July 28, 1970 H. R. IRELAND 3,522,169

METHOD OF PRODUCING A BLENDED JET FUEL

Filed June 14, 1968 2 Sheets-Sheet 1

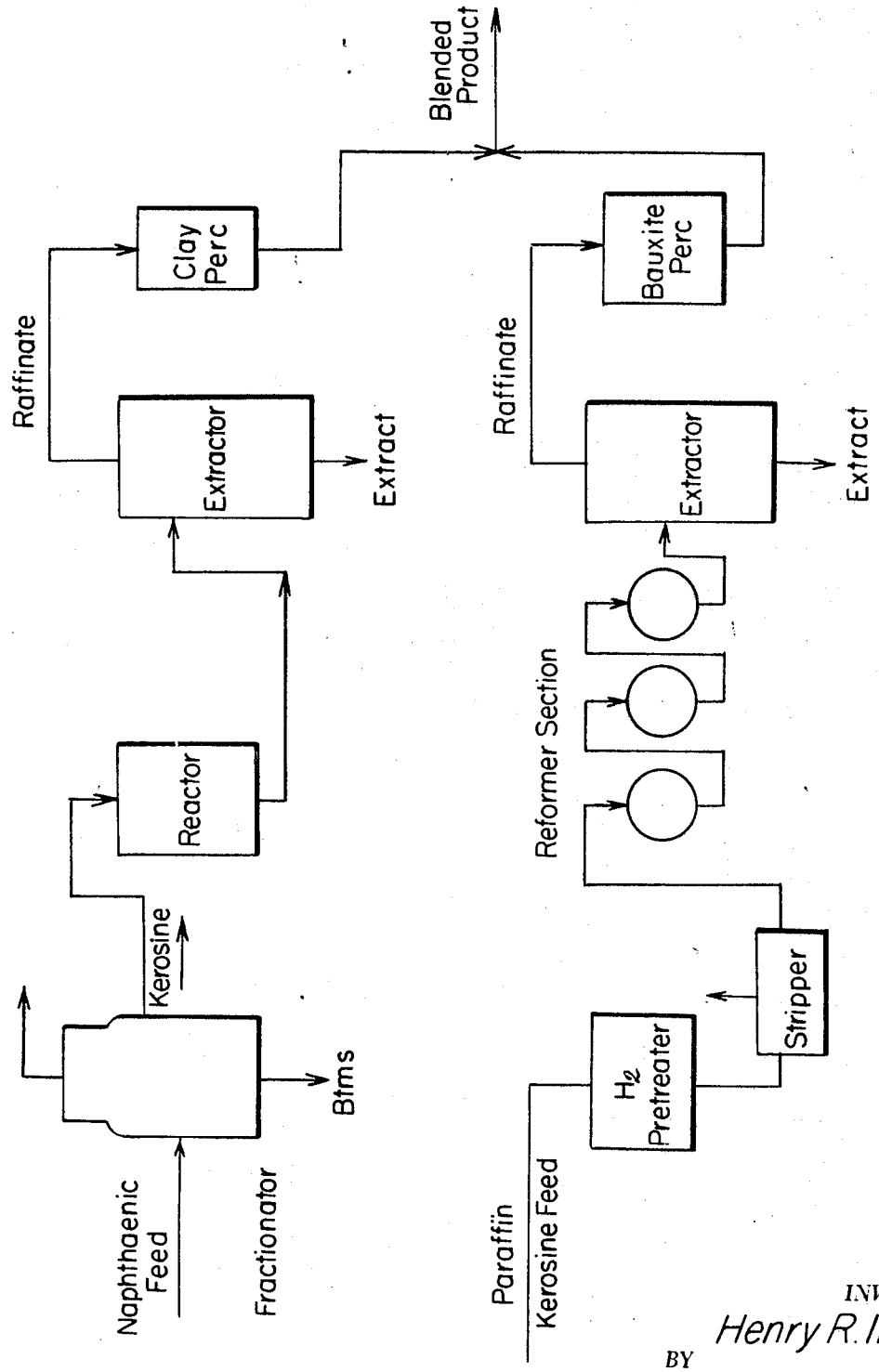

FIG. 1

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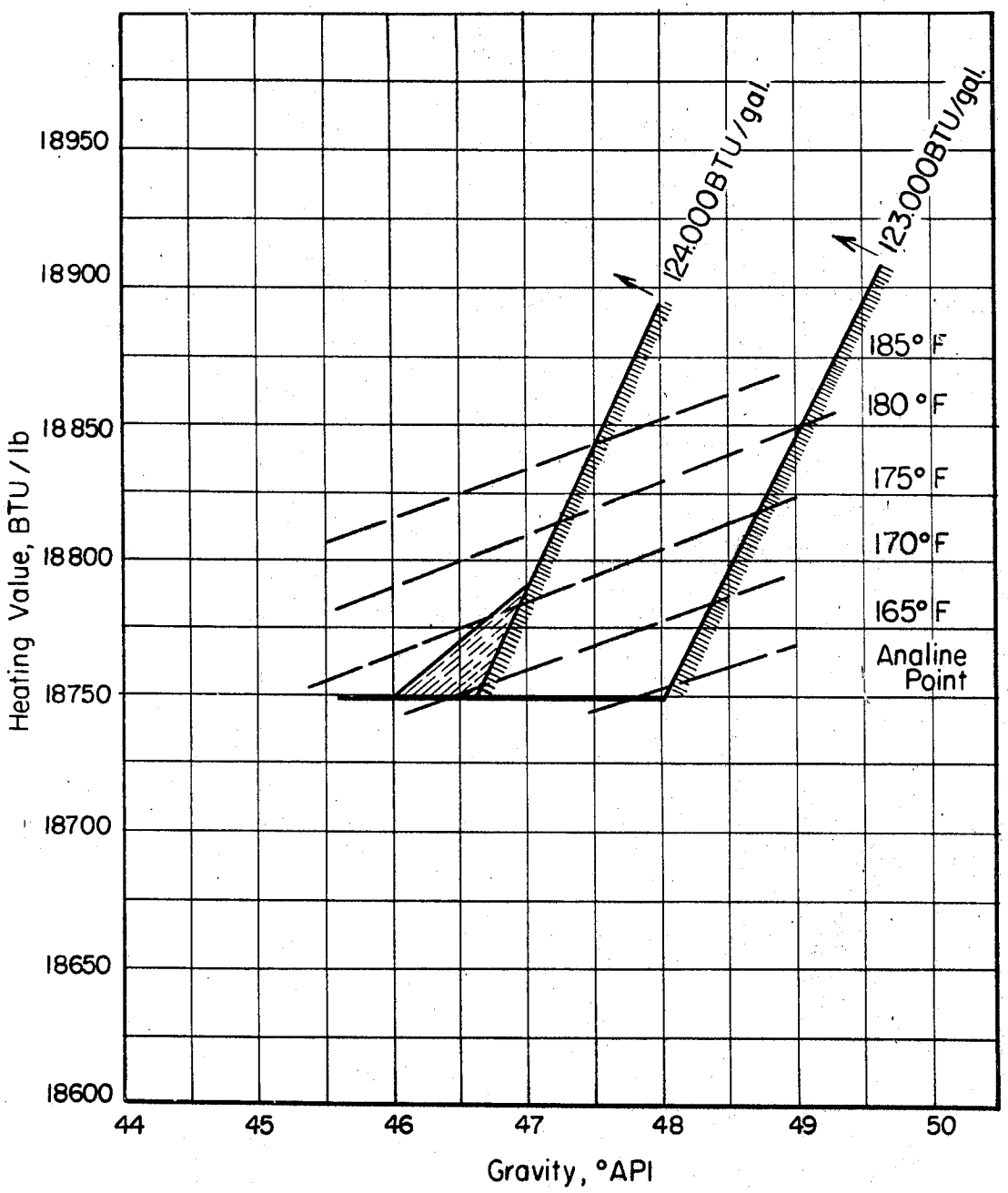
FIG. 2



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United States Patent Office

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METHOD OF PRODUCING A BLENDED JET FUEL

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ABSTRACT OF THE DISCLOSURE

Jet fuel having a low freeze point, e.g., —50° F., and high heat of combustion per gallon, e.g. about 124,000 B.t.u./gal., is produced by blending (1) a highly naphthenic jet fuel component having an advantageously very low freeze point but low heat of combustion on a pound basis with (2) a highly paraffinic jet fuel component having a high heat of combustion on a pound basis in excess of that desired in the blended product.

The present invention relates to the production of jet fuel. More particularly, this invention relates to the production of jet fuels having low freeze point and high energy content both on a weight basis (B.tu./lb.) and on a volume basis (B.t.u./gal.).

As is well known, a jet fuel should have high temperature stability, high energy content, and good handling characteristics at both low and high temperatures. An acceptable jet fuel must meet rather rigid specifications for either military or commercial use. With the passage of time, these requirements have become more demanding. For military use, there is a present need for an economical jet fuel which has a high energy content per gallon in order to increase the operating range of the aircraft, and a lower freeze point than exhibited by most prior art fuels in order to improve in air refueling of the aircraft. By way of example, a new military jet fuel specification includes the following requirements:

Gravity, °API	44–50
Freeze point, ° F., max.	—50
Heat of combustion:	
B.t.u./lb. min.	18,750
B.t.u./gal. min.	124,000
Luminometer number, min.	75
Vapor pressure, p.s.i.g. and 300° F., max.	2.7
Aromatics, vol. percent, max.	5.0
Thermal stability (300/500/600° F.):	
Pressure change, in Hg, max.	5
Preheater deposit code, max.	2
Thermal Precipitation Test	Pass

Certain of the above specifications, for example, the heats of combustion, and the low freeze point, as well as restrictions upon the boiling point distribltion and vapor pressure of the fuel, in combination, can be satisfied only by a fuel having a narrowly defined composition. As an illustration of the interplay of these specifications, those skilled in the art will appreciate that a heat of combustion of 18,750 B.t.u./pound is not of itself particularly demanding and can be met by many known jet fuel compositions. However, the further requirement that the fuel must have a heat of combustion of 124,000 B.t.u./gallon eliminates many compositions which have the required heat of combustion on a pound basis. Fuels having a high A.P.I. gravity are characterized by less weight per gallon, and since the heat of combustion per gallon is based upon the weight per gallon together with the number of B.t.u. per unit weight, a low A.P.I. gravity is desirable with respect to obtaining high heat of combustion on a gallon basis. On the other hand, the heat of combustion per pound is ordinarily estimated as the product of the A.P.I. gravity and the aniline number (aniline-gravity product) so that a reduction in the A.P.I. gravity lowers the number of B.t.u. per pound.

It is a primary object of the present invention to provide a novel jet fuel composition which is a blend of a naphthenic jet fuel component with a highly paraffinic jet fuel component, with the final product having desirable fuel properties which are intermediate between the properties of the two individual components. The naphthenic component has a low freeze point and, when employed with a relatively high freeze point paraffinic component, is used to lower the freeze point of the blended product. The naphthenic component is also used because it has a high volumetric heat of combustion. However, the naphthenic fuel component has a low heat of combustion on a pound basis, below that desired in the final product. A presently preferred paraffinic fuel component has a relatively high freeze point, and is employed primarily since it has a heat of combustion on a pound basis in excess of that desired in the blended product. By blending a naphthenic component and a paraffinic component. it is possible to obtain a jet fuel composition which will meet standards which could not be met by either the naphthenic component alone or the paraffinic component alone or by minor modification of either component.

The relative amounts of the two components which are blended varies somewhat depending upon the properties of each component and the properties desired in the final product. In general, the naphthenic component and the paraffinic component are present in a volume ratio of about 35:65 to 60:40.

It is a further object of the present invention to provide a jet fuel composition having a freeze point of a maximum of about —50° F., a heat of combustion of at least about 18,750 B.t.u./pound, and a heat of combustion of at least about 124,000 B.t.u./gallon.

In accordance with a preferred embodiment of the invention, a naphthenic jet fuel component containing about 67 to 89 vol. percent naphthenes, about 8 to 30 vol. percent paraffins, and less than about 5 vol. percent aromatics, and preferably less than about 3 vol. percent, is prepared by fractioning a highly naphthenic crude oil to obtain a kerosene fraction boiling in the range of about 380–530° F. hydrotreating the kerosene fraction in the presence of a hydrotreating catalyst to remove sulfur and nitrogen compounds to thereby improve the thermal stability of the kerosene fraction, separating the resulting normally gaseous and normally liquid fractions, and removing at least a substantial portion of the aromatic hydrocarbons from the liquid fraction, for example, by sulfur dioxide extraction, to obtain the desired naphthenic

jet fuel component. The naphthenic component is blended with a paraffinic jet fuel component containing about 3–17 vol. percent naphthenes, up to about 5 vol. percent preferably, about 2–3 vol. percent aromatics, and the remainder being substantially paraffins. The paraffinic-component has a heat of combustion of about 18,850–18,960 B.t.u./pound. The paraffinic jet fuel component is prepared by refining a kerosene fraction containing at least about 40% (vol.) paraffins at a temperature of about 790°–870° F. under conditions to dehydrogenate and isomerize naphthenes and to isomerize normal paraffins while maintaining at least 75% paraffin retention, separating the normally gaseous and normally liquid fractions from the refining treatment, extracting at least a substantial portion of the aromatic hydrocarbons from the liquid fraction, for example, by sulfur dioxide extraction, to obtain a raffinate comprising the paraffinic jet fuel component.

The blended jet fuel composition has a heat of combustion of at least about 123,000 B.t.u./gallon, preferably 124,000 B.t.u./gallon and a heat of combustion on a pound basis of at least about 18,700 B.t.u./pound, preferably 18,750 B.t.u./pound, and a freeze point of a maximum of about −50° F.

The invention will be described in further detail in connection with the accompanying drawings in which:

FIG. 1 is a simplified flow sheet of a process for preparing a jet fuel composition in accordance with the invention; and

FIG. 2 is a graph illustrating the relationship between the A.P.I. gravity of the product and the heat of combustion of the product.

Referring now to the drawing, and more particularly to FIG. 1, a preferred embodiment of the invention will now be described.

PRODUCTION OF NAPHTHENIC FUEL COMPONENT

The naphthenic fuel component of the invention is prepared by fractionally distilling a suitable highly naphthenic hydrocarbon charge in a fractionator to obtain for further processing a kerosene fraction boiling within the range of 380–530° F. The hydrocarbon charge should have a paraffin content of less than about 30 volume percent, preferably in the range of about 5 to 20 vol. percent paraffins. Suitable feed stocks are a mixture of three California crudes (Cal. mix), and a stock known as Coastal A. These feed stocks have the following approximate composition and properties.

	Coastal A	Cal. Mix
Properties:		
Gravity, ° API	32.0	35.1
Aniline Point, ° F	130	130.8
Freeze Point, ° F	<−76	<−76
Composition:		
Paraffins, vol. percent	9	16
Naphthenes, vol. percent	79	65
Aromatics, vol. percent	12	19
Distillation ASTM, ° F.:		
IBP	399	371
10	417	407
50	443	445
90	488	496
End point	527	530

The kerosene fraction is passed from the fractionator to a multiple zone reactor where the kerosene fraction is hydrotreated to improve its thermal stability by hydrogenation of olefins, if present, and removal of nitrogen and sulfur compounds and other impurities, for example, by hydrogenation of pyridine to ammonia and by hydrogenation of thiophene to hydrogen sulfide. The hydrogenation is carried out in the presence of a catalyst which may be a known catalyst employed for treatment of petroleum fractions in order to hydrogenate olefins, to hydrodesulfurize, etc. Examples of such catalysts are Group VI and Group VIII metals, oxides and sulfides, usually supported upon an inert porous carrier such as activated alumina. Mixtures of Groups VI and VIII metal oxides and sulfides are particularly advantageous. Exemplary catalysts include cobalt molybdate and nickel molybdate on alumina which are the particularly preferred catalysts of the invention.

The hydrogenation and desulfurization treatment is carried out at temperatures between 550 and 750° F., preferably between about 580–675° F. and at a space velocity of up to 5.0, a hydrogen partial pressure of about 450 to 800 p.s.i.g., and a hydrogen recyycle rate of about 500–3000 s.c.f./bbl. Although not illustrated on the simplified flow sheet, it will be understood that the products from the reactor are passed to a separator from which hydrogen is recycle, preferably after removal of hydrogen sulfide and other impurities; and after stripping off light ends the normally liquid fraction is passed to an extractor. In the extractor, the liquid fraction is contacted with a suitable solvent which is selective for aromatic hydrocarbons, for example, sulfur dioxide, which is the preferred solvent. The conditions employed during the solvent extraction are substantially conventional. Thus, when employing liquid sulfur dioxide as the solvent, the sulfur dioxide may be employed in a ratio of about 100 to about 300 volume percent based on the fraction being extracted, and the temperature may be in the range of about −20 to 50° F.

The raffinate from the extractor is then percolated for example through clay, or bauxite to yield a highly naphthenic jet fuel component containing about 67 to 89 vol. percent naphthenes, about 8 to 30 vol. percent paraffins, and less than about 3 percent aromatics.

The naphthenic jet fuel component has a freeze point less than that of the freeze point desired in the final blended product and is usually in the range of less than −76° to −60° F., preferably below −68° F. The naphthenic jet fuel component has a net heat of combustion of less than about 18,700 B.t.u./pound.

PRODUCTION OF PARAFFINIC FUEL COMPONENT

Perhaps the principal functions of the paraffinic jet fuel component are to elevate the heat of combustion in B.t.u./lb. and luminometer number of the blended final product. In accordance with the present invention, the paraffinic component is prepared from selected petroleum hydrocarbon fractions of the kerosene type composed substantially of hydrocarbon mixtures boiling in the range from about 370 to about 550° F., preferably from about 380 to about 530° F., and containing at least about 40 weight percent paraffins. Specific embodiments of suitable feed stocks include straight run kerosene fractions of the following compositions:

ASTM BOILING RANGE (375–500° F.)

	Mid-Continent		Barco		W. Texas	
	Wt.	Vol.	Wt.	Vol.	Wt.	Vol.
Paraffins	39.9	42.7	42.4	45.1	58.6	61.0
Naphthenes	43.1	42.1	43.3	42.0	33.2	31.8
Aromatics	17.0	15.2	14.3	12.9	8.2	7.1

The kerosene fractions described above are subjected to a low temperature mild catalytic refining treatment carried out under correlated reaction conditions in the presence of a dehydrogenation catalyst such that the predominant reactions are dehydrogenation of naphthenes and isomerization of normal paraffins in the feed stock with at least 75% paraffins retention; that is, cracking is minimized. The resulting liquid fraction which boils generally within the same range as the feed is then solvent extracted to remove at least a substantial amount of the aromatics, which aromatics may be those originally present in the feed as well as those formed during the refining treatment, to provide a raffinate constituting the paraffinic jet fuel component.

Where necessary, the feed stocks may be treated prior to the refining to remove impurities which would contaminate the catalysts used in the refining treatment and/or which would cause corrosion problems. Thus, feed stocks containing a relatively high concentration of sulfur are preferably pretreated to reduce the sulfur concentration to not more than about 20 parts per million, along with substantially complete removal, when present, of other undesirable impurities including nitrogen, arsenic and lead. To effect this removal, the feed stock may be subjected to hydrodesulfurization by treatment with a suitable hydrodesulfurization catalyst (e.g. cobalt molybdate on alumina, nickel-tungsten sulfide, chromia on alumina etc.) in the presence of hydrogen and conditions of pressure, space velocity and temperature to reduce the concentration of the aforementioned impurities. The following conditions are illustrative of those suitable for pretreatment of feed stocks of the invention and particularly for treatment of a 375–500° F. virgin kerosene from W. Texas Crude employing a cobalt molybdate hydrodesulfurization catalyst.

Space velocity (LHSV)	4
Hydrogen partial pressure, p.s.i.g.	450
Temperature, ° F.	700
Hydrogen circulation rate (s.c.f./bbl.)	1000

It will be understood that the desulfurization conditions may be varied depending upon the particular feed stock employed, and suitable more general operating conditions are indicated below.

Space velocity (LHSV)	0.5–10
Hydrogen partial pressure (p.s.i.g.)	250–800
Temperature, ° F.	600–800
Hydrogen circulation rate (s.c.f./bbl.)	190–3000

Following the desulfurization pretreatment, the reaction products are passed to a stripper where the gaseous phase rich in hydrogen, and containing substantially all of the hydrogen sulfide and ammonia produced in the pretreater, is stripped from the liquid phase, for example, by employing a stream of recycle gas from the reformer. The liquid phase is then passed to a multistage reformer which, for the purpose of illustration, is shown in FIG. 1 as having three stages.

In the reformer, the feed stock is subjected to mild catalytic treatment under correlated conditions to provide selective dehydrogenation of C_6 ring naphthenes to aromatics, isomerization of alkyl C_5 ring naphthenes to C_6 ring naphthenes which are then aromatized, and isomerization of normal paraffins to isoparaffins, while minimizing cracking. The conditions are correlated to obtain at least 75% paraffin retention, and preferably at least about 95% paraffin retention.

The reformer treatment conditions can be varied depending upon the particular feed stock employed, and upon the desired properties of the paraffinic fuel component to be produced, which properties are correlated with the properties of the particular naphthenic fuel component which will be blended therewith to obtain the final blended product. In general, the conditions are within the following ranges:

Space velocity (LHSV)	0.5–6
H_2/feed, s.c.f./bbl.	4000–10,000
Average temperature, ° F.	790–870
Hydrogen pressure, p.s.i.	300–800

In the illustrated embodiment in which the catalytic treatment is carried out in three stages, in the first stage, the feed stock is treated under conditions to effect substantial naphthene isomerization and dehydrogenation with only a nominal amount of other reactions such as cracking or isomerization of paraffins. The temperature of the feed entering the first stage may be about 870° F. while the temperature of the fraction leaving the first stage is in the order of 790° F. since the dehydrogenation reaction consumes heat. It will be understood that reference to a three stage treatment is intended to include different catalytic reaction zones within a single reactor, or in separate reactors, each of which contains a catalyst (e.g. a bed of catalyst), with the reaction zones being interconnected by transfer lines for the passage of product from one reaction zone to the other, which transfer lines are equipped with heaters for heating the product from one reaction zone prior to its introduction into the succeeding reaction zone. In the second and third reaction zones, the conditions are regulated to achieve primarily isomerization of normal paraffins to isoparaffins accompanied by some further dehydrogenation of any naphthenes which may still be present. The feed to the second reaction zone may be heated to about 830° F., and the product leaving the second reaction zone which may be at a temperature of about 810° F. is preferably again reheated, for example, to about 820° F. before introduction into the third reaction zone. The product from the third reaction zone may be at a temperature of about 810° F.

It will be understood that, for any given kerosene feed stock passed to the reformer, as the average reaction temperature employed increases from the lower to the higher side of the stated temperature range, the space velocities generally increase within the stated range. In addition, as the catalyst ages, the temperature is generally increased at constant space velocity, or alternatively, the space velocity is decreased while maintaining a substantially constant average temperature in order to maintain a substantially constant quality of reformed product.

The catalyst employed in the reformer is a dehydrogenation catalyst having selectivity for the isomerization and the dehydrogenation of naphthenes, and having low cracking activity.

For the catalytic treatment of the feed stocks embodied suitable catalysts are metals of the platinum series and particularly, platinum, on carriers such as alumina. Specific examples thereof are catalysts, of low cracking activity, comprising from about 0.1 to about 1.0 percent platinum on alumina (e.g. eta alumina) or on a low activity silica-alumina base and which may contain a suitable halogen (e.g. chlorine) in an amount of up to about 1.0% and, preferably, in an amount not greater than the platinum content, and preferably lower. Such catalysts that contain from about 0.3 to about 0.8% platinum are particularly suitable. In a broader aspect, however, suitable for use herein are catalysts which, as is known to those skilled in the art, possess activity for dehydrogenating naphthenes to aromatics and are of low cracking activity and, as further examples, such catalysts include tungsten and/or nickel on kieselguhr, chromium oxide on alumina, and others.

The reformate is passed to an extractor for reduction of the aromatic concentration, for example, by extraction with liquid sulfur dioxide. The conditions employed during the solvent extraction may be substantially the same as those employed during the corresponding step in treating the naphthenic jet fuel component, that is, when sulfur dioxide is the solvent, the sulfur dioxide may be

employed in a ratio of about 100 to about 300 volume percent, based on the fraction being extracted, at a temperature in the range of about —20 to 50° F.

The raffinate from the extractor is then percolated through bauxite to improve its thermal stability and to yield the desired paraffinic jet fuel component which, in its own right, has found use as a jet fuel meeting different specifications than those which are met by the blended product of the present application. The paraffinic jet fuel component of the invention contains about 3–17 vol. percent naphthenes, a maximum of about 5 vol. percent, preferably about 2–3 vol. percent aromatics, and has a freeze point in the order of about —40 to —45° F. and a heat of combustion of about 18,850–18,960 B.t.u./pound.

Other suitable paraffinic blending components include a hydrogenated heavy alkylate, and a paraffinic hydroisomerized product such as hydroisomerized wax or paraffinic hydrocrackate. The heavy alkylate blend stock is prepared by hydrogenating olefins in a heavy alkylate fraction boiling in the range of about 380–550° F. employing processing conditions substantially the same as those described above for the hydrogenation and desulfurization of the naphthenic stock. The paraffinic hydroisomerized product may be employed as is. These blend stocks have the advantage of having low freeze points. The properties of these blend stocks, and suitable hydrogenation conditions for the alkylate are set forth in the following table.

PROPERTIES OF PARAFFINIC BLEND STOCKS

	380–520° F. Heavy Alkylate		370–525° F. Hydrocrackate
Processing Conditions[1]—Hydrogenation of Olefins:			
H_2 Pressure, p.s.i.g.	450–800		
H_2 Recycle, s.c.f./b.	500–3,000		
LHSV, v./hr./v.	0.5–5.0		
Temperature, ° F.	550–750		
	Charge	Product	Product
Product Properties:			
Gravity, ° API	51.1	51.1	52.4
Aniline Point, ° F.	196	196	177.3
Luminometer No.	85	85	101
Heating Value, Btu.../lb.	18,866	18,864	18,917
Freeze Point, ° F.	<—76	<—76	<—76
Composition, vol. percent:			
Paraffins	85.0	87.0	87.2
Olefins	2.0		
Napthenes	12.0	12.0	11.0
Aromatics	1.8	1.0	1.8

[1] Cobalt Molybdate Catalyst.

BLENDING OF NAPHTHENIC AND PARAFFINIC COMPONENTS

In order to achieve a blended jet fuel composition having the desired properties, the naphthenic jet fuel component and the paraffinic jet fuel component are blended in a volume ratio of between about 35:65 to 60:40, and where it is intended to meet the aforementioned military specifications including the heat of combustion of about 124,000 B.t.u./gallon, these components are blended within the aforementioned ranges to give a product having a gravity of about 46.0 to 47.0° API.

In order to make the specification of 18,750 B.t.u./pound, the blended jet fuel should have a paraffin content between 50–62 vol. percent. About 50 vol. percent paraffins will make the specification when the amount of aromatics is about 2 vol. percent, this being a typical minimum aromatic content following sulfur dioxide extraction. A paraffin content of about 62 vol. percent will make the specification when the aromatics content is at its maximum permissible value of 5 vol. percent. In addition, at least about 50 vol. percent paraffins is required in the blended jet fuel in order to give a luminometer number of 75 or better as required by the specifications.

Referring to FIG. 2, in order to make the two heat of combustion specifications, it is necessary to operate above the 18,750 B.t.u./pound line and to the left of the 124,000 B.t.u./gal. line. In order for the blended product to have the necessary composition, the gravity must be maintained between 46.0 to 47.0° API. To meet these restrictions it is necessary to operate within the shaded area shown on FIG. 2.

In order to have a freeze point of —50° F. or less, the components should be blended to provide a product having a maximum of about 16.5% normal paraffins. It will be appreciated that, in addition to adjusting the relative amounts of the two components, the normal paraffin content may be varied by way of the treatment of the paraffinic component in the reformer to isomerize normal paraffins.

It will also be appreciated that, if specifications permit, conventional jet fuel additives may be added to the blended product. Such conventional additives include oxidation inhibitors and metal deactivators.

The invention will further be described with reference to the following example.

EXAMPLE

A naphthenic fuel component is prepared by introducing Cal. mix, the mixture of three California crudes as described previously, into a fractionator and recovering a kerosene fraction boiling within the range of 380–530° F. The kerosene fraction is passed to a reactor where it is hydrotreated at a hydrogen pressure of 650 p.s.i.a., a LHSV of 1.9 v./hr./v., a hydrogen circulation rate of 2000 s.c.f./bbl., a temperature of 626° F., and in the presence of a cobalt molybdate catalyst. The normally liquid fraction is recovered and passed to an extractor where aromatics are removed by sulfur dioxide extraction employing a ratio of sulfur dioxide of 250 vol. percent based on the fraction being extracted and a temperature of 4° F. The raffinate from the extractor is then percolated through clay to improve its thermal stability and to obtain the desired naphthenic jet fuel component.

A paraffinic fuel component is prepared from a straight run kerosene fraction which is pretreated to remove impurities in a pretreater at a hydrogen pressure of 700 p.s.i.a., a LHSV of 2.0, a hydrogen circulation rate of 2000 s.c.f./bbl., a temperature of 700° F., and in the presence of a cobalt molybdate hydrodesulfurization catalyst. After removal of the gaseous phase in a stripper, the normally liquid fraction is passed to a three stage reformer where isomerization and dehydrogenation of naphthenes and isomerization of paraffins is carried out with only nominal amounts of other reactions such as cracking. The feed enters the first stage of the multi stage reformer at a temperature of 870° F. and leaves at 790° F. After reheating to 830° F., the feed passes to the second zone from which it exits at 810° F., and is reheated to 820° F., for introduction into the third and last zone from which the product leaves at 810° F. The normally liquid product from the reformer is passed to an extractor where aromatics are removed by sulfur dioxide extraction employing sulfur dioxide in a ratio of 250 vol. percent based on the fraction being extracted, at a temperature of 4° F. The raffinate is then percolated through bauxite to improve its thermal stability and the desired paraffinic jet fuel component is thus obtained.

The naphthenic and paraffinic components are then blended to produce a blended jet fuel composition.

The properties of three blended jet fuel compositions prepared by blending naphthenic and paraffinic components as described above are set forth in the following table.

BLENDED JET FUEL COMPOSITIONS

	Blend 1	Blend 2	Blend 3
Components:			
Paraffinic Component, vol. percent	56.5	58.5	62
Naphthenic Component, vol. percent	43.5	41.5	
Topped Naphthenic Component, [1] vol. percent			38
Properties:			
Gravity, ° API	46.6	46.6	46.6
Aniline Point, ° F	170.0	170.5	172.3
Total Absorption, vol. percent	2.6	3.3	3.0
Heating Value:			
B.t.u./lb. (A×G)	18,753	18,755	18,765
B.t.u./lb. (Calorimeter)	18,770	18,760	18,780
B.t.u./gal	124,050	124,060	124,130
Freeze Point, ° F	−51	−51	−50
Freeze Point of Paraffinic Component, ° F	−40	−41	−45
Freeze Point of Naphthenic Component, ° F	−70	−68	−60
Distillation, ASTM, ° F.:			
IBP	370	377	411
10	409	405	421
20	418	411	424
50	433	426	437
70	447	441	449
90	476	470	476
EP	514	502	515

[1] Before blending, the naphthenic component was topped.

What is claimed is:

1. A process for preparing a jet fuel having a freeze point below about −40° F. and a heat of combustion on a weight basis of at least 18,700 B.t.u./pound which comprises:

(a) hydrotreating a naphthenic kerosine fraction containing less than about 30 vol. percent paraffins and boiling in the range of from about 380° F. to about 530° F. under conditions to provide a naphthenic jet fuel component of improved thermal stability.

(b) reforming a kerosine fraction containing at least about 40 vol. percent paraffins in the presence of a catalyst and operating conditions effective to dehydrogenate and isomerize naphthenes, isomerize paraffins and retain at least 75 vol. percent of the paraffins in the feed during isomerization thereof to produce a paraffinic product component, and

(c) blending said naphthenic jet fuel component with said paraffin product component after reduction in aromatic content in a volume ratio between about 35:65 to 60:40 to produce jet fuel having a heat of combustion of 124,000 B.t.u./gal., an aromatic content less than 5 vol. percent and a freeze point of at least −40° F.

2. A process according to claim 1, wherein said naphthenic jet fuel component contains about 67 to 89 vol. percent naphthenes, about 8 to 30 vol. percent paraffins, and less than about 5 vol. percent aromatics.

3. A process according to claim 1, wherein said paraffinic jet fuel component has a freeze point of about −40° to −45° F.

4. A process according to claim 1, wherein said naphthenic kerosine fraction is hydrotreated to improve its thermal stability at about 580 to 675° F. at a hydrogen pressure of about 450 to 800 p.s.i.a., and a liquid hourly space velocity of up to about 5.0.

5. The process of claim 1 wherein the preparation of product component according to (a) and (b) includes the step of extracting aromatics from the kerosine fuel with sulfur dioxide.

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HERBERT LEVINE, Primary Examiner

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