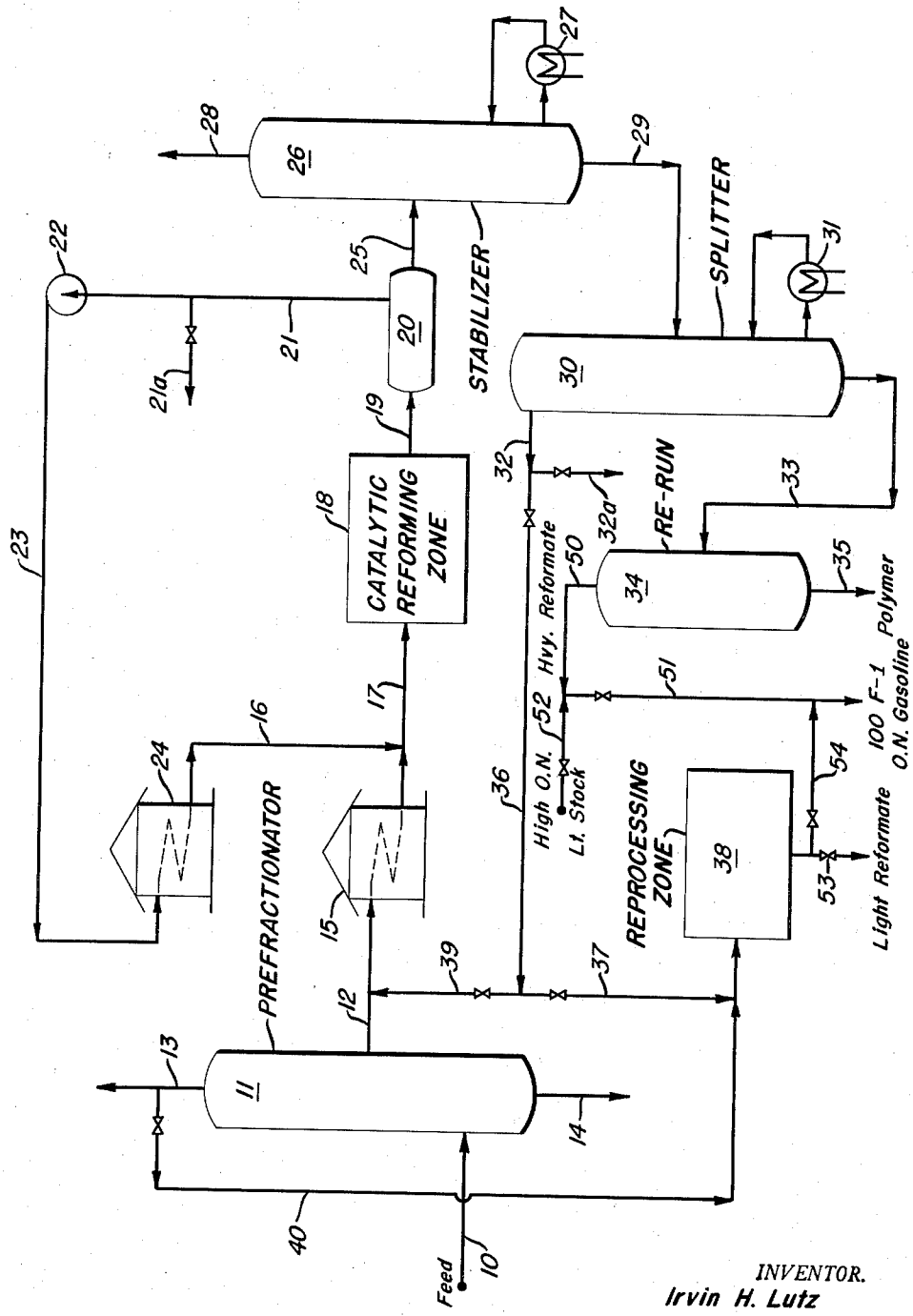
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PROCESS FOR FRACTIONATING AND BLENDING A REFORMATE TO OBTAIN A HIGH OCTANE GASOLINE

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PROCESS FOR FRACTIONATING AND BLENDING A REFORMATE TO OBTAIN A HIGH OCTANE GASOLINE

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My invention relates to the production of high octane gasoline from low octane naphthas by catalytic reforming. More particularly, it relates to the production of a high octane premium gasoline, e.g. at least 98 and more especially 100 F–1 (CFR–R) octane number or higher, and a second gasoline of lower octane number from gasoline forming and gasoline blending components in a common refinery gasoline pool by an integrated process including selective reforming, fractionation, and blending steps.

Conventional practice has been to produce premium gasoline from catalytic gasoline, i.e. the gasoline produced by catalytic cracking of gas oil. Catalytic gasoline as produced may average 93 to 95 F–1 octane number clear. Thus, it can be increased in octane, up to the 96 to 97 F–1 level, simply and economically by the addition of tetraethyl lead in amounts up to the legal limit. There has been virtually no incentive to date therefore, except in special situations, to use catalytic reforming for the production of base stock for premium grade leaded gasoline. Although catalytic reforming has been described in numerous patents and publications as producing very high octane gasolines, actually the installation and operating costs for the production of reformate of the necessary octane quality in the necessary volume, except for feedstocks of unusual quality, cannot be justified for premium gasoline, compared to the use of catalytic gasoline and the cost of tetraethyl lead. Hence, catalytic reforming has been used by most refiners to upgrade as necessary the octane value of lower quality gasolines such as virgin naphthas, thermally cracked gasolines, coke-still naphthas and the like in the refinery pool, for the production of a second structure gasoline, variously referred to as regular, house-brand, etc. This has contributed indirectly however to the production of premium gasoline by upgrading the over-all octane level of the refinery gasoline pool and by permitting the segregation of high quality naphthas necessary to meet premium octane goals.

In the production of unleaded premium gasoline of higher octane number than about 95 F–1, of course it has not been possible to use catalytic gasoline as the major base stock component. Moreover, at 98 F–1 and higher, even with tetraethyl lead, it is uneconomic or impossible within legal lead limits to rely on catalytic gasoline as a major base stock for premium gasoline. Consequently, as premium octanes reach the 98 to 100 F–1 level, it has become necessary to consider catalytic reforming on a major scale for the production of premium grade base stocks. The severity of reforming required, however, imposes severe economic penalties. As the octane level of the C_5+ reformate produced is increased above the 90 to 95 level, depending upon the quality of the charge stock, yield loss tends to become excessive. Catalyst life

is reduced; initial catalyst requirements are higher; and activity decline is such that frequent regeneration, increasing cost, is necessary.

According to my invention, a process is provided for converting low octane naphthas to high octane premium gasoline components by means of a process which conserves feed and catalyst requirements and yet produces more octane-barrels of reformate than produced by conventional reforming. The process has special value in the production of 100 F–1 octane number unleaded premium gasoline. The naphtha charge stock is prefractionated, either as an incident to crude distillation or in special facilities, to obtain a C_7+ heavy naphtha fraction, more advantageously a C_8+ heavy naphtha fraction. The final boiling point should not exceed 400° F. to any substantial extent because the product then will contain an undesirable volume of components boiling above the gasoline range. The heavy naphtha charge is subjected to reforming in the presence of a reforming catalyst and hydrogen to a severity producing a C_5+ reformate of at least 93 F–1 octane number. Advantageously, the reforming severity exceeds that producing a C_5+ reformate of 95 F–1 octane number clear and, in the production of super fuels, may approximate 100 F–1 clear. The reformate obtained is split by fractional distillation at a cut point in the range between about 225° and 300° F. to obtain a heavy fraction and a light fraction. It has been found that by correlating in a simple manner the cut point with the reforming severity for the boiling range of any particular charge stock that a heavy fraction can be produced by simple fractional distillation comprising 40 volume percent or more of the total reformate which comprises 80 percent or more aromatics. Heavy fractions so produced have been found to have octane numbers of 100+ F–1 clear and may be blended with light fractions of suitably high blending octane values to produce a full boiling range premium gasoline of 98 to 100 F–1 octane number or higher. The light fraction split from the reformate is significantly lower in octane number than the heavy fraction. It is advantageous therefore, according to the invention, to reprocess this fraction as by recycling to the reforming zone but preferably by selective processing in a second conversion stage favoring paraffin cyclization and/or isomerization. When the cut point in the splitting operation is such as to include C_7's in the light fraction, it may be advantageous, particularly at the higher severity levels, to segregate the toluene cut for separate blending, or for toluene recovery.

The invention thus provides processing means for upgrading the refinery gasoline pool to an optimum extent by producing premium grade blending stocks from low octane number naphthas through reforming combined with segregation of the super octane heavy components of reformate with suitably high octane light components from extraneous sources, e.g. light catalytic gasoline, light alkylate, reprocessed light reformate, etc. The reforming severity burden is significantly reduced compared to conventional processing requirements. The refinery pool may be upgraded further by selective reprocessing and/or segregation of the low boiling, low octane components of the reformate. In processing to maximum octane levels, this provides a substantial yield advantage over both once-through and recycle reforming. For example, the yield of 100 F–1 gasoline base stock from a blend of the heavy reformate cut from a 95 F–1 reformate with selectively reprocessed lighter components runs 5 to 10

percent higher than when produced directly by reforming to 100 F–1 or by extracting aromatics and recycling the raffinate under non-selective conditions.

The invention may be illustrated by reference to a flow diagram of one embodiment of the invention as shown on the accompanying drawing.

The charge stock comprising a full range virgin naphtha is charged through line **10** to prefractionator **11**. Heat may be supplied by preheating the charge and/or use of a reboiler in connection with prefractionator **11** in conventional manner. A heart-cut comprising C_7 to 400° F–FBP naphtha is recovered through line **12**. Lighter than C_7 naphtha, e.g. 100° to about 200° F., is taken overhead by line **13**. Heavier than 400° F. naphtha is removed as bottoms through line **14**.

The C_7+ naphtha is preheated in a fired heater **15**, and in admixture with recycle gas comprising mainly hydrogen from line **16**, is charged by line **17** to catalytic reforming zone **18**. The inlet temperature to the reforming zone is in the range of about 875° to 1000° F., and the recycle gas ratio comprises about 2000 to 10,000 cubic feet per barrel of charge. The charge mixture is contacted in the reforming zone with a reforming catalyst under a pressure in the range of about 100 to 500 p.s.i.g., preferably in the range of about 150 to 400 p.s.i.g., and at a space velocity in the range of about 0.1 to 5.0, usually about 0.5 to 1.5, weight ratio feed per hour to weight of catalyst in the reforming zone. The reforming conditions are adjusted so as to provide a severity producing a reformed product having an unleaded F–1 octane number, after stabilization, of at least 93, and preferably about 95 to 98.

The catalyst used in the reforming zone **18** most advantageously comprises a platinum-alumina reforming catalyst. The catalyst is usually in the form of pellets or tablets arranged as a plurality of fixed beds disposed in a series of separate reactors. Interheating facilities are provided between the reactors to compensate for endothermic temperature drop through the reforming zone. Other platinum-containing reforming catalysts may be used, for example, platinum on sintered silica-alumina or platinum on halide promoted alumina. Also, a molybdenum oxide-alumina or a chromia-alumina catalyst can be used although with less advantage in terms of activity and selectivity. These catalysts are readily handled in finely divided form in a fluidized state, thus facilitating regeneration.

Because of the high reforming severities required in the process of the invention, regeneration facilities for maintaining the activity of the catalyst in reforming zone **18** by periodic burn-off of carbon and oxygen treatment are desirable. The regeneration process is not a part of the present invention but will be described briefly. It may be conducted periodically or continuously. For example, one or more of the reactors can be taken off-stream, or the unit can be shut down, after the catalyst activity has dropped to a level requiring the use of excessive temperatures to obtain the desired octane quality reformate. By providing a swing reactor, the unit can be operated continuously without shut-down while the extra reactor is being regenerated.

The regeneration cycle normally requires an inert gas purging operation followed by carbon burn-off with a dilute oxygen containing gas, e.g. about 2 percent oxygen, to prevent undue temperature rise at a relatively moderate temperature in the range of about 700° to 900° F. Following the carbon burn-off, the catalyst is advantageously rejuvenated by treatment with oxygen or enriched air at a partial pressure of oxygen exceeding 0.4 atmosphere and at a temperature in the range of about 950° to 1150° F., for a period of time sufficient to restore the catalyst to the virgin activity level or higher.

When the catalyst is handled in fluidized form, as is preferred in the case of molybdenum oxide-alumina catalysts, the regeneration can be effected continuously by flowing a stream of spent catalyst from the reactor to the regenerator for carbon burn-off with air at 900° to 1100° F.

From catalytic reforming zone **18**, the charge mixture is passed via line **19** to high pressure separator **20**. Recycle gas is separated through line **21** for recycle via compressor **22**, line **23**, heater **24** and line **16**. Excess gas can be vented through line **21***a*. The liquid stream separated in separator **20** is removed through line **25** to stabilizer **26**. The stabilizer **26** is equipped with reboiler **27**. C_4's and lighter hydrocarbons are removed overhead through line **28**, and in some cases it may be desirable to include isopentane in the stabilizer overhead. The stabilized reformate is passed by line **29** to splitter tower **30**. Splitter **30** is equipped with a reboiler **31**. The tower is operated so as to take overhead through line **32** a light reformate fraction which contains the C_6 hydrocarbons and lighter and, depending upon the severity of operation, part or all of the C_7 fraction and part of the C_8 fraction. The heavy reformate is removed as bottoms through line **33**, and advantageously is rerun in tower **34** to remove as bottoms via connection **35** hydrocarbons boiling higher than the gasoline endpoint, i.e. 400 to 415° F. The heavy reformate product stream is recovered as overhead through line **50** and is pumped to storage or blending facilities via connection **51**. Ultimately, as indicated by line **52**, the heavy reformate is blended to specification octane and volatility properties with at least one high octane number light stock, which may comprise reprocessed light material as indicated by lines **53** and **54** (see below).

The light reformate produced according to the process of the invention may be passed to storage or blending via line **32***a* but advantageously is passed by lines **36** and **37** to a reprocessing zone **38** for further upgrading by selective treating. For example, the light fraction can be rerun in a second pass catalytic reforming zone. The same or a different catalyst as that used in catalytic reforming zone **18** may be used, but advantageously the conditions of reforming are favorable to paraffin isomerization and dehydrocyclization so as to obtain optimum octane improvement without excessive stock loss. For example, with a severity in zone **18** producing a 98 to 100 F–1 octane number reformate clear at 300 p.s.i.g., a severity producing a reformate in the range of 92 may be employed in zone **38** at 200–300 p.s.i.g.

Alternatively, the light fraction, preferably after dehexanization, can be treated in the presence of a dehydrocyclization catalyst such as alkalized chromia-alumina or in the presence of an isomerization catalyst such as aluminum chloride. Furthermore, the light fraction can be further fractionated, as by solvent extraction or adsorption to separate paraffins and aromatics, prior to reprocessing the paraffins for octane upgrading. If the C_6 fraction is segregated, it can be processed for benzene recovery. Where this is undesirable, it may be advantageous to segregate a toluene cut (200° F. to the reformate cut-point) for toluene extraction and dehydrogenate the C_6— (200° F.—) fraction to produce a light olefinic gasoline blending stock. The dehydrogenation can be suitably and economically accomplished by rerunning in a catalytic cracking unit, particularly where facilities are provided for splitting catalytic gasoline into light and heavy fractions. If desired the light fraction can be thermally reformed. Also, the light fraction, or a portion thereof, may be recycled via connection **39** to reforming zone **18**. Light components of virgin naphtha which are not suitable for charging to reforming zone **18** can be combined as by line **40** with the light reformate for processing under conditions more selective for upgrading light hydrocarbons. Thus, the invention provides a highly flexible process for upgrading the gasoline pool while providing an economical source of heavy high octane components for premium gasoline of 100+ octane quality.

Operation according to the invention will be more specifically illustrated by means of the following example in which the feed stock comprises a 200° to 436° F. heavy naphtha of 51.4° API gravity and 0.024 weight percent sulfur content. Typically it contains 14 percent aromatics, 52 percent naphthenes and 34 percent paraffins (all by volume), and has an octane number of 46.7 F–1. The stock is treated in a fixed bed reforming system in the presence of a catalyst containing 0.6 weight percent platinum on an alumina base and in the presence of hydrogen recycle gas supplied at a rate of 5000 s.c.f./bbl. The reactor inlet temperature is 930° F. and the average pressure is 340 p.s.i.g. The space velocity is about 1.5 weight of feed per hour per weight of catalyst.

The separation conditions in high pressure separator **20** are 105° F. and 235 p.s.i.g. Stabilizer **26** is operated with a reflux ratio of 3.5 (hot), with an overhead temperature of 142° F., and a pressure of 140 p.s.i.g. The reboiler temperature is 405° F. at 150 p.s.i.g. The C_5 to 400° F. reformate charged to splitter tower **30** as an F–1 number of 98.2. A comparison of the distillation data on the feed to the reforming zone and the C_5+ reformate charged to the splitter tower is shown in Table I.

TABLE I

ASTM Distillation, ° F., Vol. Percent Distilled	Feed	Reformate (Topped to 400° F.)
IBP	195	115.
10	234	172 (5% at 149°).
20	258	200.
30	270	230.
40	282	254.
50	297	273.
60	311	287.
70	327	303.
80	350	318.
90	378	340
FBP	436	398 (95% at 363°).

The splitter tower contains about 40 theoretical trays and is operated at 45 p.s.i.g. (tower top) and a reflux ratio of 0.85 r./d. (hot). The operating conditions in rerun tower **34** are 355° F. overhead (atmospheric pressure) and 495° F. bottoms.

With the reformate of 98 F–1 octane, the toluene fraction advantageously is included in the heavy reformate fraction separated in the splitter tower. Under these conditions, the overhead temperature is about 260° F. and the bottoms temperature is about 425° F. The yield of heavy reformate is approximately 70 volume percent. By increasing the overhead temperature to about 285 to 290° F., and with a bottoms temperature 445° F., most of the toluene fraction is taken overhead. A comparison of typical yield and octane data for the two operations follows:

ASTM Distillation Range, ° F	256–395	280–401
Yield, Vol. Percent Overhead	31.7	45.5
F–1 Octane of Bottoms	102.7	103.3
Percent of Total Toluene Fraction in Bottoms	91	16

The octanes were 76.6 and 82.8 F–1, and the ASTM distillation ranges were 104° to 220° F. and 105° to 247° F., respectively for the light fractions.

Hence, high yields of very high octane number reformate, above 100 F–1 clear, can be obtained by the process of the invention without requiring excessive severity in the reforming zone. The light components rejected are replaced with components of higher octane number from the refinery pool, e.g. light catalytic gasoline, polymer gasoline or light alkylate. The rejected light components may be blended to regular gasoline, or may be reprocessed selectively to higher octane level. Savings with reforming at the 20,000 bbl./day level may exceed several thousand dollars per day, largely as a result of catalyst savings in operating the reformer and in reducing liquid yield losses.

The advantages of the invention increase materially as octane requirements demand increased severity in the reforming step. Catalyst activity declines at an accelerating rate as severity rises from the 90 octane reformate level into the 95+ octane range. Catalyst requirements therefore may be reduced as much as 50% for production of 100 octane gasoline by operating at about the 93 octane level rather than at the 100 level. Also, there is a marked fall-off in yield as reforming severity is increased. For example, in reforming the naphtha described in the above example, the loss in C_5+ yield in going from the 80 F–1 level to the 90 F–1 level is only about 5%, but the yield loss is doubled in going from 90 to 100 octane.

The investment and operating costs for installing the invention are moderate, and in some cases can be reduced to very low values by integration with existing or conventionally employed fractionating facilities such as prefractionators or wet gas absorption towers and the like. Nevertheless, I have found that there is a breakpoint in the advantages obtainable with the invention as the severity in the reforming step exceeds that producing about 93 to 95 reformates as for the production of 100 octane clear reformate. As reforming severity increases, elimination of non-aromatic components is effected, increasing octane. In relation to yield, or barrel-octanes, however, the resulting benefit is increasingly counterbalanced by non-selective production of light components, particularly C_5's and C_6's, representing only marginal gain as straight-through severities are increased above about 93. This seems to correlate satisfactorily, in the contemplation of the invention, with the decline in catalyst life, so that as octanes spiral higher and demand higher overall severity, the advantages afforded by the invention increase.

The actual severity limit for feasibility in any particular case is related to the nature of the feed stock as well as the cut-point in the splitting operation. The more highly paraffinic naphthas such as certain Middle East naphthas may require more severe conditions to reach the 90 to 93 level than are required with more naphthenic naphthas such as Mid-Continent naphtha. Lighter boiling naphthas suffer greater yield losses for the same octane improvement over the 90 to 93 level than heavier naphthas, i.e. C_8+ naphthas.

As reforming severity is increased to obtain higher than 95 F–1 reformates, there appears to be selective conversion of high boiling low octane materials to high octane aromatics boiling in the heavy range. The increase in octane of the heavy fraction is almost equal to the increase in the octane of the total reformate, provided the cutpoint for the splitting is properly correlated. Thus, as the octane of the total reformate is increased from the 96 level to the 100 F–1 level, the C_7+ fraction increases in octane number from about 100 to 103, and the C_8+ fraction increases to about 105 F–1 octane. This is obtained at a level where octane improvement is most difficult. Moreover, there is a substantial increase in the volume of C_8 aromatics relative to other aromatics as the octane of the total reformate is increased from the 93 to 100 F–1 level. On the contrary, the octane of the C_5 to 220° F. fraction changes very little with total reformate octane. For example, octane is increased from 73.6 to only 76.6 F–1 when the octane of the total reformate is increased from 93 F–1 to 100 F–1. There is comparatively greater improvement in C_5 to 270° F. octane, from 75.1 to 83.1, because of increased production of toluene, but the level is still low.

Test data comparing the effect of severity on a typical naphtha charge boiling in the range of 222° to 424° F. and having an F–1 octane of 45 follow:

TABLE II

Properties of reformates

TBP-IBP TBP-FBP	IBP 140	140 190	190 205	205 225	225 239	239 254	254 302	302 398	398+ ------	Gas ------
Octane Severity	92.0 F-1									
Vol. Percent of Cut Percent Aromatics	8.0 ------	8.9 13.9	4.2 2.1	4.0 20.8	9.4 61.7	3.0 9.5	25.1 62.6	30.5 78.0	5.2 93.9	1.7 ------
Octane Severity	96.6 F-1									
Vol. Percent of Cut Percent Aromatics	8.4 ------	8.0 20.4	3.0 2.7	2.8 13.8	10.9 74.8	1.0 20.3	24.7 74.9	27.0 87.8	5.8 93.1	8.4 ------
Octane Severity	99.3 F-1									
Vol. Percent of Cut Percent Aromatics	9.3 ------	11.0 22.4	2.8 9.2	2.1 22.9	9.6 78.7	0.8 38.9	25.8 84.4	27.0 95.2	5.2 96.3	6.4 ------

The cutpoint also depends upon the boiling range of the feed. The cost of obtaining octane appreciation by reforming C_7 to C_8 components to 100 F–1 octane is very high compared to the cost of obtaining octanes by reforming to 92 F–1 and separating the C_7+ fraction. The increased severity appears to increase hydrocracking to an extent that the octane gain is obtained at the expense of excessive loss of hydrocarbons to the lighter than gasoline range. By comparison, reforming heavy naphthas to 100 F–1 is much more attractive. Consequently, it is advantageous to prefractionate the charge naphtha to eliminate the C_7 fraction from the feed, and for maximum advantage, split the reformate correspondingly. However, at the higher severity levels, the increase in toluene concentration justifies its inclusion in the heavy reformate.

The composition of the feed, as noted above, also may be a factor in determining the severity level at which reformate splitting becomes attractive. Thus, in running a highly paraffinic naphtha such as a Kuwait naphtha, the yield fall-off with increasing reformate octane is such as to impose a limit of about 92 to 93 F–1 clear. With stocks containing higher percentages of naphthenes such as Mid-Continent naphthas, the operation is most attractive as reformate octane exceeds 95 F–1. Also, with mixed feeds such as blends containing thermally cracked or catalytically cracked heavy naphthas, it may be desirable to limit the severity to about the 92 to 95 F–1 range.

The cutpoint in splitting also should be correlated with the properties of light stocks available for premium gasoline blending. Thus, to obtain the maximum benefit of the invention, it is advantageous to cut at as low a temperature, providing about 80% aromatics or more in the heavy reformate, as will permit replacement of the light components separated with higher octane light components from the gasoline pool. A suitable example of the latter is a light fraction separated from catalytic gasoline which includes all of the amylenes and enough of the C_6's and C_7's to provide a full range gasoline, after blending with the heavy reformate and added butanes to octane specification, without exceeding the maximum seasonal Reid vapor pressure. The light catalytic gasoline will have an F–1 octane rating approximately 3 to 5 numbers higher than the total catalytic gasoline since the amylene fraction, usually comprising up to about 20 volume percent of the total catalytic gasoline, has an F–1 octane exceeding 100. Thus, for example, a 25% by volume cut on total catalytic gasoline of 93.3 F–1 octane has an octane of 97.6 F–1. Other high octane light components of suitable volatility for blending with the heavy reformate include light alkylate, particularly technical ethylene alkylate produced by alkylation of ethylene with isobutane in the presence of aluminum chloride, technical isopentane and neohexane produced by aluminum chloride isomerization of C_5–C_6 paraffins, light olefin fractions such as di-isobutylene, and the like. Several illustrative gasoline blends follow:

Components	Blend Composition		
	A	B	C
Heavy Reformate	38	38	57
Polymer Gasoline	6	6	9
230° F. FBP Cat. Gasoline	33	23	0
Lt. Ethylene Alkylate	------	10	0
Lt. Butylene Alkylate	23	23	34
F-1 Octane	100.0	100.2	101.6

The invention thus provides a feasible and relatively economical means for producing premium gasolines of 100 F–1 clear octane and higher. These ratings, of course, can be improved by the addition of tetraethyl lead to an extent determined by the response of the particular blend to octane appreciation by this means. In blending, advantages in yield of high octane gasoline can be obtained at the higher reforming severities in conjunction with splitting as indicated by the following data indicating the yield in barrels of 100 F–1 octane gasoline per 100 barrels of feed obtained by blending heavy reformate with 93.3 F–1 catalytic gasoline.

Total Reformate F-1	Heavy Reformate		Yield, bbls./100 bbls. feed
	Percent	F-1	
99.7	50.5	102.5	68
101.5	47	104.9	81

Expressed somewhat differently, the availability of high octane blending stock from reformate for super octane fuels decreases rapidly as the reforming severity is reduced below the 95 to 100 F–1 level. The yield of 98-octane clear blending stock from 95-octane reformate is 80%, but if the total reformate split is only 90-octane, the availability of 98-octane blending stock drops to 57%. The advantage in selectivity of platinum containing reforming catalysts is indicated by comparison of these data with the yield of 98-octane blending stock from 90-octane reformate from fluid molybdenum oxide-alumina reforming which is only 50%. From 85-octane platinum reformate, the yield is 37%; from corresponding moly reformate, the yield is almost zero. If 98-octane blending stock is produced by straight reforming molybdena type catalyst to 98-octane, the yield is 65% on the feed. If the 98-octane stock is produced by fractionating 95-octane reformate, the yield is 55% on feed while a distillate fraction of about 20% on feed, rating about 82 to 84 octane number clear, is produced in addition

for blending to regular gasoline or for selective processing. Since the light reformate characteristically shows good lead response, its use in upgrading regular leaded gasoline is valuable or it can be blended to 91–96 aviation gasoline. In effect, therefore, the yield of liquid product has been increased by a minimum of 10% through an advantageous exchange of the lower octane light components of the reformate with higher octane light hydrocarbons available in the pool. At the same time, reforming severity has been reduced with resulting catalyst savings. If a 100+, rather than 98, octane stock is produced the resultant advantages are increased significantly.

In the operation of the invention, high yields of high octane stocks are produced at maximum throughput in contrast to conventional reforming or proposed methods of recycle reforming. Compared to the latter, conversion of both high and low boiling components is more selective, for the severity of recycle treatment on unconverted paraffins results predominantly in hydrocracking with resulting losses from the gasoline range and in an undesirable production of light gasoline components which inherently degrade the octane level of the high octane pool so as to limit the volume of 100+ gasoline which can be produced. Selective handling of the light fractions to produce benzene, toluene and light aromatics, or isoparaffins by isomerization, is facilitated. Thus, the over-all octane of the refinery pool can be raised to the optimum extent (or chemicals production increased) while maximizing the production of super octane premium fuel.

I claim:

1. In the production of high octane premium gasoline and a second gasoline of lower octane number from gasoline forming and gasoline blending components of a common refinery gasoline pool, a process for producing 100 octane and higher octane full boiling range premium gasoline from low octane naphthas, which process comprises charging a heavy naphtha charge boiling within the range of C_7 hydrocarbons to about a 400° F. end point to a catalytic reforming zone containing a platinum-alumina reforming catalyst, subjecting said charge in said reforming zone to a combination of conditions, including a temperature in the range of about 875° to 1000° F., a pressure in the range of about 100 to 500 p.s.i.g., a hydrogen recycle gas ratio in the range of about 2000 to 10,000 cubic feet of gas per barrel of charge and a space velocity in the range of about 0.1 to 5.0 weight ratio charge per hour to weight of catalyst in said reforming zone, providing thereby a severity sufficient to produce a reformate having a C_{5+} octane number of at least about 93 F–1 (clear), charging said reformate to a fractionating zone, splitting said reformate in said fractionating zone at a cut point within the range of between a maximum of about 300° F. and a minimum of about 225° F. according to the relationship wherein said cut point is near said maximum of 300° F. when the C_5+ octane number of said reformate is about 93 F–1 (clear) and said cut point is decreased within said range, thereby increasing the yield of the hereinafter designated heavy fraction above a minimum of at least about 40 volume percent of the total C_5+ reformate, towards said minimum cut point of about 225° F. as the severity of reforming is increased to provide a reformate having a C_5+ octane number of at least about 100 F–1 (clear), whereby two fractions are recovered constituting a light fraction boiling below said cut point and a heavy fraction boiling in the range of said cut point to the end point of said reformate, and whereby said heavy fraction comprises at least about 40 volume percent of the total C_5+ reformate and contains at least about 80 volume percent aromatics and has an octane number of at least about 100 F–1 (clear), and thereafter blending said heavy fraction with an extraneous light fraction of high blending octane number in proportions sufficient to produce a full boiling range premium gasoline of at least about 100 F–1 octane number.

2. In the production of high octane premium gasoline and a second gasoline of lower octane number from gasoline forming and gasoline blending components of a common refinery gasoline pool, a process for producing from low octane naphthas a full boiling range premium gasoline having an octane number of at least about 100 F–1, which process comprises charging a heavy naphtha charge boiling in the range of C_7 hydrocarbons to about a 400° F. end point to a catalytic reforming zone containing a platinum-alumina reforming catalyst, subjecting said charge in said reforming zone to a combination of conditions, including a temperature in the range of about 875° to 1000° F., a pressure in the range of about 100 to 500 p.s.i.g., a hydrogen recycle gas ratio in the range of about 2000 to 10,000 cubic feet of gas per barrel of charge and a space velocity in the range of about 0.1 to 5.0 weight ratio charge per hour to weight of catalyst in said reforming zone, providing thereby a severity sufficient to produce a reformate having a C_5+ octane number of at least about 93 F–1 (clear), charging said reformate to a fractionating zone, splitting said reformate in said fractionating zone at a cut point within the range of between a minimum of about 225° F. and a maximum of about 300° F., wherein two fractions are recovered constituting a light fraction boiling below said cut point and a heavy fraction boiling in the range of said cut point to the end point of said reformate, and whereby said heavy fraction comprises at least about 40 volume percent of the total C_5+ reformate and contains at least about 80 volume percent aromatics and has an octane number of at least about 100 F–1 (clear), selecting said cut point depending upon the severity of reforming said charge as evidence by the C_5+ octane number of said reformate, wherein said cut point is selected in the upper portion of said temperature range when the C_5+ octane number of said reformate is about 93 F–1 (clear) and said cut point is decreased within said temperature range, thereby increasing the yield of said heavy fraction above said minimum of at least about 40 volume percent of the total C_5+ reformate, to said minimum cut point of about 225° F. as the C_5+ octane number of said reformate is increased above about 93 F–1 (clear) towards at least about 100 F–1 (clear), and thereafter blending said heavy fraction with an extraneous light fraction of high blending octane number in proportions sufficient to produce a full boiling range premium gasoline having an octane number of at least about 100 F–1.

3. The process of claim 1 wherein said heavy napththa charge boils within the range of C_8 hydrocarbons to about a 400° F. end point.

4. The process of claim 1 in which the severity in the reforming zone is sufficient to produce a C_5+ reformate of at least 95 F–1 octane number clear.

5. The process of claim 1 in which the severity in the reforming zone is sufficient to produce a C_5+ reformate of at least 100 F–1 octane number clear.

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