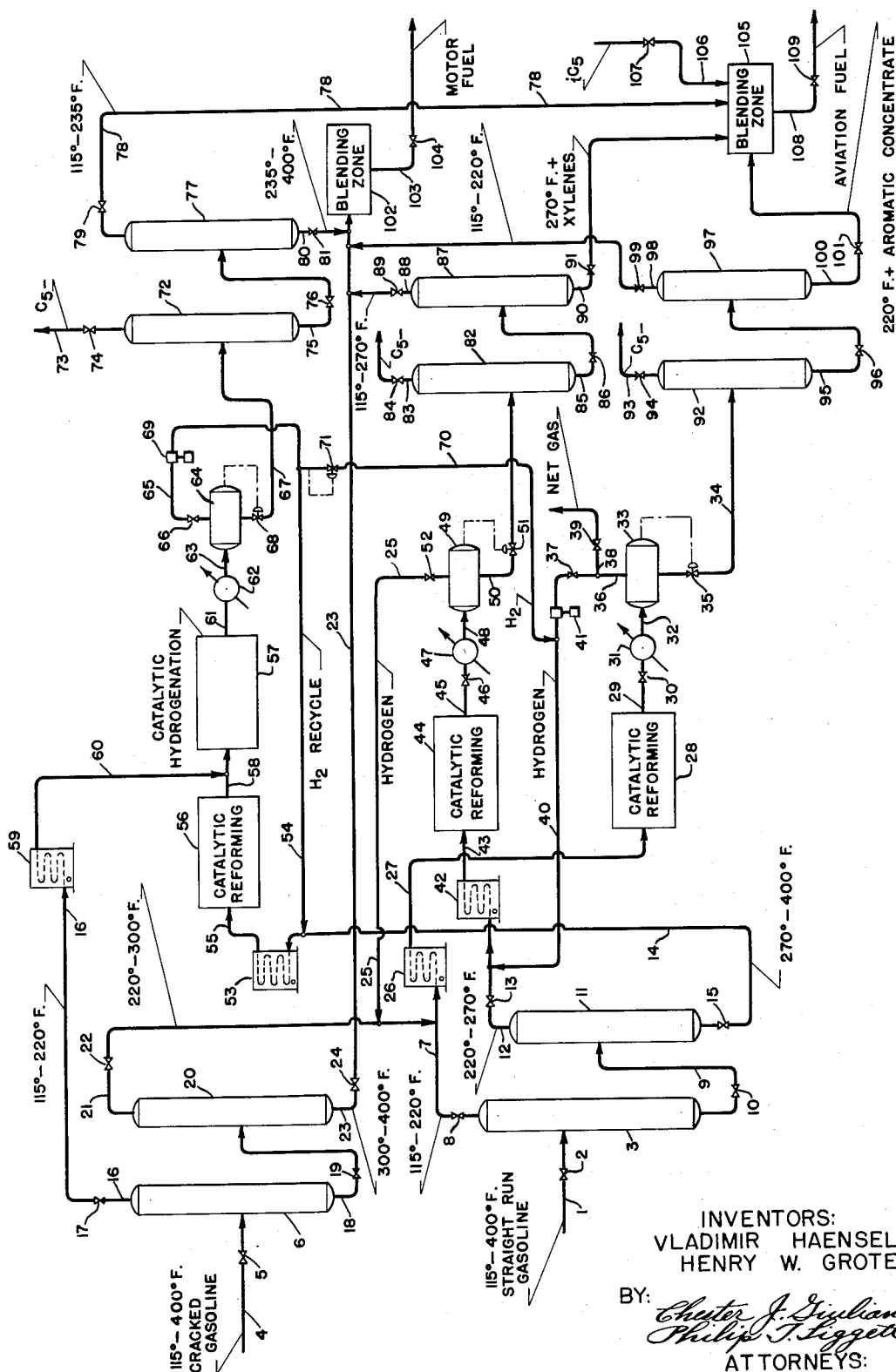


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REFORMING OF BOTH STRAIGHT RUN AND CRACKED  
GASOLINES TO PROVIDE HIGH OCTANE FUELS  
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## REFORMING OF BOTH STRAIGHT RUN AND CRACKED GASOLINES TO PROVIDE HIGH OCTANE FUELS

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This invention relates to an improved combined method for reforming both straight run and cracked gasolines or naphthas to provide high octane fuels. More specifically, the present improved operation integrates fractionation with catalytic reforming in a manner where different boiling point fractions of both straight-run and cracked gasolines may be independently treated under optimum conditions to provide both premium motor and aviation fuels.

It is recognized that various types of combination reforming operations have been utilized to improve both straight-run and cracked gasoline fractions, which may include both thermally and catalytically cracked materials, or mixtures thereof. However, many processing methods do not handle the streams to the best advantage so as to provide optimum yields and octane numbers, while in addition, effecting the contacting of the catalyst at conditions providing a minimum of damage to the catalyst. For example, it has been discovered that in catalytic reforming operations, it is desirable to subject cracked gasolines, or other olefinic gasolines and naphthas, to saturation by a hydrogenation step prior to effecting the reforming thereof, since the olefins tend to depress the hydrocracking and isomerizing reactions of the reforming operation. In catalytic reforming, there is normally some hydrocracking and isomerizing of paraffins, as well as dehydrogenation of naphthenes to aromatics, in effecting the overall conversion with a resulting substantial increase in octane number. Generally, resulting aromatic fractions are separated from the non-aromatic after the reforming operation by suitable extraction means so as to permit independent use of the products, or to permit blending of product streams into desired fuels.

It is a principal object of the present combined and integrated operation to provide pre-fractionation of both straight-run or cracked gasolines or naphtha streams to provide different boiling point cuts and to independently process various of these cuts in different reforming zones so as to permit optimum conversion conditions, and in addition to substantially fractionate and separate product streams to permit controlled blending and the production of both premium motor and aviation fuels.

A particular feature of the present operation is that a multiple fractionation system is combined with the different reforming steps of the present operation to obviate the necessity of recovering the resulting aromatics by an extraction process. Another feature of the present arrangement and operation is the use of hydrogen recycle systems within the unit in a manner which integrates the different operating pressures in the different portions of the combined unit so as to necessitate the use of only two compressors in the recycle systems.

Another feature of the present improved operation is to effect a high degree of aromatization and octane improvement in the combined units with a substantially non-regenerative type of catalyst. This catalyst is a

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recently developed reforming catalyst having superior quality and providing superior conversion results over long periods of use, when used under proper conditions. This catalyst may be further designated as a platinum-alumina-combined halogen catalyst. The platinum content of the catalyst may be quite high but for economic as well as yield and quality reasons, will be within the range of from about 0.05% to about 1.5% by weight of the alumina on a dry basis. The concentration of the halogen ion in the combined catalyst may be within the range of from about 0.1% to about 8% by weight of the alumina on a dry basis. However, the fluoride ion appears to be more active than the chloride ion and therefore will be used within the range of from about 0.1% to about 3% by weight of alumina on a dry basis. The chloride ion may be used within the range of from about 0.2% to about 8% by weight of the alumina on a dry basis. Of course, both fluoride and chloride ions may be used together to provide the halogen-containing catalyst. Bromide and iodide ions may be used, but are found to be of poor activity and preferably the aforementioned fluoride and chloride ions are combined with the platinum-alumina catalysts.

The operation of the combined and integrated fractionation and reforming steps of the present invention are best explained in connection with the accompanying drawing, however, the combined process may be set forth in the following brief embodiment. A combined substantially non-regenerative process for reforming both straight-run and cracked gasoline fractions to provide high octane number fuels, in a manner which comprises, independently fractionating both the straight-run and cracked gasolines to provide low boiling point, intermediate boiling point, and high boiling point fractions, combining the resulting low boiling straight-run fraction with the resulting intermediate boiling point cracked fraction and subjecting the mixture to reforming in a first reforming zone, subjecting the resulting intermediate boiling point straight-run fraction to reforming in a second reforming zone, subjecting the resulting high boiling straight-run fraction to reforming in a third reforming zone and passing the thus reformed and dehydrogenated stream with resulting hydrogen and without additional heating into a hydrogenation zone in admixture with the low boiling cracked gasoline fraction, contacting the mixture in this latter zone with a sulfur resistant hydrogenation catalyst under conditions effecting the saturation of the olefinic components of the stream, independently separating and fractionating the resulting reformed streams from each of the first and second reforming zones and from the hydrogenation zone to provide high and low boiling product fractions, blending the untreated high boiling cracked fraction with the resulting high boiling fractions from the hydrogenation step and with both of the resulting low boiling fractions separated from the first and second reforming zones to provide a desirable premium motor fuel, and blending the low boiling fraction from the hydrogenation step, with both of the resulting high boiling fractions separated from the first and second reforming zones to provide a premium aviation fuel.

Reference to the accompanying drawing and the following description thereof will aid in setting forth the combined reforming operation of the present invention as well as point out further advantageous features in connection therewith.

In the present embodiment, a straight-run gasoline stream is introduced by way of line 1 and valve 2 into a fractionating chamber 3, while a separate cracked gasoline stream is introduced by way of line 4 and valve 5 into fractionating chamber 6. This latter stream may be a catalytically cracked material or alternatively a

thermally cracked stream or other olefinic stream having a large quantity of unsaturated material. Preferably, each of the streams are depentanized and boiling within the range of from about 115° F. to about 400° F., as indicated.

The straight run fraction in column 3 is distilled and fractionated to provide an overhead cut, boiling in the range of from about 115° F. to about 220° F., and being withdrawn by way of line 7 and valve 8, while a bottoms fraction passes by way of line 9 and valve 10 into a second fractionation column 11 to be further distilled and separated into an intermediate boiling point fraction and a higher boiling fraction. The intermediate boiling point fraction is indicated as boiling in the range of from about 220° F. to 270° F. and discharged by way of line 12 and valve 13, while the higher boiling fraction is indicated as boiling in the range of from about 270° F. to about 400° F. being withdrawn by way of line 14 and valve 15.

The olefinic cracked gasoline fraction is separated in column 6 to provide an overhead stream, boiling in the range of from about 115° F. to about 220° F., and being discharged by way of line 16 and valve 17, while a bottoms fraction is passed by way of line 18 and valve 19 into a second fractionating column 20 for further distillation and separation. An intermediate boiling point fraction having a boiling range of from about 220° F. to about 300° F. is discharged from the upper portion of column 20 by way of line 21 and valve 22, while the heavier fraction, having a boiling point range of from about 300° F. to about 400° F., is withdrawn from the lower end of column 20 by way of line 23 and valve 24.

In accordance with the present combined and integrated operation, the low boiling straight-run fraction from line 7 is combined with the intermediate boiling point cracked fraction from line 21, as well as with recycle hydrogen obtained from line 25, and the mixture is then heated in a suitable heater or furnace 26 and discharged by way of line 27 to a catalytic reforming zone indicated diagrammatically at 28. The low boiling and intermediate boiling point cuts which are combined and passed to this reforming zone provide naphthenic hydrocarbons suitable for dehydrogenation and aromatization and the production of a considerable quantity of benzene, toluene, and xylenes suitable for high octane blending components. Thus, in order to effect substantial dehydrogenation of the stream, the material passing by way of line 27 into the reforming zone 28 is at a temperature say of about 900° F. or within the range of from about 800° F. to 950° F., while at a pressure of preferably less than about 400 p. s. i. g., and preferably within the range of from about 200-400 p. s. i. g.

Preferably, the catalyst used in the reforming zone 28 is of the improved type comprising platinum-alumina and combined halogen, in order to provide superior results and in order to provide a substantially non-regenerative type of operation. It is, however, to be understood, that more than one reforming zone or chamber may be utilized with suitable heaters or heat exchange means placed between the separate catalytic contacting chambers of the unit. The reformed stream from zone 28 is passed by way of line 29 and valve 30 to a suitable cooler 31, and from the latter by way of line 32 into a separator 33. From the separator 33, a liquid aromatic containing hydrocarbon stream is withdrawn by way of line 34 and valve 35, while a gaseous hydrogen containing stream is discharged from the upper portion thereof by way of line 36 and valve 37. Means is also provided by way of line 38 and valve 39 for withdrawing a portion of the gaseous stream and thus preventing the build-up of methane or other undesired light gaseous components.

The intermediate boiling point range straight-run cut from column 11, and passing by way of line 12, is combined with a hydrogen stream from line 40 and compressor 41 and the mixture is passed by way of a suit-

able heater 42 and line 43 into a separate reforming zone indicated as 44. This naphthenic fraction, containing some virgin toluene and xylene along with toluene and xylene forming naphthenes, undergoes reforming and aromatization within the reforming unit 44 at a temperature of the order of about 900° F., or with in the range of from about 800° F. to about 950° F., while at a pressure of preferably less than about 500 p. s. i. g., and within the range of from about 250 to 500 p. s. i. g. As noted in connection with catalytic reforming zone 28, the present reforming zone 44 may comprise one or more separate catalytic chambers having suitable heaters or heating means incorporated therebetween so as to provide suitable reforming conditions and maximum conversion to high octane fractions. Also, an improved platinum-alumina-combined halogen catalyst is preferably used in the reforming zone 44.

The resulting reformed fraction from zone 44 passes by way of line 45 and valve 46 to a cooler 47 and from the latter by way of line 48 into a separator 49. From the latter a liquid hydrocarbon stream of high toluene and xylene concentrations is passed by way of line 50 and valve 51, while a gaseous hydrogen-containing stream is discharged from the upper portion of the chamber by way of line 25 and valve 52. In accordance with a particular feature of the present operation, it is to be noted that this hydrogen containing gaseous stream being discharged from separator 49 by way of line 25 is that which is combined with the light straight-run cut and the intermediate boiling point cracked gasoline cut and passing to reforming zone 28. The operating pressures are controlled so that there is no compressor required in line 25 to maintain the hydrogen recycle stream. In other words, reforming zone 28 operates at a lower pressure than reforming zone 44 and the compressor 41 provides a high pressure for the hydrogen stream leaving the separator 33 suitable to maintain pressure through reforming zone 44, through the cooler 47 and the separator 49 and thus permit the recycle of the hydrogen stream, by way of line 25, back into the first catalytic reforming zone 28.

In accordance with a further portion of the present combined operation, the high boiling straight-run cut, being withdrawn by way of line 14 from column 11, passes in admixture with hydrogen obtained from line 54 through heater 53 and charge line 55 to a third catalytic reforming zone 56. In zone 56, the high boiling cut is subjected to more severe reforming conditions, say at a temperature of about 900° F. or within the range of from about 800° F. to about 950° F., and a pressure above 500 p. s. i. g., say at about 700 p. s. i. g., or within the range of from about 500 to 800 p. s. i. g. As in the other separate reforming zones, the present high boiling cut contacts preferably a platinum-alumina-combined halogen catalyst suitable to provide overall reforming including dehydrogenation and isomerization and hydrocracking, with resulting optimum conversions to high octane materials in a manner where each zone is substantially non-regenerative. In this instance, the resulting reformed stream from zone 56 passes without additional heat directly to a catalytic hydrogenation zone 57, by way of line 58, while in admixture with the low boiling cut of cracked gasoline being discharged by way of line 16 and passing by way of a suitable heater or exchanger 59 and line 60. In other words, the olefinic cracked gasoline fraction from the fractionator 6 is combined with the reformed stream obtained from the high boiling cut of the straight-run charge stream and the mixture is subjected to catalytic hydrogenation in the zone 57 whereby to effect the saturation of the olefinic components in the stream.

The resulting reformed and saturated product stream from the hydrogenation zone 57 passes by way of line 61 to cooler 62 and through line 63 into a suitable separating chamber 64. From separator 64, a gaseous hydrogen-containing stream is discharged by way of line 65

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and valve 66 while the liquid hydrocarbon reformat stream passes by way of line 67 and valve 68 to fractionating means. A second hydrogen recycle system is provided in connection with the catalytic reforming zone 56 and the catalytic hydrogenation zone 57. As indicated, the hydrogen stream in line 65 is compressed in a suitable compressor 69 and passed at least in part to the line 54, for introduction into heater 53 together with the high boiling straight-run gasoline fraction, as hereinbefore set forth. The compressor 69 in this instance provides a high pressure stream which may be introduced into the high pressure catalytic reforming zone 56. However, an excess portion of the hydrogen stream may be passed from line 54 through line 70 and valve 71 to hydrogen line 40, whereby the hydrogen may be introduced from one recycle system to the other.

The catalyst within the hydrogenation zone 57 may be of platinum-alumina-combined halogen catalyst such as utilized in the reforming zones, or it may be a combined platinum-alumina catalyst without the halogen component, or a cobalt-molybdate catalyst suitable for hydrogenation of an olefinic material. The platinum-alumina catalyst is, however, preferred in the present combined unit in order to provide catalytic zones which are substantially non-regenerative and which may be utilized for long periods of operation without replacement or reactivation. Also, the catalytic hydrogenation zone 57 is diagrammatic and may comprise one or more separate catalytic contacting chambers, as may be desired.

The light cracked gasoline fraction from chamber 6 may be heated in the heater 59 to a temperature of the order of about 700° F. and combined with the resulting reformed stream from the zone 56 and passing by way of line 58, in order that a resulting mixed stream may be introduced into the hydrogenation zone at a temperature of the order of about 700° F. or within the range of from about 700° F. to 800° F. The pressure maintained within the hydrogenation zone 57 is substantially the same as that within the reforming zone 56, i. e. within the range of from about 500 to 800 p. s. i. g.

In each of the catalytic contacting zones, it is desired to maintain a high hydrogen to hydrocarbon molal ratio in order to provide optimum conversion conditions and to prevent the excessive formation of carbon on the catalyst and a resulting deactivation thereof. The hydrogen to hydrocarbon molal ratio may be of the range of from about 1 to 12, but is preferably greater than about 2. The weight hourly space velocities in the various reforming zones (with space velocity being defined as the weight of hydrocarbon charge per hour per weight of catalyst in a reaction zone) may lie within the range of from about 0.5 to about 20, however, more generally may lie within the range of from about 2 to 4. The space velocity in the catalytic hydrogenation zone 57 is preferably maintained higher than that within the various catalytic reforming zones and is preferably greater than 4, say within the range of from about 4 to 10.

In accordance with the present invention, which combines catalytic reforming with fractionation in an integrated manner to provide desired blended high octane fuels, each of the resulting reformed gasoline streams are subjected to fractionation to provide at least high and low boiling components thereof. Thus, the reformed and saturated hydrocarbon stream from separator 64 and line 67 passes to a suitable fractionation zone 72 and is therein distilled and fractionated to provide an overhead stream of C<sub>5</sub> and lighter material which is discharged by way of line 73 and valve 74, while the bottom fraction passes by way of line 75 and valve 76 to a second fractionation zone 77. In the latter zone, the product stream is separated to provide an overhead cut boiling in the range of from about 115° F. to about 235° F., being withdrawn by way of line 78 and valve 79, while the higher boiling cut, within the range of from

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about 235° F. to about 400° F., is withdrawn by way of line 80 and valve 81.

The resulting reformed stream from the intermediate boiling point straight-run gasoline fraction, being withdrawn from separator 49 by way of line 50 is passed to a suitable fractionator 82, where C<sub>5</sub> and lighter fractions may be discharged and removed by way of line 83 and valve 84. The bottoms fraction passes by way of line 85 and valve 86 to another fractionating and distilling column 87 from which a light overhead cut boiling in the range of from about 115° F. to about 270° F. is discharged by way of line 88 and valve 89. The higher boiling cut, boiling in the range of from about 270° F. and higher, and consisting primarily of xylenes is discharged from the lower portion of fractionator 87 by way of line 90 and valve 91.

In a similar manner, the resulting reformed fractions from separator 33 are passed by way of line 34 to a fractionating column 92. The pentane and lighter materials are discharged through line 93 and valve 94, while a heavier bottoms fraction is passed by way of line 95 and valve 96 into a second fractionating column 97. In column 97, the materials are separated to provide a light overhead cut boiling in the range of from about 115° F. to about 220° F., being discharged by way of line 98 and valve 99, while the higher boiling cut, having materials boiling in the range of from about 220° F. and higher, is discharged by way of line 100 and valve 101. Although not indicated in the embodiment of this drawing, it is to be noted that the pentane and lighter cuts from each of the fractionating zones 72, 82 and 92 may be further fractionated to provide normal pentane and isopentane fractions. The n-pentane may be in part introduced into one or more of the different catalytic reforming zones to undergo isomerization and the formation of higher octane fractions, while all or a portion of the isopentane may be blended into the aviation fuel blending zone, being provided as will hereinafter be set forth.

Still further, in accordance with the present combined operation, the various resulting product streams are blended to provide both motor fuel and aviation fuel streams. The high boiling 300° F. to 400° F. cracked gasoline or naphtha stream withdrawn from fractionator 20 by way of line 23 is passed to a suitable blending zone 102 together with the high boiling reformed fraction from column 77 and line 80, and noted as boiling in the range of from about 235° F. to about 400° F. Also, the light or low boiling point fractions containing benzene and toluene from each of the fractionators 37 and 97, and passing by way of lines 38 and 98 respectively, pass to the blending zone 102 by way of line 23. There is thus provided within the blending zone 102 a superior and desirable high octane fuel which may be withdrawn by way of line 103 and valve 104 for passage to storage or other such zone as may be desired.

The higher boiling aromatic streams containing toluene and xylene from each of the fractionators 87 and 97 and passing by way of lines 90 and 100 respectively, are introduced into a suitable aviation fuel blending zone 105. Also, blending with these higher boiling aromatic concentrates is a low boiling fraction, in the range of from about 150° F. to about 235° F., from fractionating column 77 and line 78 and containing isoparaffins, benzene and some toluene, while isopentane is indicated as being introduced directly into the blending zone 105 by way of line 106 and valve 107. There is thus provided a blended aviation fuel within zone 105 which makes it possible to provide an aviation fuel of superior performance and normally meeting the 115-145 grade requirements. Such superior aviation fuel may be withdrawn and passed to storage by way of a line 108 and valve 109, or passed to another desired zone.

The present combined reforming operation is of course not to be limited by the present drawing, for the latter

is diagrammatic only. Nor is the specific operation with respect to boiling points of particular cuts or fractions to be considered limiting, for obviously, minor variations in carrying out the fractionation to obtain the various low, intermediate, and high boiling point cuts may be made in accordance with the present combined and integrated operation to provide both motor fuel and aviation fuel of high octane. No pumps have been shown in the drawing, however, necessary pumps, and additional valves, as well as reboilers and the like, are of course to be incorporated in all units as may be required.

We claim as our invention:

1. An integrated and combined process for reforming both straight-run and cracked gasoline fractions to provide high octane number fuels, which comprises, fractionating each of the straight-run and cracked gasoline fractions to provide low, intermediate, and high boiling fractions, combining the low boiling straight-run fraction with the intermediate boiling cracked fraction and subjecting the mixture to reforming in the presence of a reforming catalyst within a first reforming zone, subjecting the resulting intermediate straight-run fraction to reforming in a second catalytic reforming zone, subjecting the resulting high boiling straight-run fraction to reforming in a third reforming zone and passing the resulting stream with hydrogen and without additional heating into a hydrogenation zone in admixture with the low boiling cracked gasoline fraction, contacting said mixture with a sulfur resistant hydrogenation catalyst in said hydrogenation zone in a manner effecting the saturation of olefinic components of said stream, independently separating and fractionating the resulting reformed streams from each of said first and second reforming zones and from said hydrogenation zone in a manner providing high and low boiling fractions, blending the untreated high boiling cracked fraction with the resulting low boiling fractions from said first and second reforming steps and with the high boiling fraction from said hydrogenation step to provide a desirable premium motor fuel, and blending the low boiling fraction from said hydrogenation step with both the resulting high boiling fractions separated from said first and second reforming zones to provide a premium aviation fuel.

2. An integrated and combined process for reforming straight-run and cracked gasoline fractions to provide high octane number fuels, which comprises, separately fractionating the straight-run and cracked gasoline fractions to provide low boiling, intermediate boiling, and high boiling fractions, combining the resulting low boiling straight-run fraction with the intermediate boiling cracked fraction and subjecting the mixture to reforming in the presence of hydrogen and a platinum-alumina-combined halogen catalyst in a first reforming zone, separating a gaseous hydrogen-containing stream from the resultant reformed products, subjecting the intermediate straight run fraction to reforming in the presence of said hydrogen stream separated from first said reforming zone and while in contact with a platinum-alumina-combined halogen catalyst in a second reforming zone, cooling and separating the resulting reformed stream to provide a gaseous hydrogen containing stream and a liquid aromatic containing hydrocarbon stream, subjecting the high boiling straight-run fraction to reforming in the presence of a recycle hydrogen stream and in contact with a platinum-alumina-combined halogen catalyst in a third reforming zone, passing the resulting stream from said third reforming zone and without additional heating into a hydrogenation zone in admixture with the low boiling cracked gasoline fraction, said mixture contacting a sulfur resistance platinum-alumina catalyst in said hydrogenation zone and effecting the saturation of olefinic components of said stream, cooling and separating the resulting reformed and saturated stream to provide a gaseous hydrogen containing stream and a liquid hydrocarbon stream, with said hydrogen containing stream being recycled into admixture with said high boiling

straight-run fraction as said hydrogen recycle stream, and further recycling at least a portion of said gaseous hydrogen containing stream being separated from said second reforming zone into admixture with said low boiling straight run-fraction and said intermediate boiling cracked fraction to provide the aforesaid hydrogen passing to said first reforming zone, independently separating and fractionating the resulting reformed streams from each of said first and second reforming zones and from said hydrogenation zone in a manner providing high and low boiling fractions, blending the untreated high boiling cracked fraction with the resulting low boiling reformed fractions from said first and second reforming zones and with the low boiling reformed fraction from said hydrogenation step whereby to provide a desirable premium motor fuel, and blending the low boiling fraction from said hydrogenation step with both of the resulting high boiling reformed fractions separated from said first and second reforming zones whereby to provide a premium aviation fuel.

3. The method of claim 2 further characterized in that said straight-run and cracked gasoline fractions are depentanized prior to fractionation into said low, intermediate and high boiling fractions, and the resulting reformed streams from each of said separate reforming zones are depentanized prior to providing said low and high boiling reformed fractions being blended into said motor and aviation fuels.

4. An integrated and combined process for reforming straight-run and cracked gasoline fractions to provide high octane fuels, which comprises, separately fractionating the straight-run and cracked gasoline fractions to provide low boiling, intermediate boiling, and high boiling fractions of each, combining the resulting low boiling straight-run fraction with the intermediate cracked fraction and subjecting the mixture to reforming at a temperature of the order of about 900° F. and a pressure of less than about 400 p. s. i. g. while in the presence of hydrogen obtained as hereinafter set forth and while in contact with a platinum-alumina-combined halogen catalyst in a first reforming zone, separating the resulting reformed stream into a gaseous hydrogen containing stream and a liquid aromatic containing stream, subjecting the intermediate straight-run fraction to reforming in the presence of said hydrogen stream separated from first said reforming zone at a temperature of the order of about 900° F. and a pressure of less than about 500 p. s. i. g. but greater than the pressure maintained in first said reforming zone and while in contact with a platinum-alumina-combined halogen catalyst within a second reforming zone, cooling and separating the resulting reformed stream to provide a gaseous hydrogen containing stream and a liquid stream containing aromatic hydrocarbons, subjecting the high boiling straight-run fraction to reforming in the presence of a recycle hydrogen stream at a temperature of the order of 900° F. and a pressure greater than about 500 p. s. i. g. while in contact with a platinum-alumina-catalyst maintained in a third reforming zone, passing the resulting stream from last said reforming zone and without additional heating into a hydrogenation zone in admixture with the low boiling cracked gasoline fraction, said mixture contacting a platinum-alumina catalyst at a temperature of the order of about 700° F. and a pressure greater than about 500 p. s. i. g. within said hydrogenation zone, effecting the saturation of olefinic components of said combined stream in said zone, cooling and separating the resulting reformed and saturated stream to provide a gaseous hydrogen containing stream and a liquid hydrocarbon stream, said hydrogen containing stream being recycled at least in part into admixture with said high boiling straight-run fraction as said hydrogen recycle stream, and further recycling at least a portion of said gaseous hydrogen containing stream being separated from said second reforming zone into admixture with said low boiling straight-run fraction and said intermediate boiling

cracked fraction to provide the aforesaid hydrogen passing to said first reforming zone, independently separating and fractionating the resulting reformed streams from each of said first and second reforming zones and from said hydrogenation zone in a manner providing depentanized high and low boiling fractions, blending the untreated high boiling cracked fraction with the resulting low boiling reformed fractions from said first and second reforming zones and with the high boiling reformed fractions from said hydrogenation step whereby to provide a desirable premium motor fuel, and blending the low boiling fraction from said hydrogenation step with both of the resulting high boiling reformed fractions separated from said first and second reforming zones whereby to provide a premium aviation fuel.

5. The method of claim 4 further characterized in that the hydrogen containing gaseous stream separated from said first reforming zone is compressed and raised to an elevated pressure of less than about 500 p. s. i. g. and sufficient to pass into said second reforming zone, and the resulting hydrogen containing gaseous stream separated from said reformed stream from second reforming zone is subsequently passed without an increase to pressure into first said reforming zone at a pressure less than that maintained in second reforming zone.

6. The method of claim 4 further characterized in that said straight-run gasoline fraction is fractionated to provide a low boiling cut boiling within the range of from about 115° F. to about 220° F., an intermediate cut boiling in the range of from about 220° F. to about 270° F., and a high boiling cut having a boiling range of from about 270° F. to about 400° F., and said cracked gasoline fraction is fractionated to provide a low boiling cut having a boiling point range of from about 115° F., to about 220° F., an intermediate cut boiling in the range of from about 220° F. to about 300° F., and a high boiling cut having a boiling range of from about 300° F. to about 400° F.

7. The method of claim 4 further characterized in that each of said reforming streams from said separate reforming zones are fractionated to remove pentanes and higher materials prior to separating said streams into low and high boiling reformed fractions, and said pentanes and lighter materials are subsequently fractionated to provide an isopentane stream, and at least a portion of said isopentane is blended with said low boiling fraction from said hydrogenation step and the high boiling reformed fractions from said first and second reforming zones to provide said premium aviation fuel.

8. A process for producing high octane number fuels which comprises separately fractionating a straight-run gasoline and a cracked gasoline and separating from each of the gasolines a light, an intermediate and a heavy fraction, combining the light straight-run fraction with the intermediate cracked fraction and reforming the mixture in a first zone, separately reforming the intermediate

straight-run fraction in a second zone, reforming the heavy straight-run fraction in a third zone, introducing the reformed products from the third zone, the light fraction of said cracked gasoline and hydrogen into a hydrogenation zone and therein saturating olefins with hydrogen, independently fractionating the products from each of said first and second zones and said hydrogenation zone and separating from each of the product streams a light fraction and a heavy fraction, blending the untreated heavy fraction of said cracked gasoline with the light product fractions from said first and second zones and with the heavy product fraction from said hydrogenation zone to form a motor fuel, and blending the light product fraction from said hydrogenation zone with the heavy product fractions from said first and second zones to form an aviation fuel.

9. The process of claim 8 further characterized in that each of the reforming steps is effected in the presence of hydrogen, with hydrogen being passed from the first to the second zone and being recycled from the second to the first zone, and still further characterized in that a hydrogen-containing gas is separated from the products of said hydrogenation zone and at least a portion thereof supplied to said third zone.

10. The process of claim 1 further characterized in that the reforming in each of said first, second and third zones is effected in the presence of hydrogen and platinum-containing catalyst.

11. The process of claim 1 further characterized in that the reforming in each of said first, second and third zones is effected in the presence of hydrogen and platinum-alumina-combined halogen catalyst.

12. The process of claim 8 further characterized in that the reforming in each of said first, second and third zones is effected in the presence of hydrogen and platinum-containing catalyst.

13. The process of claim 8 further characterized in that the reforming in each of said first, second and third zones is effected in the presence of hydrogen and platinum-alumina-combined halogen catalyst.

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