

[54] DEWAXING PROCESS 3,038,854 6/1962 Kiersted..... 208/37
 2,287,966 6/1942 Brandt 208/37
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 both of Sarnia, Ontario, Canada 2,361,503 10/1944 Schutte et al..... 196/14.5
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[63] Continuation-in-part of Ser. No. 17,869, March 9, 1970, abandoned, which is a continuation-in-part of Ser. No. 666,268, Sept. 8, 1967, abandoned.

[52] U.S. Cl..... 208/33, 196/14.5, 208/37, 208/38

[51] Int. Cl..... C10g 43/08

[58] Field of Search..... 208/33, 37, 38; 196/14.5, 135

[57] **ABSTRACT**

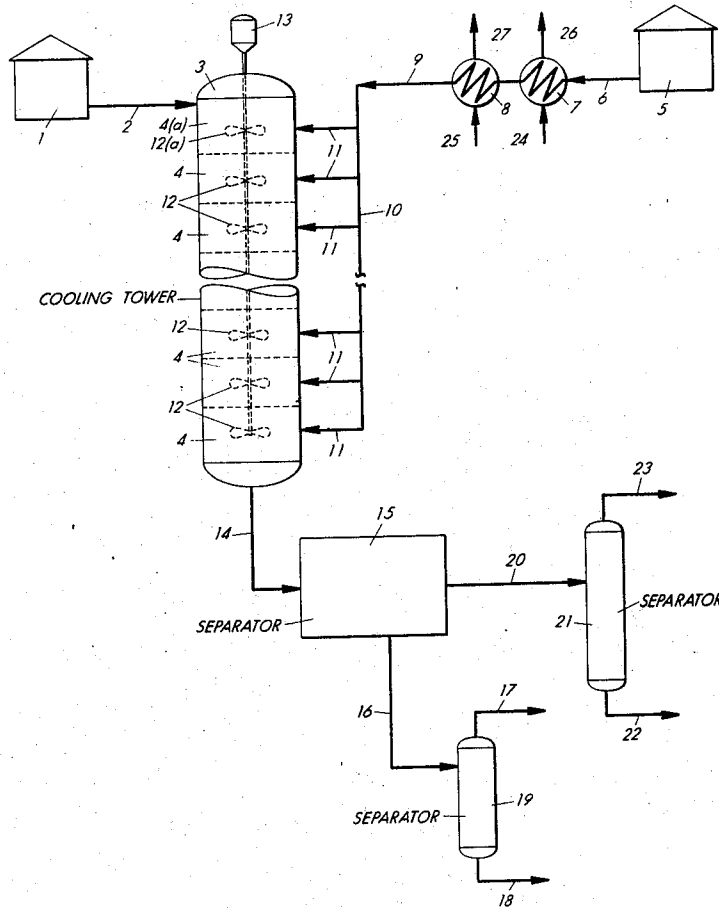
An improved process for the solvent dewaxing of petroleum oil stocks. The dewaxing solvent is prechilled and added incrementally or continuously at several points along the height of a cooling tower. The oil-solvent mixture is agitated during the chilling step to permit substantially instantaneous mixing of the prechilled solvent with the oil.

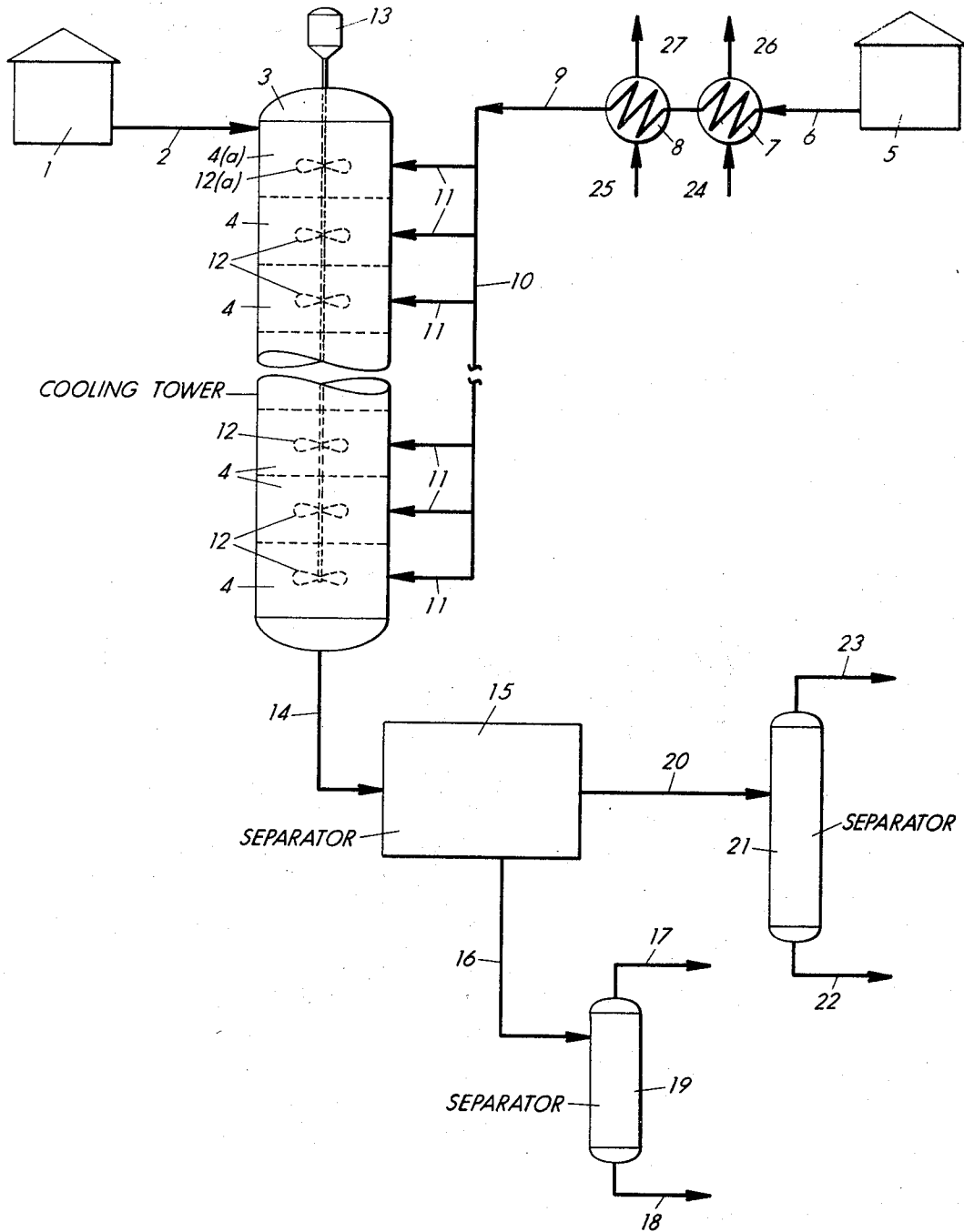
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23 Claims, 1 Drawing Figure





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DEWAXING PROCESS**CROSS-REFERENCE TO RELATED APPLICATIONS**

This is a continuation-in-part of co-pending application, Ser. No. 17,869, filed Mar. 9, 1970, now abandoned which is a continuation-in-part of Ser. No. 666,268, filed Sept. 8, 1967, and now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a process for dewaxing petroleum oil stocks. More particularly, this invention relates to a process wherein selective dewaxing solvents are used to facilitate the precipitation of wax from waxy petroleum oil stocks. Still more particularly, this invention relates to a process wherein the wax is precipitated by incremental or continuous addition of a prechilled selective solvent along the height of a vertical, stirred chilling tower.

It is known in the prior art to dewax petroleum oil stocks by cooling an oil/solvent solution in a scraped surface exchanger. In this type process, the oil and selective solvent are admixed in such a manner as to effect thorough solution of the oil in the solvent. The extent of dilution is dependent upon the particular oil and the particular solvent employed and is adjusted to facilitate easy handling and optimum filtration rates. The solution is cooled at a uniformly slow cooling rate; e.g., 1°-8°F./minute, under conditions which are controlled so as to avoid any substantial agitation of the solution during precipitation of the wax.

Notwithstanding the carefully controlled conditions used in this type process, there are several deficiencies which hamper successful commercial operation. Most significant among these deficiencies is the loss of good heat transfer due to wax deposition on the exchange surfaces. Such fouling has been repeatedly noted after short periods of operation; e.g., 24-48 hours. Associated directly with the loss of good heat transfer is the loss of careful control over the cooling rate and a corresponding loss of uniform crystal growth. This non-uniform crystal growth results in lower filtration rates. The high pressure drop through the chilling section also reduces the maximum feed rate attainable. Physical mashing of the wax crystals by the action of the scrapers may also contribute to poor filtration.

It is also known in the prior art to dewax petroleum oil stocks by cooling in scraped surface exchangers using an incremental solvent addition technique. In this technique, the solvent is added at several points along the chilling apparatus. The waxy oil is chilled without solvent until some wax crystallization has occurred and the mixture has thickened considerably. The first increment of solvent is introduced at this point and cooling continues. Each incremental portion of solvent is added as necessary to maintain fluidity until the desired separation temperature is reached at which point the remainder of the solvent desired for filtration is added.

Using this common industrial technique, it is well known and has been repeatedly demonstrated that the temperature of the incrementally added solvent should be the same as that of the main stream at the point of addition. Having the solvent at a lower temperature causes shock chilling of the slurry at that point, with resulting formation of crystal fines, and impairment of filter rate; having the solvent warmer throws an unnecessary additional load on the scraped surface chillers.

The bulk of the chilling of the slurry in this well-known process is accomplished through the walls of the scraped surface chillers rather than by means of cold solvents.

It is also known in the art, as described in U.S. Pat. No. 2,361,503 to Schutte et al., to subject lubricating oil fractions to agitation in a multistage tower with water or brine which also serves as the cooling medium. This process suffers from the disadvantage that the cooling medium is completely immiscible with the wax and oil and rapid separation occurs between the feed and water unless the mixture is maintained in an agitated state or is emulsified. The use of water as the cooling medium also practically limits the process to an upflow operation.

BRIEF SUMMARY

According to this invention, waxy petroleum stocks are dewaxed by cooling the petroleum oil stock in an elongated stirred vessel, preferably a vertical tower, with a prechilled solvent that will solubilize at least a portion of the oil stock. The solvent is preferably introduced incrementally along the length of the vessel. It is necessary that the degree of agitation in the stirred, elongated vessel be sufficient to permit substantially instantaneous mixing of the oil and solvent. The prechilled solvent is added in an amount sufficient to permit easy handling and good filtration rates. The wax, which precipitates during the cooling stage, may be separated from the solution by conventional means known in the art. Following separation of the wax, the oil, which has a reduced pour and cloud point, is recovered from the solution by means well known in the art.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE is a flow diagram of the dewaxing process of the invention.

DETAILED DESCRIPTION

Referring to the FIGURE, the oil stock to be dewaxed is conducted from the storage tank 1, through line 2, to the top of the vertical cooling tower 3, where it enters the first stage of the cooler 4(a). The selected solvent for the oil stock is passed from storage tank 5 through line 6, through heat exchangers 7 and 8, where the solvent temperature is reduced to a level sufficient to cool the oil to the desired dewaxing temperature. Coolant enters the heat exchangers 7 and 8 through lines 24 and 25, respectively, and leaves through lines 26 and 27. The solvent leaves the heat exchanger 8, through line 9, and enters manifold 10. The manifold comprises a series of parallel lines providing solvent inlets 11 to the several stages of the cooling tower 3. The rate of flow through each inlet is regulated by flow control means (not shown). The rate of solvent flow is regulated so as to maintain a desired temperature gradient along the height of the cooling tower 3.

The first portion or increment of the solvent enters the first stage, 4(a), of the cooling tower 3 where it is substantially instantaneously admixed with oil due to the action of the agitator 12(a). The agitator is driven by a variable speed motor 13 and the degree of agitation is controlled by variation of the motor speed, with due allowance for the flow rate through the cooling tower. The oil-solvent mixture may pass upwardly or downwardly through the cooling tower 3 (downward flow only has been shown). Additional prechilled sol-

vent is introduced into at least a portion of the several stages 4, through inlets 11 so as to maintain a substantially constant cooling rate and at the same time to provide the desired degree of dilution. It should be noted that any number of stages, for example fifty may be employed; however, it is desirable that at least six stages be used.

The oil-solvent solution with precipitated wax passes from the final stage of the cooling tower through line 14 to means for separating the wax from said solution 15. Any suitable means, such as filtration or centrifugation, for such separation may be employed. The wax-solvent is removed from the separation means through line 16. The solvent is recovered in a suitable separating system 19, which is preferably a distillation tower, through line 17 and the wax exits through line 18. The oil-solvent solution leaves the wax separation means through line 20 and passes to means for separating the oil from solution 21. Any suitable means for this separation may be used, such as distillation or selective adsorption. The oil is removed from the separator and is recovered through line 22. The solvent is removed through line 23.

Any waxy petroleum oil stock or distillate fraction thereof may be dewaxed with the process of this invention. In general, these oil stocks or distillate fractions will have a boiling range within the broad range of about 500°F. to about 1300°F. The preferred oil stocks are the lubricating oil and specialty oil fractions boiling within the range of 550°F. and 1200°F. These fractions may come from any source, such as the paraffinic crudes obtained from Aramco, Kuwait, the Panhandle, North Louisiana, Tia Juana, etc.

Any selective solvent may be used in the process of this invention. Representative examples of such solvents are (a) the aliphatic ketones having from 3 to 6 carbon atoms, such as acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) and (b) the low molecular weight hydrocarbons such as ethane, propane, butane, and propylene, as well as mixtures of the foregoing ketones and mixtures of the aforesaid ketones with aromatic compounds such as benzene and toluene. In addition, halogenated low molecular weight hydrocarbons, such as C₂-C₄ chlorinated hydrocarbons, e.g., dichloromethane and dichloroethane and mixtures thereof, may be used as solvents. Specific examples of suitable solvent mixtures are methyl ethyl ketone and methyl isobutyl ketone, methyl ethyl ketone and toluene, dichloromethane and dichloroethane, and propylene and acetone.

The preferred solvents are ketones with methyl ethyl ketone being particularly preferred. A particularly preferred solvent mixture is a mixture of methyl ethyl ketone and methyl isobutyl ketone.

During the operation of the process of the present invention, the petroleum oil stock is fed to the cooling tower 3 at a temperature above its pour and cloud point. In the case of an oil fraction containing a relatively small amount of wax, the oil may be fed at ambient temperature. In the case of an oil containing a relatively large amount of wax an elevated temperature will be used. In general, the wax content of the oil feed will vary between ten and twenty-five weight percent and the pour and cloud points will range, respectively, between 70° and 170°F. and 75° and 175°F. In general, a feed rate between 100 and 600 bbl./hour will be used;

however, it will be apparent to those skilled in the art that higher or lower feed rates can be used.

The solvent, or solvent mixture, will be prechilled to a temperature sufficient to permit cooling of the oil to the desired temperature. The exact temperature employed will depend upon the amount of oil to be cooled and the amount of solvent to be added to the oil; i.e., the degree of dilution which is sought during the filtration step. The prechilled solvent is added incrementally along the length of the cooling tower so as to maintain an average chilling rate at or below about 8°F./minute and preferably between about 1° to about 5°F./minute. In general, the amount of solvent added will be sufficient to provide a liquid/solid weight ratio between the range of 5/1 and 20/1 at the dewaxing temperature and a solvent/oil volume ratio between 1.5/1 and 5/1.

An essential feature of this invention is the maintenance of a high degree of agitation in at least a portion of the stages during chilling. In general, the degree of agitation must be sufficient to provide substantially instantaneous mixing; i.e., substantially complete mixing of the oil-solvent mixture in one second or less. In this way, the deleterious effects of shock chilling are offset, the chilling rate is more readily controlled and increased filtration rates are obtained. The degree of agitation required in this invention can be achieved by increasing the agitator RPM when all other mixing variables; e.g., flow rate through the mixer, vessel and agitator design, viscosity of the ingredients, etc. are maintained constant. In general, the degree of agitation required in this invention can be achieved when the modified Reynolds Number, (Perry, "Chemical Engineer's Handbook," 3rd, p. 1224, McGraw-Hill, New York, 1959), N_{Re} , which is defined by the equation:

$$N_{Re} = L^2 n l / \mu$$

where L = agitator diameter, ft.

l = liquid density, lb./ft.³

n = agitator speed, r.p.s.

μ = liquid viscosity, lb./ft. sec.

is between about 200 and about 150,000.

The dimensionless ratio of cooling tower diameter to agitator diameter is between about 1.5/1 and about 10/1, and the ratio of the impeller blade length to impeller blade width ranges from about 0.75 to 2 and preferably from about 1 to 1.5. The ratio of the mixing stage height to the diameter of the stage will generally range from about 0.2/1-1/1. A turbine type agitator is preferred; however, other types of agitators such as propeller agitators may be used.

The cooling tower may or may not be baffled, but a baffled tower is preferred. Each stage will generally contain from about 2-8 baffles and preferably from 2-4 baffles located about the outer periphery of each stage. The width of the baffles may range from about 5-15 percent of the diameter of the tower. In general, the dimensionless ratio of the cross-section of the restricted flow opening to the cross-section of the tower will be between about 1/20 and about 1/200.

In general, the cooling tower of the present invention will be operated at a pressure sufficient to prevent flashing of the solvent. Atmospheric pressure is sufficient when the ketones are employed as solvents; however, superatmospheric pressures are required when low molecular weight hydrocarbons, such as propane, are used.

PREFERRED EMBODIMENT

The invention will be more apparent from the preferred embodiment and working examples set forth below. Turning again to the drawing, a lubricating oil distillate fraction, having a boiling range from about 850° to 950°F., a wax content of from about 18 to about 21 wt. percent, and initial pour and cloud points between about 110 and 120°F. and 112° and 125°F., respectively, is fed from the storage tank 1 through line 2 to the first stage 4(a) of the cooling tower 3. A solvent such as methyl ethyl ketone or a mixture of 55 wt. percent methyl isobutyl ketone and 45 wt. percent methyl ethyl ketone is passed from storage tank 5 through line 6 to the heat exchangers 7 and 8, where the solvent is cooled by conventional means to a temperature between -15° and -25°F.

In the preferred embodiment cold filtrate from the separator 21 is used to precool the solvent in heat exchanger 7. The filtrate enters through line 24 and leaves through line 26. The solvent is further cooled in heat exchanger 8 with liquid propane or other suitable coolant, entering through line 25 and leaving through line 27. It is preferred that the solvent be prechilled to a temperature which will permit cooling of the oil to a temperature between about 20°F. and 25°F. although lower temperatures can be used.

The cooled solvent passes from the heat exchanger 8 through line 9 to the manifold 10. In the preferred embodiment the cooling tower is divided into 16 stages, 4, and the manifold consists of 16 parallel solvent inlets 12. The flow rates are adjusted to give the desired temperature drop per stage. Each of the 16 separate stages is provided with an agitator turbine 12 which is turned at a sufficiently high RPM to produce adequate mixing. The oil and solvent entering the first stage 4(a) is substantially instantaneously mixed. As the oil-solvent mixture passes downwardly through the cooling tower, it is substantially instantaneously mixed with additional solvent which is added to each stage. As a result of the instantaneous mixing of the warmer oil or oil solvent mixture with the added solvent, the temperature of the total mixture is substantially instantaneously reduced in each stage. In this way, the adverse effects of shock cooling are minimized.

The oil-solvent mixture leaves the bottom of the cooling tower as a mixture containing precipitated wax at a temperature ranging from about 0°-50°F. The solution-wax mixture passes through line 14 to a separating means 15 which is preferably a rotary vacuum filter. The wax-solvent is passed through line 16 to a liquid-liquid separating means 19 which is preferably distillation. The wax is recovered through line 18 and the ketone solvent is recovered through line 17. The oil-solvent solution is passed through line 20 to a liquid-liquid separating means which is preferably distillation. The dewaxed oil is recovered through line 22 and the mixed ketones solvent is recovered through line 23. The dewaxed oil which now has a reduced pour point and cloud point may be used directly or subjected to further dewaxing by conventional means such as the well known ketone or propane dewaxing methods.

EXAMPLE 1

Using the preferred embodiment described above, a lubricating oil having the following specifications:
Boiling Range 800° to 950°F.

Gravity, API 30.2

Dry Wax Content 20 Wt. percent at 30°F.

Pour Point 115°F.

Cloud Point 118°F.

5 was dewaxed. The oil fraction was fed at a rate of 200 cc./min. and at a temperature of 130°F. The ketone mixture described above was used as the solvent. The solvent was prechilled to -20°F. and introduced through the 16 parallel inlets in volumes which increased from stage to stage to give equivalent temperature drops per stage. The total solvent feed rate was 660 cc/min. The temperature achieved in each stage at steady state is shown in Table I, following.

TABLE I

Stage.....	Steady state temperature, ° F. of each stage							
	1	2	3	4	5	6	7	8
Temp.....	123.2	116.4	109.6	102.8	96.0	89.2	82.4	75.6
Stage.....	9	10	11	12	13	14	15	16
Temp.....	68.8	62.0	55.2	48.4	41.6	34.8	28.0	21.2

The average chilling rate was 2°F./min.

The precipitated wax was removed from the oil-solvent solution by filtration. The oil was recovered from solution by distillation. The recovered oil had the following specifications:

Boiling Range 800° to 950°F.

Gravity, API 29.0

Dry Wax Content 0 Wt. percent at 30°F.

Pour Point 25°F.

Cloud Point 31°F.

The cooling tower employed in this and the following examples was four feet in height and one-half foot in diameter. The solvent inlets were positioned uniformly along the height of the tower at one-half foot intervals. The agitator consisted of 16 impellers positioned along the height of a single shaft. The impeller diameter was 2 inches.

EXAMPLES 2-4

To illustrate the effect of the degree of agitation upon both the filter rate and extent of separation between the solvent and wax, the following runs were made in the manner disclosed above using the cooling tower, oil fraction and solvent of Example 1. The oil and solvent flow rates were adjusted so as to maintain an average chill rate of about 2°F./min. The mixed solvent was prechilled to -20°F. The agitator RPM was set at 200, 400 and 600 corresponding to modified Reynolds Numbers of 5.55K*, 11.11K* and 16.67K*, respectively. The results obtained are shown in Table II, below.

TABLE II

Effect of Agitation Upon Filter Rate and Oil Yield	Ex. 2	Ex. 3	Ex. 4
	Agitator RPM	200	400
Reynolds Number *	5.55K*	11.11k*	16.65K*
Filter Rate			
USG Dewaxed Oil/Ft. ² /Hr.	4.4	4.6	4.7
Oil Yield, % on Feed	63	70	72
K* = l/μ			
l = density			
μ = viscosity			

both l and μ have different values in each stage due to the effect of dilution chilling and precipitation.

It will be apparent from the foregoing results that both the filtration rate and oil yield increase with increasing agitation as reflected by the Reynolds Numbers.

EXAMPLES 5-8

To show the effect of chilling rate upon the filtration rate, the following runs were completed using the method described in Example 1. The solvent and feed rates were varied to vary the chilling rate. The agitator speed was constant in all runs at 600 RPM. The results are shown in Table III. below.

TABLE III

Effect of Chilling Rate on Filtration Rate				
Average Chilling Rate, °F./min.	Ex. 5	Ex. 6	Ex. 7	Ex. 8
Filtration Rate U.S.G. Dewaxed Oil Per Ft. ² /Hr.	0.5	1	2	3
	4.8	4.6	4.0	3.4

It will be apparent from the foregoing results that the filtration rate, over the range shown, decreases as the chilling rate increases.

The above process has been described in connection with the separation of wax from oil. However, it may also be used for crystallization and purification of other materials. For example, it can be used to recrystallize slack waxes or petrolatums or with any feed in which there is a crystallizable material which can be separated from the feed on cooling. Thus, it can be used for paraxylene separation, fatty acid purification, dichlorobenzene isomer separation and the like. Additionally it can be used for solvent purification such as benzene, pharmaceutical purification and the like.

What is claimed is:

1. A process for dewaxing a waxy petroleum oil stock comprising introducing said waxy oil stock into a chilling zone divided into a plurality of stages, introducing a cold dewaxing solvent, into at least a portion of said stages, maintaining a high degree of agitation in a plurality of the solvent-containing stages so as to effect a substantially instantaneous mixing of said solvent and said waxy oil while cooling the solvent-waxy oil mixture as it progresses through the chilling zone thereby precipitating a substantial portion of said wax from said mixture under conditions of said high degree of agitation and effecting a final temperature of said mixture in said chilling zone of between about 0° and 50°F., separating the precipitated wax from the solvent-oil mixture and recovering a petroleum oil stock having a reduced wax content from said mixture.

2. The process of claim 1 wherein the chilling zone is divided into at least 6 agitated stages.

3. The process of claim 1 wherein the cold dewaxing solvent is a mixture of propylene and acetone.

4. The process of claim 1 wherein the cold dewaxing solvent is chosen from the group consisting of ketones having 3 to 6 carbon atoms and their mixtures.

5. The process of claim 1 wherein the cold dewaxing solvent is selected from the group consisting of low molecular weight hydrocarbons and their mixtures.

6. The process of claim 1 wherein the cold dewaxing solvent is selected from the group consisting of halogenated hydrocarbons.

7. The process of claim 1 wherein the degree of agitation in each of said stages is maintained between about 200 and 150,000 modified Reynolds Number.

8. The process of claim 1 wherein said solvent-oil mixture is cooled in said chilling zone at a rate of about 1°-5°F. per minute.

9. The process of claim 1 wherein the petroleum oil stock is a lubricating oil fraction.

10. A process for dewaxing a waxy petroleum oil stock comprising introducing said oil stock into a chilling zone divided into at least 6 agitated stages, introducing a cold dewaxing solvent into each of said agitated stages, maintaining a high degree of agitation in each of said stages so as to effect substantially instantaneous mixing of said solvent and waxy oil in each of said agitated stages while cooling the solvent-waxy oil mixture at an average rate of about 1°-8°F. per minute as it progresses through the chilling zone thereby precipitating a substantial portion of said wax from said mixture under conditions of said high degree of agitation and effecting a final temperature of said mixture in said chilling zone of between about 0° and 50°F., withdrawing the solvent-oil mixture containing precipitated wax from said chilling zone, separating the precipitated wax from the oil-solvent mixture and recovering the petroleum oil stock having a reduced wax content from said mixture.

11. A process for dewaxing a waxy petroleum oil stock comprising introducing said oil stock into a chilling zone divided into at least 6 agitated stages, introducing a cold dewaxing solvent into each of said agitated stages, maintaining the degree of agitation in each of said stages between about 200 and 150,000 modified Reynolds Number so as to effect substantially instantaneous mixing of said solvent and oil in each of said agitated stages while cooling said mixture at an average rate of about 1°-8°F. per minute as it progresses through the chilling zone thereby precipitating a substantial portion of said wax from said mixture under conditions of said high degree of agitation and effecting a final temperature of said mixture in said chilling zone of between about 0° and 50°F., withdrawing the oil-solvent mixture containing precipitated wax from said chilling zone, separating the precipitated wax from the oil-solvent mixture and recovering the petroleum oil stock having a reduced wax content from said mixture.

12. The process of claim 11 wherein the cold dewaxing solvent is propylene-acetone.

13. A process for dewaxing a waxy lubricating oil stock comprising introducing said petroleum oil stock into the top of a chilling zone divided into between about 6 and 50 agitated stages, introducing a cold dewaxing solvent into each of said stages, maintaining the degree of agitation in each of said stages between about 200 and 150,000 modified Reynolds Number so as to effect substantially instantaneous mixing of said solvent and said oil in each of said agitated stages while cooling said mixture at an average rate of about 1°-5°F. per minute as it progresses down the chilling zone thereby precipitating a substantial portion of said wax from said mixture under conditions of said high degree of agitation and effecting a temperature of said mixture in the final agitated stage of between about 0 and 40°F., withdrawing the oil-solvent mixture containing precipitated wax from said chilling zone, separating the precipitated wax from the oil-solvent mixture and recovering a petroleum oil stock having a reduced wax content from said mixture.

14. A process for separating a wax-oil mixture comprising introducing said mixture, at a temperature above its cloud point, into a chilling zone divided into a plurality of stages, introducing a dewaxing solvent into at least a portion of said stages, maintaining a high

degree of agitation in a plurality of the solvent-containing stages so as to effect a substantially instantaneous mixing of said solvent and said wax-oil mixture while cooling said mixture as it progresses through said chilling zone thereby precipitating a substantial portion of said wax from said mixture under conditions of said high degree of agitation.

15. A process for dewaxing a waxy petroleum oil stock comprising introducing said petroleum oil stock into a chilling zone divided into a plurality of stages, introducing a dewaxing solvent into a plurality of said stages, maintaining a high degree of agitation in each of said stages so as to effect a substantially instantaneous mixing of said solvent and said oil while cooling said solvent-oil mixture as it progresses through said chilling zone thereby precipitating a substantial portion of the wax from said mixture under conditions of said high degree of agitation, separating precipitated wax from said solvent-oil mixture and recovering a petroleum oil stock having a reduced wax content from said mixture.

16. A process for dewaxing a waxy petroleum oil stock comprising introducing said petroleum oil stock into a chilling zone divided into a plurality of stages, introducing a dewaxing solvent into a plurality of said stages, maintaining a high degree of agitation in each of said stages so as to effect a substantially instantaneous mixing of said solvent and said oil while cooling said solvent-oil mixture at an average rate of about

1°-8°F. per minute as it progresses through said chilling zone thereby precipitating a substantial portion of the wax from said mixture under conditions of said high degree of agitation, separating precipitated wax from the oil-solvent mixture and recovering a petroleum oil stock having a reduced wax content from said mixture.

17. The process of claim 1 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

18. The process of claim 10 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

19. The process of claim 11 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

20. The process of claim 13 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

21. The process of claim 14 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

22. The process of claim 15 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

23. The process of claim 16 wherein said dewaxing solvent comprises a mixture of methylethyl ketone and toluene.

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