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TREATMENT OF HYDROCARBONS

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This invention relates to an improved method of treating hydrocarbons to prevent formation of gum and other deterioration products when the gasoline is stored. More particularly, it relates to improvement in the stabilizing effects obtainable by the addition of inhibitors to cracked gasolines.

In one specific embodiment the invention comprises stabilizing hydrocarbon distillate such as cracked gasoline against deterioration in the presence of oxygen containing gases, by adding thereto a gum inhibitor and an activating compound comprising essentially an amino pyridine.

The use of gum inhibitors to prevent formation of color, gum, and other oxidation products in hydrocarbon distillates such as cracked gasoline is widely practiced. According to my invention, improved results are obtained by adding to the inhibited hydrocarbons a small quantity of a compound which is not itself a gum inhibitor but which enhances the activity or potency of the gum inhibitor. According to this invention relatively smaller amounts of the inhibitor can be used to produce the same improvement in storage stability than when the inhibitor is used without the activator. Thus, for example, a considerable quantity of the active inhibitor component normally used can be replaced by the activating compound to produce the same desired storage stability. Another advantage is that with a given quantity of inhibitor a higher induction period is obtainable when the activating compound is added than could be obtained by the addition of an equivalent quantity of the inhibitor itself.

This invention has the advantage in certain instances of permitting the use of relatively smaller quantities of expensive inhibitors by replacing them with smaller quantities of a less expensive activating compound.

In some cases gum inhibitors of relatively great potency are but slightly soluble in gasoline so that sufficient quantity of inhibitor cannot be added to give the desired protection without the formation of sediment. In other cases when inhibitors are added in sufficient quantity to give the necessary protection against deterioration, objectionable discoloration of the gasoline occurs. As a result the commercial utility of the compounds is limited. By means of the present invention it becomes feasible to use many of these compounds as gum inhibitors due to the fact that the desired storage stability is obtainable without using such large quantities of the inhibitor.

Thus, for example, if a given inhibitor could not be used from the practical standpoint in concentrations greater than 0.005% and this percentage would not give a satisfactory gasoline from the standpoint of storage stability, a few thousandths of a per cent of an amino pyridine can be added to the gasoline together with the inhibitor in question and a product of satisfactory storage stability can be obtained.

It is desirable that the amino group of the amino pyridine should be in the 2 position. The compound can be further substituted by various groups such as, for example, alkyl groups or another amino group. 2-amino pyridine is a good activator. 2-methyl-6-amino pyridine is a representative of an alkyl substituted amino pyridine. 2,6 di-amino pyridine is an example of the di-amino substituted compounds. It is understood that any of these compounds can be substituted in other positions although it should be stated that not all of the possible compounds obtainable are necessarily equivalent in their actions. The following examples are given to illustrate the usefulness of the process:

Example I

A Pennsylvania gasoline was used for this test. The induction period was obtained by the well-known oxygen bomb method. The following results were obtained:

	Induction per., min.
Pennsylvania gasoline	95
Pennsylvania gasoline+0.01% 2,6 diamino pyridine	90
Pennsylvania gasoline+0.01% gum inhibitor[1]	385
Pennsylvania gasoline+0.01% gum inhibitor[1]+0.01% 2,6-diamino pyridine	505

[1]The gum inhibitor was a solution of N-butyl p-aminophenol.

It will be noted that the 2,6 diamino pyridine gave no improvement in the induction period unless the inhibitor was present but when added together with the gum inhibitor produced a marked increase in the induction period.

Example II

Another Pennsylvania gasoline was used in the following test:

	Induction per., min.
Uninhibited cracked gasoline	215
Uninhibited cracked gasoline+0.01% gum inhibitor[1]	475
Uninhibited cracked gasoline+0.01% gum inhibitor[1]+0.0005% 2-amino-pyridine	515
Uninhibited cracked gasoline+0.01% gum inhibitor[1]+0.0010% 2-aminopyridine	535
Uninhibited cracked gasoline+0.01% gum inhibitor[1]+0.005% 2-aminopyridine	595
Uninhibited cracked gasoline+0.01% gum inhibitor[1]+0.010% 2-aminopyridine	705

[1]The gum inhibitor was a solution of N-butyl p-aminophenol.

It will be noted that as little as 0.005% of 2-amino pyridine produces a marked increase in the induction period of the inhibited cracked

gasoline. When adding 2-amino pyridine to the gasoline without the gum inhibitor being present no improvement was shown in the induction period of the cracked gasoline over that of the uninhibited gasoline, even though quantities of 2-amino pyridine in excess of 0.01% were used.

Example III

The same Pennsylvania gasoline used in Example II was employed in the following tests:

	Induction per., min.
Cracked gasoline+gum inhibitor [1]+0.0005% 2-methyl-6-aminopyridine	505
Cracked gasoline+gum inhibitor [1]+0.005% 2-methyl-6-aminopyridine	535
Cracked gasoline+gum inhibitor [1]+0.010% 2-methyl-6-aminopyridine	590

[1]The gum inhibitor was a solution of N-butyl p-aminophenol.

The addition of as little as 0.005% of 2-methyl-6-amino pyridine improved the induction period substantially when the gum inhibitor was also present. In the same gasoline the addition of more than 0.01% of 2-methyl-6-amino-pyridine in the absence of gum inhibitor produced no improvement in the storage stability of the cracked gasoline.

I claim as my invention:

1. A method for stabilizing hydrocarbon distillates normally tending to form gum which comprises adding thereto a gum inhibitor and a small but sufficient amount of an amino-pyridine to increase the potency of said inhibitor.

2. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of an amino-pyridine to increase the potency of said inhibitor.

3. A method for stabilizing hydrocarbon distillates normally tending to form gum which comprises adding thereto a gum inhibitor and a small but sufficient amount of a substituted amino-pyridine to increase the potency of said inhibitor.

4. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of a substituted amino-pyridine to increase the potency of said inhibitor.

5. A method for stabilizing hydrocarbon distillates normally tending to form gum which comprises adding thereto a gum inhibitor and a small but sufficient amount of a substituted 2-amino-pyridine to increase the potency of said inhibitor.

6. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of a substituted 2-amino-pyridine to increase the potency of said inhibitor.

7. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of 2-amino-pyridine to increase the potency of said inhibitor.

8. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of 2-methyl-6-amino-pyridine to increase the potency of said inhibitor.

9. A method for stabilizing olefinic gasoline which comprises adding thereto a gum inhibitor and a small but sufficient amount of -2,6-di-amino-pyridine to increase the potency of said inhibitor.

10. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of an amino-pyridine to increase the potency of said inhibitor.

11. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of a substituted amino-pyridine to increase the potency of said inhibitor.

12. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of a substituted 2-amino-pyridine to increase the potency of said inhibitor.

13. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of 2-methyl-6-amino-pyridine to increase the potency of said inhibitor.

14. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of 2,6-di-amino-pyridine to increase the potency of said inhibitor.

15. Motor fuel comprising olefinic gasoline, a gum inhibitor and a small but sufficient amount of 2-amino-pyridine to increase the potency of said inhibitor.

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