluol will be present to prevent separation of oil from the cold solution along with the wax.

Where it is desired to dewax at extremely low temperatures, such as around −30 to −40° F., for the production of relatively low pour test products, the proportion of toluol in the solvent mixture may be still further increased with advantage.

Accordingly, in dewaxing the wax-bearing fractions usually encountered in plant scale operations, it has been found advantageous to employ a solvent mixture which comprises from about 28 to 35% acetone or methyl ethyl ketone, 5 to 20% of toluol and about 45 to 60% benzol by volume of the solvent mixture.

The invention is applicable to the treatment of various wax-bearing hydrocarbon fractions, either distillate or residual, for the removal of the wax constituents. The invention may also be applied to the dewaxing of such oils either prior to or following other refining operations such as treatment with acids and subsequent neutralization with alkali or by contact with absorbent clay.

While I have specifically referred to the use of toluol in admixture with acetone or with acetone and benzol, it is contemplated that xylol or cumene might also be used in substitution for toluol.

Obviously many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. The method of dewaxing wax-bearing mineral oil containing liquid hydrocarbon constituents which precipitate from a solvent mixture consisting of 35% acetone and 65% benzol at a higher temperature than that at which the benzol precipitates therefrom to produce oil of 0° F. or below pour test which comprises mixing with the wax-bearing oil a solvent liquid mixture of aliphatic ketones, benzol and toluol, homogeneous at temperatures of −10° F. and below comprising around 35% aliphatic ketone of the character of acetone, and from 5% to 30% of toluol, and of such a nature that upon cooling the mixture of solvent liquids and wax-bearing oil to 0° F. and below and removing the solid hydrocarbons so precipitated and the solvent liquid the resulting oil has a pour test corresponding substantially to the temperature at which the wax was removed from the mixture, chilling the mixture to a temperature of 0° F. and below, and removing therefrom the solid hydrocarbons so precipitated.

2. The method of dewaxing wax-bearing mineral oil containing liquid hydrocarbon constituents which precipitate from a solvent mixture consisting of 35% acetone and 65% benzol at a higher temperature than that at which the benzol precipitates therefrom to produce oil of 0° F. or below pour test which comprises mixing with the wax-bearing oil a solvent liquid mixture of aliphatic ketone, benzol and toluol, homogeneous at temperatures of −10° F. and below comprising around 35% acetone and from 5% to 30% of toluol, and of such a nature that upon cooling the mixture of solvent liquids and wax-bearing oil to 0° F. and below and removing the solid hydrocarbons so precipitated and the solvent liquid the resulting oil has a pour test corresponding substantially to the temperature at which the wax was removed from the mixture, chilling the mixture to a temperature of 0° F. and below, and removing therefrom the solid hydrocarbons so precipitated.

3. The method of dewaxing wax-bearing mineral oil containing liquid hydrocarbon constituents which precipitate from a solvent mixture consisting of 35% acetone and 65% benzol at a higher temperature than that at which the benzol precipitates therefrom to produce oil of 0° F. or below pour test which comprises mixing with the wax-bearing oil a solvent liquid mixture of aliphatic ketone, benzol and toluol, homogeneous at temperatures of −10° F. and below comprising around 35% aliphatic ketone of the character of acetone and from 15% to 20% of toluol, and of such a nature that upon cooling the mixture of solvent liquids and wax-bearing oil to 0° F. and below and removing the solid hydrocarbons so precipitated and the solvent liquid the resulting oil has a pour test corresponding substantially to the temperature at which the wax was removed from the mixture, chilling the mixture to a temperature of 0° F. and below, and removing therefrom the solid hydrocarbons so precipitated.

4. The method of dewaxing wax-bearing mineral oil containing liquid hydrocarbon constituents which precipitate from a solvent mixture consisting of 35% acetone and 65% benzol at a higher temperature than that at which the benzol precipitates therefrom to produce oil of 0° F. or below pour test which comprises mixing with the wax-bearing oil a solvent liquid mixture of aliphatic ketone, benzol and toluol, homogeneous at temperatures of −10° F. and below comprising around 35% aliphatic ketone of the character of acetone, and from 10% to 15% of toluol, and of such a nature that upon cooling the mixture of solvent liquids and wax-bearing oil to 0° F. and below and removing the solid hydrocarbons so precipitated and the solvent liquid the resulting oil has a pour test corresponding substantially to the temperature at which the wax was removed from the mixture, chilling the mixture to a temperature of 0° F. and below, and removing therefrom the solid hydrocarbons so precipitated.

5. The method of solvent dewaxing viscous wax-bearing mineral oil containing liquid hydrocarbon constituents which precipitate from a solvent mixture consisting of 35% acetone and 65% benzol at a higher temperature than that at which the benzol precipitates therefrom with a solvent liquid having selective solvent action as between wax and oil at temperatures of 0° F. and below, which comprises mixing with the oil a solvent comprising from about 28 to 35% of an aliphatic ketone of the character of acetone and methyl ethyl ketone, about 45 to 60% of benzol and about 5 to 20% of toluol by volume of the solvent mixture, the proportion of toluol being sufficient to prevent separation of oil from the mixture when chilled to temperatures of the order of −10° F., chilling the mixture to precipitate wax and removing the wax thus precipitated.

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