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MOTOR FUEL

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This invention relates to motor fuels and pertains more particularly to the introduction of certain compounds, such as antioxidants, into the fuel to improve the character thereof.

According to the invention, a motor fuel which may undergo changes such as oxidation, polymerization, gum formation, or alterations in anti-knock qualities is treated or stabilized by incorporating therein certain compounds known as inhibitors or antioxidants to eliminate or to inhibit reactions tending to produce the above mentioned changes.

Motor fuels which may be treated according to the invention may comprise any fuel suitable for internal combustion engines. The invention is applicable to the treatment of refined or unrefined gasolines, naphthas, or other oils containing constituents substantially within the boiling range of commercial gasoline which tend to go off-color, to form gum, or otherwise to decrease in value on standing. The invention has been found to be particularly useful in the treatment of cracked gasolines or other motor fuels containing unsaturated or cracked petroleum hydrocarbons which commonly compose a substantial amount of fuels of high anti-knock property.

More particularly according to the invention, the motor fuel is treated by adding thereto, or incorporating therein by suitable means, an acyl derivative of the polyhydric phenols. This type of compound has been found to produce efficient results and to have advantages over certain inhibitors employed heretofore.

The acyl polyhydric phenols are compounds having the characteristic acyl radical, R—CO, attached to the ring of the polyhydric phenols. The compounds may be prepared by interaction of a polyhydric phenol and an acyl chloride whereby the acyl radical apparently replaces a hydrogen of the benzene ring with the elimination of hydrogen chloride. The acyl derivatives have substantially all the advantages of the polyhydric phenols as antioxidants and furthermore are more desirable in that the acyl radical increases the solubility of the compounds in gasoline and decreases the solubility thereof in water.

The polyhydric phenols which may be used as starting materials to form the acyl derivatives comprise the isomeric di- and trihydric phenols. In these classes are the three isomeric dihydroxy benzenes, pyrocatechol, resorcinol, and hydroquinone; and the three isomeric trihydroxy benzenes, pyrogallol, phloroglucinol, and 1, 2, 4 trihydroxy benzene.

The acyl derivatives of the polyhydric phenols which have been found useful according to the invention may be classified as aromatic acyl derivatives, aliphatic acyl derivatives, substituted aromatic acyl derivatives and substituted aliphatic acyl derivatives. Compounds falling within these classes comprise, for example, acetyl-, propionyl-, butyryl-, valeryl-, capryl-, heptylyl-, caprylyl-, caproyl-, palmityl-, stearyl-, oleyl-, salicylyl-, benzoyl-, toluyl-, ethylbenzoyl-, tolylacetyl-, and phenylacetyl-pyrogallols or the corresponding derivatives of the other isomeric trihydric phenols, phloroglucinol and 1, 2, 4 trihydroxy benzenes; and the corresponding derivatives of the dihydric phenols, pyrocatechol, resorcinol and hydroquinone.

The quantities of inhibitor necessary to be used according to the invention to obtain the desired results may vary somewhat but for economical reasons it is usually advantageous to use the minimum which is commensurate with the beneficial result expected of the inhibitor. The quantity is usually predetermined by accelerated tests, such as accelerated gum and aging tests, which indicate the result to be expected in actual practice. In general, it may be said that quantities of the inhibitor varying between 0.005% and 0.1% of the weight of the fuel are usually satisfactory, and preferably a quantity of around 0.01%.

The inhibitor may be dissolved in the fuel by suitable means, such as agitating the compound with the oil. In the case of compounds difficultly soluble in the motor fuel it may be advantageous to use a solvent aid or mutual solvent to effect solution. Thus, the compounds may be first dissolved in a small quantity of a solvent such as acetone, benzol, alcohol, etc. and then the resulting solution incorporated in the motor fuel.

In practicing the invention a vapor phase cracked gasoline, showing approximately 200 mgs. of gum per 100 cubic centimeters when evaporated in a copper dish according to Method 530.1, Technical Paper 323B of the Bureau of Mines, was treated with about 35 pounds of benzoyl pyrogallol per 1,000 barrels of the oil. The resulting gasoline, when tested according to the above method, showed about 10 mgs. of gum per 100 cubic centimeters. The treated gasoline was greatly increased in stability on standing as to gum, color and anti-knock property. A sample of gasoline treated in a similar manner with butyryl pyrogallol gave substantially the same results. Other compounds of the classes given heretofore may be used to produce results similar to the examples just described and specific examples of all the various compounds, therefore,

will not be given; however, it is to be understood that the scope of the invention is intended to cover broadly the acyl derivatives of the polyhydric phenols, as described, and the invention should not be limited to the specific examples given.

Obviously many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. The method of improving the character of volatile liquid motor fuels containing cracked hydrocarbons which comprises adding to the fuel a small amount of an acyl derivative of a polyhydric phenol.

2. The method of improving the character of cracked gasolines which comprises adding to the gasoline a small amount of an aromatic acyl derivative of a polyhydric phenol.

3. The method of improving the character of cracked gasolines which comprises adding to the gasoline a small amount of an aliphatic acyl derivative of a polyhydric phenol.

4. The method of improving the character of cracked gasoline which comprises adding to the gasoline a small amount of a butyl derivative of a polyhydric phenol.

5. The method of improving the character of cracked gasolines which comprises adding to the gasoline a small amount of butyryl pyrogallol.

6. The method of improving the character of cracked gasolines which comprises adding to the gasoline a small amount of benzoyl pyrogallol.

7. A composition of matter comprising a volatile liquid motor fuel containing cracked hydrocarbons to which has been added a minor proportion of an acyl derivative of a polyhydric phenol.

8. A composition of matter comprising a cracked gasoline to which has been added a minor proportion of an aromatic acyl derivative of a polyhydric phenol.

9. A composition of matter comprising a cracked gasoline to which has been added a minor proportion of an aliphatic acyl derivative of a polyhydric phenol.

10. A composition of matter comprising a cracked gasoline to which has been added a small amount of a butyryl derivative of a polyhydric phenol.

11. A composition of matter comprising a cracked gasoline to which has been added a small amount of butyryl pyrogallol.

12. A composition of matter comprising a cracked gasoline to which has been added a small amount of benzoyl pyrogallol.

13. The method of improving the character of cracked gasolines which comprises adding to the gasoline a small amount of stearyl pyrogallol.

14. A composition of matter comprising a cracked gasoline to which has been added a small amount of stearyl pyrogallol.

15. The method of improving the character of volatile liquid motor fuels, containing cracked hydrocarbons normally tending to deteriorate and form gum on storage, which comprises providing in the fuel an acyl derivative of a dihydric phenol compound in sufficient quantity to retard such deterioration and gum formation.

16. The method of improving the character of volatile liquid motor fuels, containing cracked hydrocarbons normally tending to deteriorate and form gum on storage, which comprises providing in the fuel an acyl derivative of a trihydric phenol compound in sufficient quantity to retard such deterioration and gum formation.

17. The method of improving the character of volatile liquid motor fuels, containing cracked hydrocarbons normally tending to deteriorate and form gum on storage, which comprises providing in the fuel, in sufficient quantity to retard such deterioration, an acyl derivative of a nuclear substituted polyhydroxy aromatic hydrocarbon compound.

18. A volatile liquid motor fuel containing cracked hydrocarbons normally tending to deteriorate and form gum on storage and containing an acyl derivative of a dihydric phenol compound in sufficient quantity to retard such deterioration.

19. A motor fuel containing cracked hydrocarbons normally tending to deteriorate and form gum on storage and containing an acyl derivative of a trihydric phenol in sufficient quantity to retard such deterioration and gum formation.

20. A volatile liquid motor fuel containing cracked hydrocarbons normally tending to deteriorate and form gum on storage and containing, in sufficient quantity to retard such deterioration, an acyl derivative of a nuclear substituted polyhydroxy aromatic hydrocarbon compound.

21. The method of improving volatile liquid motor fuels containing cracked hydrocarbons, normally tending to deteriorate and form gum on storage, which comprises providing in the fuel, in sufficient quantity to retard such deterioration and gum formation, an acyl derivative of a phenolic compound in which the acyl radical is substituted for a hydrogen on the aromatic nucleus.

22. A volatile liquid motor fuel, containing cracked hydrocarbons normally tending to deteriorate and form gum on storage, and containing in sufficient amount to substantially retard such deterioration and gum formation, an acyl derivative of a phenolic compound in which the acyl radical is substituted for a hydrogen on the aromatic nucleus.

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