

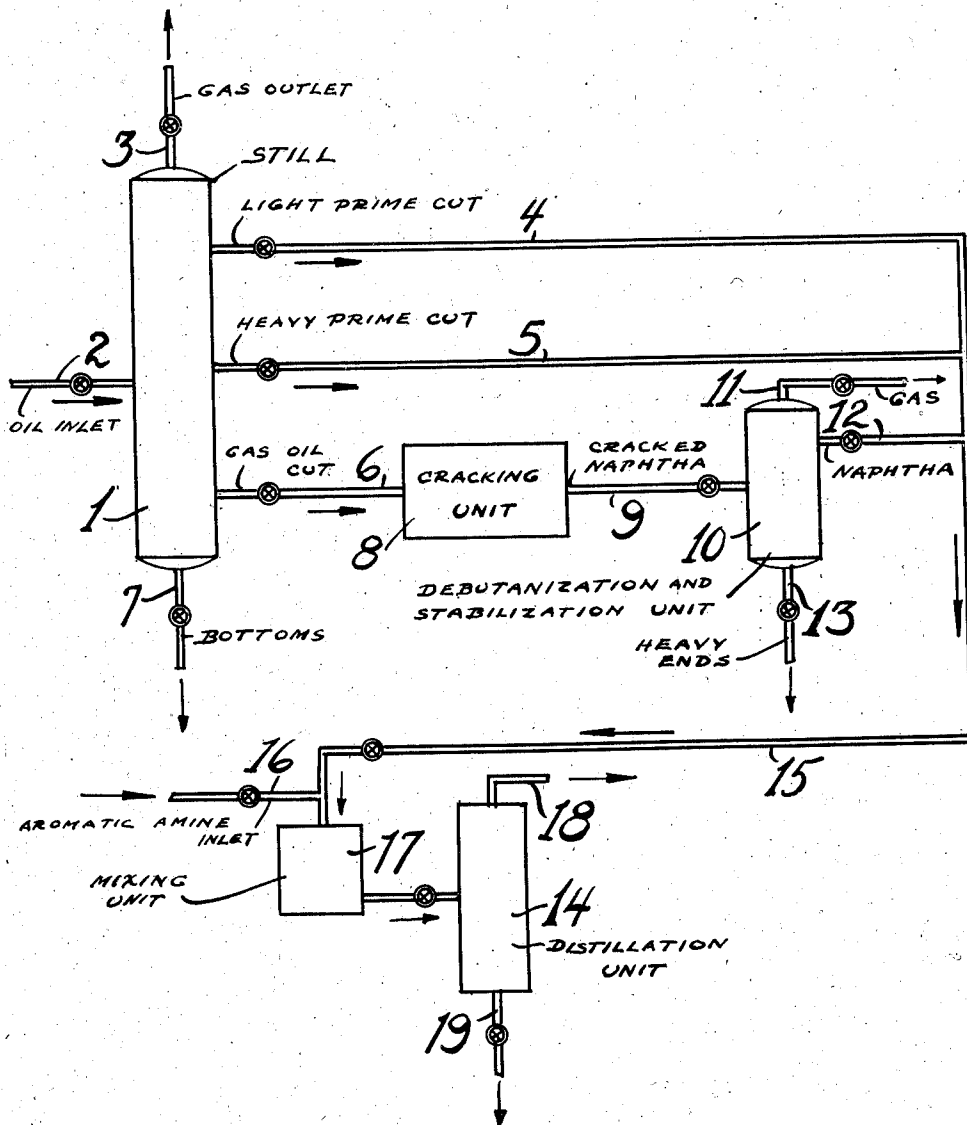
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REFINING OF PETROLEUM DISTILLATES

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REFINING OF PETROLEUM DISTILLATES

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The present invention relates to the production of high quality petroleum distillates. The invention is particularly directed to the production of petroleum distillates of improved color and color stability secured by distilling said distillates in the presence of a relatively high boiling aromatic amine.

It is known in the art to refine petroleum oils by distilling the same and then to contact the resulting distillates in various ways with clays, metallic oxides, bauxite and the like in order to remove color bodies from the same and to stabilize the distillates against subsequent decomposition evidenced by additional color bodies forming. These distillates are usually treated by passing the same through beds of clay or by contacting the distillate with sulfuric acid or with an equivalent acid. These methods, although satisfactory for the removal of color bodies, have the disadvantage in that a considerable loss is experienced when removing the color bodies in this manner. I have now discovered a process for the removal of color bodies and for the production of color stabilized oil which will not substantially affect the yield of the color improved and color stabilized product. In accordance with my invention, petroleum oils are distilled in the presence of a high boiling aromatic amine.

The process of my invention may be readily understood by reference to the attached drawing illustrating one modification of the same. A petroleum oil which for the purpose of the description is taken to be a petroleum crude oil is introduced into still 1 by means of feed line 2. Conditions are maintained on still 1 to remove overhead fixed gas by means of line 3 and to segregate a light prime cut, a heavy prime cut, a gas oil cut, and a bottoms cut which are removed by means of line 4, 5, 6, and 7 respectively. The gas oil cut is then subjected to temperature and pressure conditions in cracking unit 8 to convert the gas oil cut boiling in the range from about 400° F. to 700° F. into petroleum oil fractions boiling in the range below about 400° F. This so-called cracked naphtha fraction is removed from cracking unit 8 by means of line 9 and introduced into debutanization and stabilization unit 10. Fixed gas fractions are removed from debutanization and stabilization unit 10 by means of line 11 and the stabilized naphtha boiling below about 400° F. by means of line 12. The heavy ends are removed from unit 10 by means of line 13 and may be handled in any manner desirable. The cracked distillate may be combined with the virgin fractions and then passed to return distillation unit 14 by means of line 15. Prior to introducing said products into rerun unit 14, a small quantity of an aromatic amine is introduced into line 15 by means of line 16 and the mixture passed through mixing unit

17. Conditions are maintained in rerun distillation unit 14 to remove overhead substantially the entire quantity of the naphtha by means of line 18. A relatively small amount of naphtha and the aromatic amine are removed from distillation unit 14 by means of line 19 and treated in a manner to regenerate the high boiling aromatic amine.

The process of my invention may be widely varied. Although any aromatic amine having a boiling point above about 425° F. may be employed, as for example, benzyl aniline, alpha-or betanaphthylamine, aminodiphenyl, xylydine, toluidine, diphenylethylenediamine, or naphthylaniline, I have found that particularly desirable results are secured when distilling a petroleum oil in the presence of naphthylamines, particularly alphanaphthylamine. The aromatic amine should be in liquid phase under the distillation conditions. In general, it is preferable that the aromatic amine have a boiling point at least 100° F., preferably at least 200° F. above the Engler distillation end point of the stock being distilled. The quantity of aromatic amine employed will depend upon the particular amine utilized, the boiling range of the oil being treated, as well as upon the color characteristics of the oil. In general, the amount of the aromatic amine employed should be in the range above 1%, preferably in the range of about 2% to 3%, and should not exceed about 5%. The distillation operation likewise may be conducted under various temperature and pressure conditions. I have found that, in general, it is desirable to remove overhead at least 90% of the distillate, preferably about 95% of the distillate. Especially desirable results are secured by utilizing less than 3% of the aromatic amine and conducting the distillation operation to remove overhead at least 98% of the petroleum distillate. The remaining 2% of the petroleum distillate and 3% of the aromatic amine is then removed as a bottoms. By conducting this rerunning distillation operation in the manner described, 2% to 5% higher yields are obtained for a final product of equivalent quality.

In order to illustrate the invention, the following examples are given which should not be construed as limiting the same in any manner whatsoever:

EXAMPLE 1

A heavy naphtha (produced by a catalytic cracking operation) and boiling in the range from about 225° F. to 400° F. had a +13 Saybolt color*. Operations were conducted in which

*Color determined by A. S. T. M. test D156-38.

portions of this distillate were rerun in the absence of an aromatic amine and in the presence of a mixture of alphanaphthylamine and ben-

zylalanine. The results of these operations were as follows:

Table 1

	Color Saybolt
Naphtha before rerunning-----	13
Naphtha rerun in absence of aromatic amine-----	13
Naphtha rerun in presence of 3% of aromatic amine mixture consisting of equal quantities of alphanaphthylamine and benzylalanine-----	19

EXAMPLE 2

Operations were conducted in which portions of a catalytic cracked naphtha having a color of 16 Saybolt were redistilled in the absence of an aromatic amine and in the presence of 5% alphanaphthylamine. The distillation was conducted in a manner to remove 95% of the naphtha overhead. The results of these operations were as follows:

Table 2

	Color Saybolt
Naphtha before rerunning-----	16
Naphtha rerun in absence of aromatic amine-----	16
Naphtha rerun in presence of 5% alphanaphthylamine-----	28

The naphthas distilled in the manner described above were subjected to a colorhold test by heating for 16 hours at a temperature of 212° F. The results of these tests were as follows:

Table 3

	Color after distillation	Color after colorhold test
Naphtha distilled in absence of aromatic amine.	16	Straw colored (too low to read on Saybolt Chromometer).
Naphtha distilled in presence of 5% alphanaphthylamine.	28	24

The process of the present invention is not to be limited by any theory or mode of operation, but only in and by the following claims.

I claim:

1. Process for the refining of petroleum distillates for the production of products of improved color and color stability comprising finishing said distillates by distilling the same in the presence of about 1% to 5% of a naphthylamine under conditions to remove overhead at least 90% of the distillate and to remove as a bottoms undistilled oil containing the naphthylamine.

2. Process in accordance with claim 1 in which the naphthylamine is alphanaphthylamine.

3. Process for the production of petroleum oils boiling in the range below about 400° F. having improved color and color stability, said oils being secured from cracking processes, comprising distilling said oils in the presence of about 2% to 3% of a naphthylamine under conditions to remove overhead oil fractions boiling in the gasoline boiling range and removing as a bottoms the undistilled fractions and the naphthylamine.

4. A process for refining petroleum distillates boiling in the range below about 400° F. and having improved color and color stability which comprises adding to the petroleum distillate about 1% to 5% of a heat stable aromatic amine having a boiling point at least 100° F. and up to 200° F. higher than the end boiling point of the petroleum distillate to be treated, distilling the petroleum distillate to remove overhead about 98% of the treated distillate and to remove as bottoms undistilled petroleum oil containing the aromatic amine, the aromatic amine being in the liquid phase during the distillation.

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