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TREATMENT OF GASOLINE

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15 Claims. (Cl. 44—72)

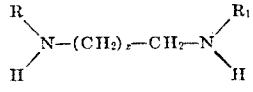
This invention relates to a method for improving the stability of hydrocarbon distillates insofar as color and gum formation are concerned. More particularly the process concerns improved methods of preventing deterioration of cracked gasolines which may be stored over relatively long periods of time in the presence of air.

The use of inhibitors to prevent the depreciation of olefin-containing hydrocarbon distillates such as cracked gasoline has been practiced. Such compounds as alkyl-substituted phenols, aminophenols, fractions of wood tar distillates, etc., have been added to cracked gasoline in relatively minor quantities, of the order of 0.001–0.1% to inhibit the formation of objectionable oxidation products and prevent loss of color and antiknock properties of said gasolines during storage periods. The use of inhibitors has replaced or supplemented such forms of refining as acid-treating, clay-treating and the like. The result has been a material saving in refining costs as well as the conservation of substantial amounts of gasoline which were formerly lost in the refining steps.

The present invention offers a means of improving the inhibiting properties of gasoline gum inhibitors and of effecting material savings in the quantities of such materials which may be required adequately to preserve the valuble properties of gasoline.

In one specific embodiment the present invention comprises a method for treating olefin-containing hydrocarbon distillate such as cracked gasoline to preserve the valuble properties thereof which consists in adding to said distillate a gasoline gum inhibitor together with a relatively minor quantity of an hydroxy-alkyl-substituted alkylene diamine.

The compounds have the general structural formula:



wherein R is an hydroxy-alkyl group, R′ is a hydrogen atom or an hydroxy-alkyl group and x is an integer. A representative compound is hydroxyethyl ethylene diamine.

The present class of compounds are used in combination with known gasoline gum inhibitors such as N-substituted alkyl amino-phenols, alkyl phenols, substituted phenol ethers, fractions of wood tar distillate boiling in the range of approximately 240–280° C., and others. The compounds of this invention may be added to the gasoline separately or simultaneously with the gum inhibitor, or may be mixed with the gum inhibitor and the mixture added to the gasoline.

The quantity of hydroxy-alkyl-substituted alkylene diamine commonly used in the gasoline is of the order of 0.001–0.01% by weight of the gasoline. The exact quantity required is a function of the inhibitor with which it is used and of the gasoline as well as the desired stability of the gasoline treated. The compounds of this invention are not of themselves gum inhibitors and the effect observed is not therefore the additive effect such as might be expected by the joint use of two gasoline gum inhibitors.

When the present class of compounds are added alone to cracked gasoline in amounts up to approximately 0.1%, little or no increase in the oxygen bomb induction period is to be observed and storage tests indicate that no protection is obtained for the gasoline under storage conditions. However, when used with an inhibitor, the induction period with a given quantity of a gum inhibitor is markedly increased and with the more effective compounds of this invention, more than equal weight percentages of the inhibitor can be replaced without suffering a loss in inhibitor potency. This will be brought out more fully in the examples to be given later.

The compounds of this invention are not necessarily exactly equivalent in their effects and it should be understood that they cannot necessarily be used to replace one another in the composite inhibitor with equal effects either on a weight or a molal equivalent basis.

The following example is given to illustrate the usefulness and practicability of the process, but should not be construed as limiting it to the exact conditions or compounds given therein.

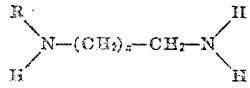
A Pennsylvania cracked gasoline was treated with a gum inhibitor comprising N-butyl aminophenol in a concentration of 0.01%. The gasoline had an oxygen bomb induction period originally of 95 minutes which was increased to 330 minutes with the inhibitor. To the inhibited gasoline was added 0.01% of hydroxyethyl ethylene diamine and the gasoline had a resultant induction period of 595 minutes. When hydroxyethyl ethylene diamine was added to the uninhibited gasoline, the induction period was 100 minutes.

I claim as my invention:

1. A process for treating olefin-containing hydrocarbon distillate to prevent depreciation thereof which comprises adding to said distillate

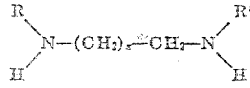
a gasoline gum inhibitor and an hydroxy-alkyl-substituted alkylene diamine.

2. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding to said gasoline a gasoline gum inhibitor and a compound of the following general formula:



wherein R is an hydroxy-alkyl group, and x is an integer.

3. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding to said gasoline a gasoline gum inhibitor and a compound of the following general structure:



wherein R and R′ are hydroxy-alkyl groups and x is an integer.

4. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding thereto a gasoline gum inhibitor and a minor quantity of hydroxyethyl ethylene diamine.

5. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding thereto a gasoline gum inhibitor and an amount of an hydroxy-alkyl-substituted alkylene diamine within the limits of approximately 0.0001–0.01% by weight of the gasoline.

6. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding thereto a gasoline gum inhibitor in amounts of approximately 0.001–0.1% and an amount of an hydroxy-alkyl-substituted-alkylene diamine within the limits of approximately 0.0001–0.01%, both by weight of the gasoline.

7. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding to said gasoline a gasoline gum inhibitor consisting of an N-substituted-alkyl aminophenol and an hydroxy-alkyl-substituted alkylene diamine.

8. A process for treating cracked gasoline to prevent depreciation thereof which comprises adding to said gasoline a gasoline gum inhibitor consisting of a wood tar fraction boiling within the limits of approximately 240–280° C. and an hydroxy-alkyl-substituted alkylene diamine.

9. An inhibitor for cracked gasoline comprising essentially a mixture of a gasoline gum inhibitor and an hydroxy-alkyl-substituted alkylene diamine.

10. An inhibitor for cracked gasoline which comprises essentially a mixture of an N-substituted-alkyl-aminophenol with an hydroxy-alkyl-substituted alkylene diamine.

11. An inhibitor for cracked gasoline which comprises essentially a mixture of a wood tar distillate boiling within the limits of approximately 240–280° C. and an hydroxy-alkyl-substituted alkylene diamine.

12. A composition of matter useful for inhibiting the oxidation of unstable organic substances such as olefin-containing hydrocarbon distillates which comprises a mixture of an antioxidant with an hydroxy-alkyl-substituted alkylene diamine.

13. A composition of matter useful for preventing oxidation of unstable organic substances which comprises a mixture of an antioxidant with hydroxyethyl ethylene diamine.

14. In the art of stabilizing olefinic distillates against deterioration by the addition of gum inhibitors thereto, the method of increasing the gum inhibiting potency of the inhibitor which comprises incorporating into the olefinic distillate, in addition to the gum inhibitor, a relatively small amount of an hydroxy-alkyl-substituted alkylene diamine.

15. A stabilizing agent suitable for retarding gum formation in olefinic distillates comprising a phenolic gum inhibitor and an amount of an hydroxy-alkyl-substituted alkylene diamine such as to increase the inhibiting potency of the phenolic inhibitor.

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