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# UNITED STATES PATENT OFFICE

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## ANTISOLVENT DEWAXING

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This invention relates to the removal of wax from mineral oils and it pertains more particularly to a diluent for decreasing the viscosity of the oil and the solubility of the wax.

Mineral oils in their natural state contain varying amounts of paraffin, petrolatum and other waxes. If these oils are used as lubricants under extreme temperature conditions, it is essential that substantially all of the wax be removed therefrom because said wax causes the oil to solidify or to unduly resist flow at low temperatures.

Dewaxing may be accomplished by mixing the oil with a highly fluid diluent, chilling the mixture to solidify the wax and throw it out of solution, mechanically separating the wax from the chilled mixture, and separating the wax-free oil from the diluent by distillation. The effectiveness of this process depends, to a considerable extent, on the nature of the diluent; the diluent should be readily miscible with the oil and should not separate therefrom even at the lowest chilling temperatures; it should be extremely fluid or non-viscous at the chilling temperatures; it should tend to throw wax out of solution in a physical form that will facilitate mechanical separation by filtering, centrifuging or settling; it should be chemically inert and it should be relatively inexpensive. The object of my invention is to provide such a diluent.

A further object of my invention is to provide a diluent which will overcome difficulties encountered in the use of diluents heretofore known. A further object is to provide a diluent which can be successfully used on all types of mineral oils by a slight variation in proportions. A further object is to provide a means for using an acetone-benzol mixture for dewaxing heavy oils without causing the benzol to freeze out and without causing the heavy oil to separate from the diluent. Other objects will be apparent as the detailed description of my invention proceeds.

Acetone is an antisolvent for wax. However, the antisolvent power of acetone is so great that it cannot be used by itself as a diluent, but must be blended with a secondary solvent which will prevent the oil from separating out with the wax. Coal tar benzene (benzol) is a very good secondary solvent and an effective mixture is 62% benzol and 38% acetone.

This mixture is not satisfactory for dewaxing heavy oils, particularly oils of the Pennslvania type, at low temperatures because the oil is thrown out of solution as well as the wax. If the percentage of benzol is increased, the benzol will crystallize or freeze out. If the percentage of acetone is increased, the tendency for the oil to separate out will likewise increase. Mid-Continent lubricating oil of S. A. E. 40 viscosity, or a Pennsylvania lubricating oil of S. A. E. 30 cannot be satisfactorily dewaxed with an acetone benzol mixture at temperatures of −10° F. Oils in the range of S. A. E. viscosity 50 and 60 are even more difficult to dewax.

I have discovered that the addition of a third ingredient to the acetone benzol diluent will overcome the tendency of the oil to separate out and the tendency of the benzol to crysallize out at dewaxing temperatures. The new ingredient must have a low freezing point and a high affinity for oil, and it must be miscible with acetone and benzol; I prefer to use naphtha (initial boiling point 165° F., and point 250° F.,—approximate boiling range of diluent mixture). In practicing my invention I prefer to slightly increase the proportion of benzol and to decrease the proportion of acetone, as will be hereinafter set forth. In all of the following examples I use one volume of oil to about two and one-half to three volumes of diluent, but it is understood that other proportions may be used without departing from my invention.

I have found that the exact amount of naphtha required is dependent upon the nature of the oil which is to be dewaxed. A Mid-Continent oil having a viscosity at 210° F. of from 70 to 120 seconds is most effectively dewaxed by the use of a diluent consisting of 32% acetone, 65% benzol, and 3% naphtha.

A Mid-Continent oil having a viscosity at 210° F. from 120 seconds to 180 seconds requires more naphtha, a preferred formula be-

ing 30% acetone, 65% benzol and 5% naphtha.

Pennsylvania oils and oils of similar temperature viscosity coefficient require still further amounts of naphtha to maintain a homogeneous mixture at −10° F. For instance, a Pennsylvania oil having a viscosity at 210° F. of from 45 to 60 seconds requires 30% acetone, 65% benzol and 5% naphtha. Pennsylvania oil from 60 to 100 seconds at 210° F. requires 27% acetone, 65% benzol and 8% naphtha, and 140 seconds (viscosity at 210° F.) Pennsylvania oil requires 25% acetone, 65% benzol and 10% naphtha.

While I have specifically described my invention as applied to a mixture of acetone and benzol, it is understood that I do not limit myself to the above details. For instance, I may use methyl formate, methyl carbonate, methyl ethyl ketone, etc. instead of acetone. When using these antisolvents, however, the proportion of naphtha required will vary somewhat from that required when using acetone, depending on their antisolvent power.

In the diluent, as above described, the function of the naphtha is not merely to reduce the viscosity of the oil, the use of naphtha for this purpose being well known. In the formulas hereinabove set forth the naphtha serves an entirely different purpose. It prevents the separation of heavy oils from acetone without freezing out the benzol or, in other words, it serves to maintain the chilled diluent in a fluid state. This is probably due to the fact that naphtha is closely associated chemically with the mineral oil and at the same time is miscible with the benzol and acetone. The specific solvents hereinabove set forth have been found to give remarkably efficient separation of wax from oil at low chilling temperatures.

While I have described a preferred embodiment of my invention it is understood that I do not limit myself to the details therein set forth except as defined by the following claims.

I claim:

1. An antisolvent dewaxing mixture for petroleum oils which comprises about 65% benzol, at least 25% of acetone and enough naphtha to prevent the separation of oil from diluent when the mixture is chilled to −10° F.

2. An antisolvent diluent for use in dewaxing heavy mineral oils which comprises about 65% benzol, 25 to 32% acetone, and 3 to 10% naphtha.

3. An antisolvent diluent for use in dewaxing heavy mineral oils which comprises about 25% acetone, 65% benzol and 10% naphtha.

4. An antisolvent diluent for use in dewaxing heavy mineral oils which comprises about 32% acetone, 65% benzol and 3% naphtha.

5. An antisolvent diluent for use in dewaxing heavy mineral oils which comprises about 30% acetone, 65% benzol and 5% naphtha.

6. The method of dewaxing heavy mineral lubricating oil which comprises mixing about one part of said oil with two and one-half parts of a diluent consisting of about 65% benzol, 25 to 32% acetone, and 3 to 10% naphtha, chilling said mixture to about −10° F., mechanically separating said chilled mixture from solidified wax, and distilling said diluent from said dewaxed oil.

7. The method of dewaxing heavy mineral lubricating oil which comprises diluting said oil with a homogeneous solution of acetone, benzol and a small amount of naphtha, chilling said mixture to effect solidification of the wax, mechanically separating the diluted mixture from solidified wax, and distilling said diluent from the dewaxed oil.

In witness whereof I have affixed my signature.

JOHN A. ANDERSON.