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MOTOR FUELS

Ernest F. Pevere, Beacon, N. Y., assignor, by mesne assignments, to The Texas Company, New York, N. Y., a corporation of Delaware

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This invention relates to motor fuels and has to do particularly with the manufacture of a motor fuel of improved antiknock value.

Ordinary motor fuels of the gasoline type contain a complex mixture of hydrocarbons which vary in antiknock value. Some of these hydrocarbons are very high in antiknock properties, while others are relatively low. Mixtures of such hydrocarbons of low and high antiknock value have shown antiknock values of the blend substantially below average of the antiknock values of the respective hydrocarbons. This indicates that there is an incompatibility with respect to antiknock properties of hydrocarbon mixtures such as occur in gasoline.

For example, aromatic hydrocarbons have a high antiknock value but, when these hydrocarbons are blended with straight chain paraffin hydrocarbons, particularly the higher molecular weight normal paraffins, such as occur in the higher boiling fractions of gasoline, there is an unexpected depreciation in the antiknock value of the aromatics. Thus the octane number of benzene alone is about 111.6 whereas in blends of ordinary gasoline the blending antiknock number of a 50% blend of benzene is about 85 as tested by the C. F. R. M. method.

The reasons for this incompatibility are not fully understood but it is thought that it may be due to the oxidation of the less stable low antiknock hydrocarbons, whereby the more stable, high antiknock hydrocarbons are reacted upon below their normal combustion temperature.

It has been found that an improved motor fuel may be obtained by blending aromatic hydrocarbons with a more stable type of paraffin hydrocarbons, such as isoparaffins and low molecular weight normal paraffins. The following data show the octane number of certain hydrocarbons and blends thereof with benzene:

Composition	Octane No. C. F. R. M.	Blending octane No. of benzene
100% isopentane.....	89.4	
50% isopentane and 50% benzene.....	91.6	93.8
100% commercial iso-octane.....	96.3	
50% commercial iso-octane and 50% benzene.....	95.8	95.3
100% normal pentane.....	60	
50% normal pentane and 50% benzene.....	78	96

It will be noted from the above data, wherein benzene is blended with certain selected hydrocarbons, that the blending octane number of the

benzene is about 95, as compared with 85 when the benzene is blended with ordinary gasoline.

In accordance with the invention, an improved motor fuel is obtained by blending aromatic hydrocarbons with isoparaffin hydrocarbons of gasoline boiling range and low molecular weight normal paraffins of less than 6 carbon atoms, for example paraffins of 4 to 5 carbon atoms.

The aromatic hydrocarbons may be substantially pure aromatics, such as benzene or toluene. The aromatic hydrocarbons may be obtained from an aromatic fraction boiling above about 160° F. of cracked gasoline by solvent extracting the aromatics with a suitable solvent such as sulfur dioxide or any other solvent having properties for selective extraction of the aromatics.

The isoparaffin hydrocarbons may be substantially pure isoparaffins, such as iso-octane. The isoparaffin hydrocarbons are preferably commercial products such as an alkylation gasoline or a hydrogenated polymer gasoline. The alkylation gasoline is prepared by the alkylation of low boiling isoparaffins, such as isobutane or isopentane with olefins, such as normally gaseous olefins or polymers thereof, in the presence of an alkylation catalyst, such as sulfuric acid and aluminum chloride. The hydrogenated polymer gasoline is produced by the hydrogenation of polymers resulting from the selective polymerization of isobutylene or interpolymerization of isobutylene and normal butylenes. The alkylation gasoline or the hydrogenated polymer gasoline may be a broad boiling range liquid fraction with an endpoint up to 400° F. or it may be a lighter cut, such as 311° F. endpoint fraction.

In the case where the broad boiling range fraction is employed, or in any other case where found desirable, the blend of the aromatic fraction with the alkylation or hydrogenated polymer gasoline may be adjusted as to its light end boiling range by the addition, preferably, of a desired proportion of C₄ or C₅, or a mixture of C₄ and C₅ saturated paraffin hydrocarbons, which may be obtained from the stabilization or debutanization of natural or straight run gasoline.

By way of further examples of the present invention, an alkylation motor fuel gasoline, having a boiling range of approximately 95° to 400° F. blended in the proportion of 75-25% by volume with 25-75% of an Edeleanu extract of a cracked gasoline having a boiling range of approximately 160° to 400° F., produces a motor fuel of unusually high C. F. R. M. octane of the order of 90-95 with satisfactory distillation characteristics and Reid vapor pressure. Similarly, a light

end of natural gasoline consisting essentially of C₄ and C₅ hydrocarbons blended in the proportion of 10-15% by volume with 70-80% of a similar Edeleanu extract and 20-25% of hydrogenated polymer gasoline produces a motor fuel of good octane of the order of 80-85 with suitable distillation characteristics and Reid vapor pressure.

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. A motor fuel comprising a blend of a substantial and effective proportion not in excess of about 75% of an aromatic hydrocarbon boiling within the gasoline boiling range with at least 25% of a synthetic saturated paraffinic gasoline fraction consisting essentially of isoparaffinic hydrocarbons including iso-octane, said motor fuel being substantially free from normal paraffin hydrocarbons of higher molecular weight than normal pentane such that the blending octane number by the C. F. R. M. method of a 50% blend of benzene with the saturated paraffinic components of the fuel is at least about 93.8.
2. A motor fuel in accordance with claim 1, wherein the synthetic saturated paraffinic gasoline fraction is a hydrogenated polymer gasoline.

3. A motor fuel of high anti-knock value comprising a blend of a substantial proportion not in excess of about 50% of an aromatic hydrocarbon boiling within the gasoline boiling range with at least 50% of a saturated paraffinic gasoline fraction of broad boiling range and consisting essentially of a synthetic mixture of isoparaffinic hydrocarbons including iso-octane, said motor fuel being substantially free from normal paraffin hydrocarbons of higher molecular weight than normal pentane such that the blending octane number by the C. F. R. M. method of a 50% blend of benzene with the saturated paraffinic components of the fuel is at least about 93.8.
 4. A motor fuel containing, as the only non-metallic hydrocarbon constituents thereof, a blend of a substantial and effective proportion not in excess of about 50% by volume of an aromatic hydrocarbon boiling within the gasoline boiling range, and at least 50% by volume of a saturated paraffinic gasoline fraction of broad boiling range, the C₆ and higher hydrocarbons of said fraction consisting essentially of a synthetic mixture of isoparaffinic hydrocarbons including iso-octane selected from the group consisting of hydrogenated polymer gasoline and isoparaffinolefin alkylate, said motor fuel being substantially free from normal paraffin hydrocarbons of higher molecular weight than normal pentane.
- ERNEST F. PEVERE.