

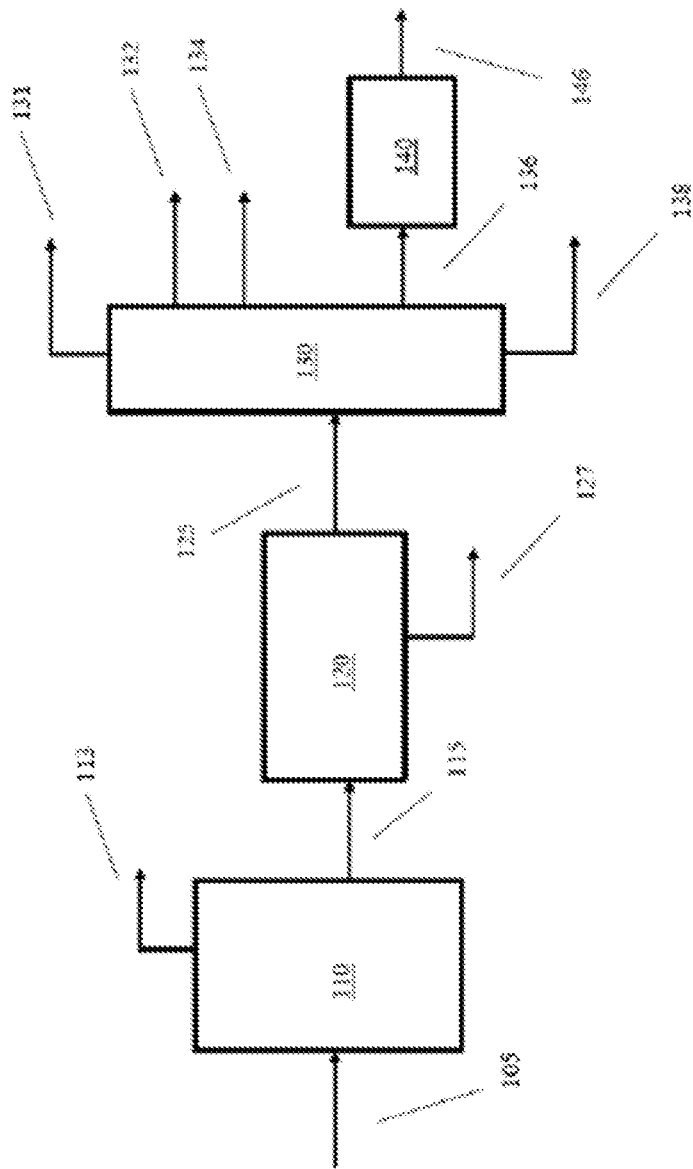


FIG. 1

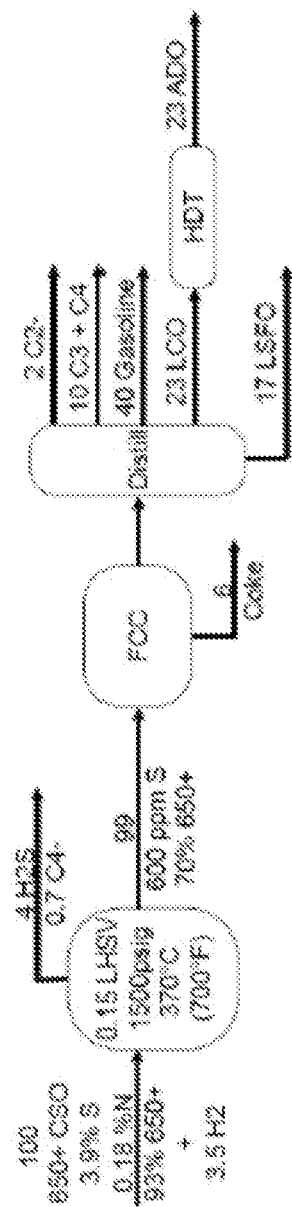


FIG. 2

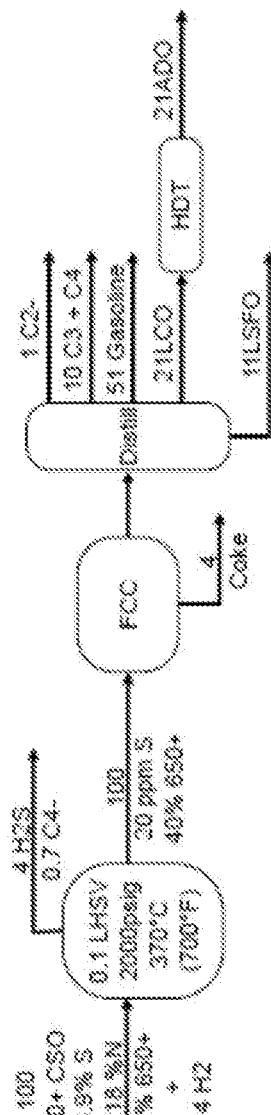


FIG. 3

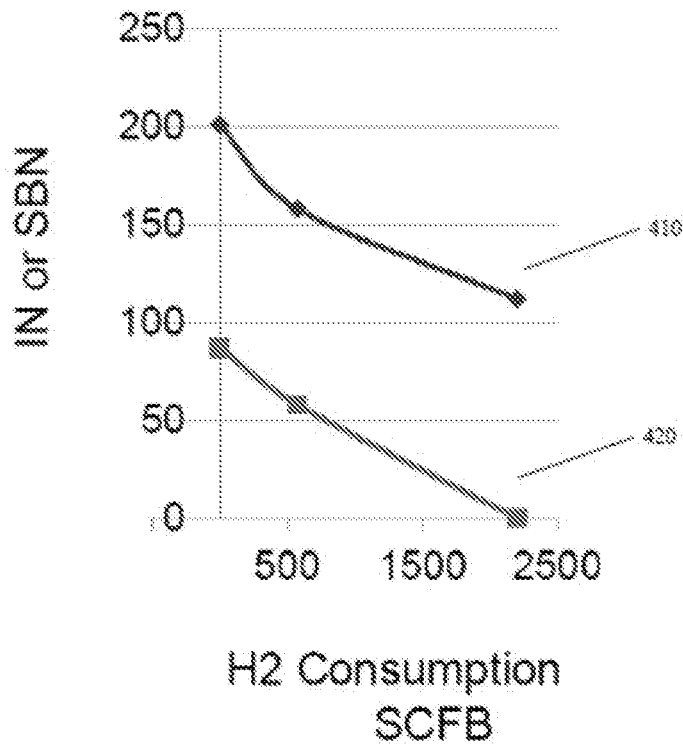


FIG. 4

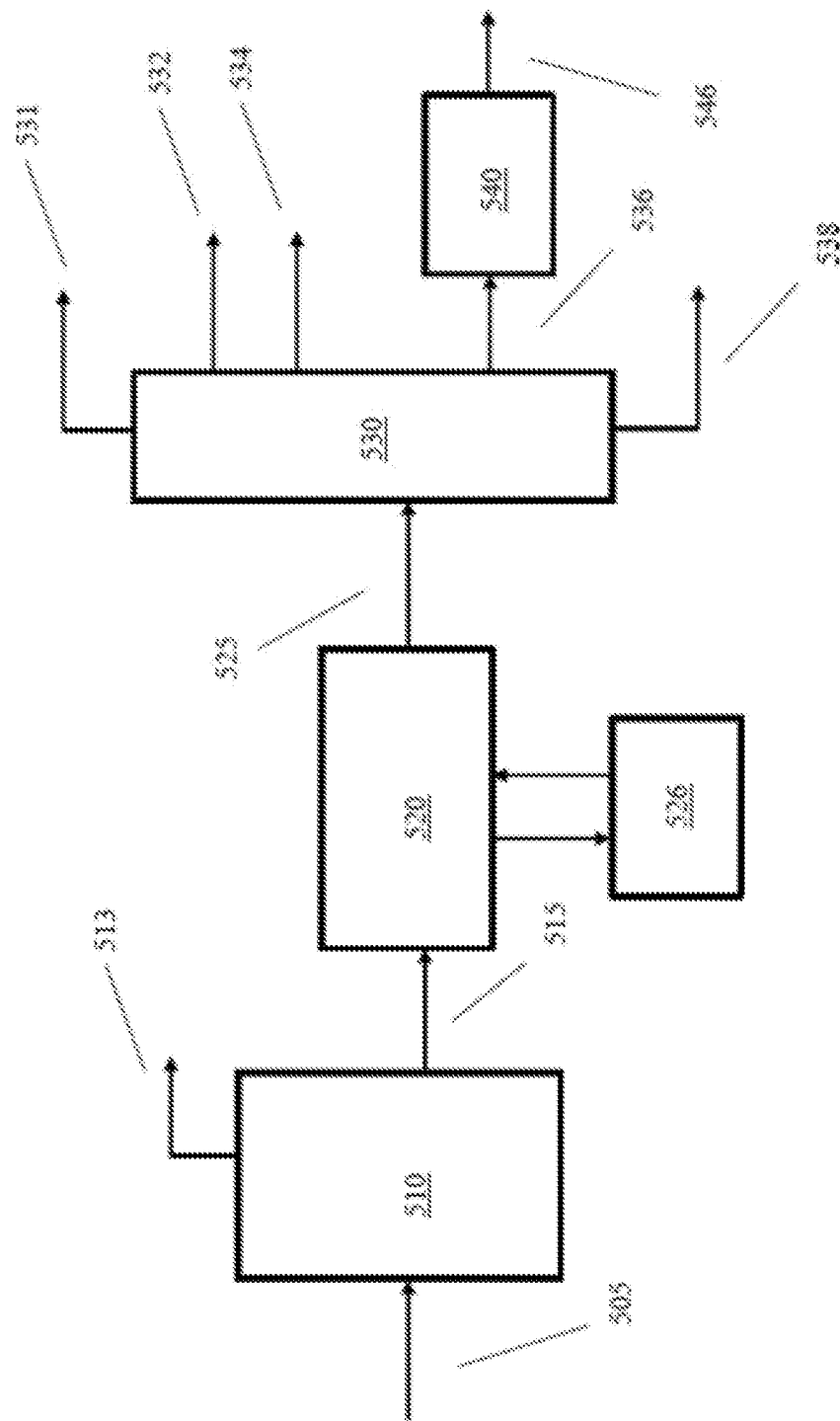


FIG. 5

Property	Result	
Kinematic Viscosity @ 50 °C, mm ² /s	51.40	Test method = D445
Density at 15 °C, estimated, g/mL	0.9771	Estimated from SG, thermal expansion coefficient = 0.0007/°C
Specific gravity at 60 °F	0.9776	Calculated from API Gravity
API gravity at 60 °F	13.24	
CCAI	863	
BMCI	82	
Sulfur, mg/kg	117	Test method = D2622
Hydrogen, mass%	11.2	
Nitrogen, mg/kg	54	
Saturates, wt%	35	Test method = Star7
1 aromatic ring, wt%	23.2	Test method = Star7
2 aromatic ring, wt%	17.9	Test method = Star7
3 aromatic ring, wt%	11.1	Test method = Star7
4+ aromatic ring, wt%	10.5	Test method = Star7
Carbon residue, estimated, wt%	1.13	Estimated from mass fractions and asphaltene content of 316C+ cuts
Energy content (net), estimated, MJ/kg	41.1	Estimated using equation in ISO 8217, Annex E. Assumed 0.10 vol% water and 0.01 %wt ash.
N-Heptane insolubles, estimated, %	0.03	Assumed to be no higher than the value of 316C+ cut
Asphaltenes, estimated, wt%	0.75	Estimated from mass fractions and asphaltene content of 316C+ cuts
Pour Point, estimated, °C	-9	Method = D37
Simulated Distillation IBP, °C	203	
Simulated Distillation 5% off, °C	371	
Simulated Distillation 10% off, °C	296	
Simulated Distillation 30% off, °C	338	
Simulated Distillation 50% off, °C	371	
Simulated Distillation 70% off, °C	412	
Simulated Distillation 90% off, °C	484	
Simulated Distillation 95% off, °C	530	
Simulated Distillation EP, °C	625	

FIG. 6

Property	Result	
Kinematic Viscosity @ 40 °C, mm ² /s	5.4	Method = D445
Density at 15 °C, g/ml	0.92	
Cutane Index	29.2	Method = D4737
Derived Cutane Number	31.2	Method = D6890
Cloud Point, °C	-56	Method = D6500
Specific gravity at 60 °F	0.92	Calculated from API gravity
API gravity at 60 °F	22.9	
CFPP, °C	-19	Method = D6371
Energy content (net), estimated, MJ/kg	41.9	Estimated by ISO6317, Annex E. Assumed 0.02 vol% water and 0.0035 %wt ash.
Sulfur, mg/kg	12	
Hydrogen, mass%	12.1	
Nitrogen, mg/kg	5	
Paraffins, wt%	1.5	
1 naphthene ring, wt%	2.7	
2+ naphthene ring, wt%	60.4	
Total naphthenes, wt%	63.1	
1 aromatic ring, wt%	28.7	
2 aromatic ring, wt%	5.5	
3+ aromatic ring, wt%	1.2	
Total aromatics, wt%	35.4	
Distillation IBP, °C	247	Method = D66
Distillation 5% off, °C	280	Method = D66
Distillation 10% off, °C	286	Method = D66
Distillation 30% off, °C	288	Method = D66
Distillation 50% off, °C	294	Method = D66
Distillation 70% off, °C	303	Method = D66
Distillation 90% off, °C	314	Method = D66
Distillation 95% off, °C	319	Method = D66
Distillation FBP, °C	322	Method = D66

FIG. 7

Property	Result	
Kinematic Viscosity @ 50 °C, mm ² /s	~177 - 180	Method = D445
Density at 15 °C, estimated, g/ml	0.99	Estimated from SG, thermal expansion coefficient = 0.0007/°C
Specific gravity at 60 °F	0.99	Calculated from API gravity
API gravity at 60 °F	11.5	
CCA1	859	
BAC1	86.5	
Carbon residue, mass%	1.4	Method = D4520
Pour Point, °C	0	Method = D97
Energy content (net), estimated, MJ/kg	41.2	Est. by ISO6217, Annex E. Assumed 0.10 vol% water and 0.01%wt ash.
N-Heptane Insolubles, %	0.03	Method = D3279
Asphaltenes, estimated, wt%	0.92	Estimated from carbon residue
Sulfur, mg/kg	154	Method = D2622
Hydrogen, mass%	10.86	
Nitrogen, mg/kg	62	
Saturates, wt%	26.6	Method = Slur 7
1 aromatic ring, wt%	22.8	
2 aromatic ring, wt%	16.6	
3 aromatic ring, wt%	10.8	
4+ aromatic ring, wt%	9.2	
Simulated Distillation (EP), °C	300	
Simulated Distillation 5% off, °C	320	
Simulated Distillation 10% off, °C	329	
Simulated Distillation 30% off, °C	357	
Simulated Distillation 50% off, °C	366	
Simulated Distillation 70% off, °C	425	
Simulated Distillation 90% off, °C	487	
Simulated Distillation 95% off, °C	545	
Simulated Distillation EP, °C	627	

FIG. 8

Property	Result	
Kinematic Viscosity @ 50 °C, mm ² /s	52.03	Test method = D445
Density at 15 °C, estimated, g/ml	0.9782	Estimated from SG, thermal expansion coefficient = 0.0007/°C
Specific gravity at 60 °F	0.9787	Calculated from API Gravity
API gravity at 60 °F	13.08	
CCAl	884	
BMCI	82.5	
Sulfur, mg/kg	125	Test method = D6622
Hydrogen, mass%	11.04	
Nitrogen, mg/kg	51.4	
Saturates, wt%	40.7	Test method = Star7
1 aromatic ring, wt%	22.0	Test method = Star7
2 aromatic ring, wt%	18.4	Test method = Star7
3 aromatic ring, wt%	10.2	Test method = Star7
4+ aromatic ring, wt%	8.5	Test method = Star7
Carbon residue, estimated, wt%	1.13	Estimated from mass fractions and asphaltene content of 371C+ cut
Energy content (net), estimated, MJ/kg	41.1	Estimated using equation in ISO 8217, Annex E. Assumed 0.10 vol% water and 0.01 %wt ash.
N-Heptane insolubles, estimated, %	0.14	Assumed to be no higher than the value of 371C+ cut
Asphaltenes, estimated, wt%	0.75	Estimated from mass fractions and asphaltene content of 371C+ and 371C+ cuts
Pour Point, estimated, °C	-12	Method = D97
Simulated Distillation IBP, °C	300	
Simulated Distillation 5% off, °C	371	
Simulated Distillation 10% off, °C	386	
Simulated Distillation 30% off, °C	399	
Simulated Distillation 50% off, °C	371	
Simulated Distillation 70% off, °C	412	
Simulated Distillation 90% off, °C	482	
Simulated Distillation 95% off, °C	524	
Simulated Distillation EP, °C	606	

FIG. 9

Property	Result	
Kinematic Viscosity @ 40 °C, mm ² /s	13.1	Method = D445
Density at 15 °C, g/ml	0.95	
Cetane Index	27.1	Method = D4737
Derived Cetane Number	29.2	Method = D6890
Cloud Point, °C	-36	Method = E2500
Specific gravity at 60 °F	0.95	Calculated from API gravity
API gravity at 60 °F	18.1	
CFPP, °C	7	Method = D6371
Energy content (net), estimated, MJ/kg	41.6	Estimated by ISO8217, Annex E. Assumed 0.02 vol% water and 0.0005 %wt ash.
Sulfur, mg/kg	6	
Hydrogen, mass%	11.75	
Nitrogen, mg/kg	1	
Paraffins, wt%	1.2	
1 naphthene ring, wt%	1.8	
2+ naphthene ring, wt%	53.9	
Total naphthenes, wt%	55.5	
1 aromatic ring, wt%	28.3	
2 aromatic ring, wt%	10.7	
3+ aromatic ring, wt%	4.3	
Total aromatics, wt%	43.3	
Distillation IBP, °C	306	Method = D86
Distillation 5% off, °C	381	Method = D86
Distillation 10% off, °C	293	Method = D86
Distillation 30% off, °C	316	Method = D86
Distillation 50% off, °C	328	Method = D86
Distillation 70% off, °C	338	Method = D86
Distillation 90% off, °C	349	Method = D86
Distillation 95% off, °C	354	Method = D86
Distillation FBP, °C	356	Method = D86

FIG. 10

Property	Result	
Kinematic Viscosity @ 60 °C, mm ² /s	-620 - 925	Method = D445
Density at 15 °C, estimated, g/ml	1.01	Estimated from SG, thermal expansion coefficient = 0.0007/°C
Specific gravity at 60 °F	1.01	Calculated from API gravity
API gravity at 60 °F	9.1	
CCAI	685	
EMCI	69.7	
Carbon residue, mass%	2.5	Method = D4530
Pour Point, °C	-18	Method = D97
Energy content (net), estimated, MJ/kg	40.9	Est. by ISO6217, Annex E. Assumed 0.10 vol% water and 0.01%wt ash.
N-Heptane Insolubles, %	0.14	Method = D3079
Asphaltenes, estimated, wt%	1.65	Estimated from carbon residue
Sulfur, mg/kg	219	Method = D2622
Hydrogen, mass%	10.04	
Nitrogen, mg/kg	105	
Saturates, wt%	29.2	Method = Star 7
1 aromatic ring, wt%	17.3	Method = Star 7
2 aromatic ring, wt%	19.6	Method = Star 7
3 aromatic ring, wt%	16.2	Method = Star 7
4+ aromatic ring, wt%	14.8	Method = Star 7
Simulated Distillation IBP, °C	352	
Simulated Distillation 5% off, °C	367	
Simulated Distillation 10% off, °C	374	
Simulated Distillation 30% off, °C	397	
Simulated Distillation 50% off, °C	422	
Simulated Distillation 70% off, °C	456	
Simulated Distillation 90% off, °C	527	
Simulated Distillation 95% off, °C	570	
Simulated Distillation EP, °C	840	

FIG. 11

Feed Description		GTL Lobe	343C+ HDT MCB		Hydraulic Oil	
Typical or Fully HDT			Typical	Fully HDT	Typical	Fully HDT
Properties	Units					
API Gravity (60F)	API	38.6	11.5	19.3	21.0	23.2
Avg Molecular Weight	AMU	567	310	317	449	453
Hydrogen	WT%	14.68	10.99	12.97	12.97	13.55
Sulfur	PPMw	0	155	0	457	0
Nitrogen	PPMw	0	72	0	160	0
Composition	WT%					
Normal Paraffins		0.0	0.6	0.7	0.0	0.0
Iso-Paraffins		100.0	5.1	5.3	3.6	3.6
1-Ring Naphthenes		0.0	4.3	4.0	8.0	9.0
2-Ring Naphthenes		0.0	2.7	6.8	15.3	19.0
3-Ring Naphthenes		0.0	5.7	21.1	15.3	26.4
4-Ring Naphthenes		0.0	12.6	38.0	13.7	23.5
5-Ring Naphthenes		0.0	5.5	22.2	8.7	15.9
6+ Ring Naphthenes		0.0	1.0	1.1	2.6	2.6
1 Ring Aromatics		0.0	25.9	0.0	21.4	0.0
2 Ring Aromatics		0.0	15.7	0.0	6.7	0.0
3 Ring Aromatics		0.0	9.1	0.0	2.8	0.0
4+ Ring Aromatics		0.0	11.7	0.0	1.6	0.0
Sulfides		0.0	0.0	0.0	0.2	0.0
Polars		0.0	0.0	0.0	0.2	0.0

GCD °C					
ESP	434	311	302	317	311
5% Off	469	337	326	373	367
10% Off	479	347	337	393	388
30% Off	496	370	360	436	429
50% Off	510	396	375	471	462
70% Off	524	426	402	505	504
90% Off	544	475	443	548	538
95% Off	550	496	470	568	560
EP	560	534	523	595	591

FIG. 12

Yields from 8 cSt GTL Lube over High Rare Earth USY at 482°C and 3.9 Cat to Oil

Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total			
H ₂ -H ₂ S-NH ₃	0.0					0.0			
C1	0.0					0.0			
C2	0.0		0.0			0.0			
C3	0.7		3.2			3.9			
C4	0.9	4.3	7.8			12.9			
C5	0.4	3.6	3.8	0.0	0.0	7.8			
Total C3-C5	2.0	7.9	14.7	0.0	0.0	24.6			
C6-430F	nPar	iPar	Ole	CyOle	Nap	Arom	Total		
C6	0.3	5.2	2.9	0.0	0.1	0.1	8.7		
C7	0.3	4.6	1.8	0.1	0.2	1.0	8.1		
C8	0.2	3.8	1.2	0.1	0.1	1.6	7.0		
C9	0.2	3.2	1.1	0.0	0.1	1.2	5.8		
C10	0.1	2.5	0.9	0.0	0.1	1.1	4.8		
C11	0.1	2.3	0.7	0.0	0.1	0.7	4.0		
C12+	0.1	2.8	0.6	0.0	0.1	0.4	4.0		
Total	1.3	24.5	9.2	0.3	0.9	6.1	42.3		
430-650F	Paraffins	Olefins	Nap	Nap	Nap	Arom	Arom	Arom	Total
C11-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C12	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.5
C13	1.0	0.2	0.1	0.0	0.0	0.4	0.1	0.1	1.8
C14	1.7	0.3	0.1	0.0	0.0	0.2	0.0	0.3	2.5
C15	1.5	0.3	0.1	0.0	0.0	0.1	0.0	0.2	2.1
C16	1.3	0.2	0.0	0.0	0.0	0.1	0.0	0.1	1.7
C17	1.1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	1.4
C18+	2.8	0.3	0.1	0.0	0.0	0.1	0.0	0.0	3.2
Total	9.6	1.5	0.4	0.0	0.0	1.1	0.1	0.7	13.3
	Paraffin	Nap	Nap	Nap	Arom	Arom	Arom	Arom	Total
650F+ CSO	17.5	0.3	0.0	0.0	0.1	0.0	0.2	0.1	18.3
Coke									1.4

FIG. 13

Yields from 8 cSt GTL Lube over Low Rare Earth USY at 482°C and 3.9 Cat to Oil										
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total				
H ₂ -H ₂ S-NH ₃	0.0					0.0				
C1	0.0					0.0				
C2	0.0					0.0				
C3	0.7		0.0			7.0				
C4	0.6	3.8	10.8			15.2				
C5	0.8	4.1	9.4	0.0	0.0	14.3				
Total C3-C5	2.1	8.0	26.4	0.0	0.0	36.5				
C6-400F CN	nPar	iPar	Ole	CyOle	Nap	Arom	Total			
C6	0.4	3.2	10.7	0.1	0.3	0.1	14.8			
C7	0.3	2.9	6.7	0.2	1.1	0.6	11.9			
C8	0.2	2.3	3.1	0.3	1.7	1.7	9.3			
C9	0.2	1.6	2.0	0.1	0.9	1.3	6.1			
C10	0.1	1.2	1.0	0.1	0.7	0.8	4.0			
C11	0.1	1.3	0.4	0.0	0.6	0.5	3.0			
C12~	0.1	1.7	0.2	0.0	0.6	0.3	2.9			
Total	1.5	14.4	24.2	0.8	5.8	5.2	51.9			
400-650F LCO	Paraffins	Olefins	1 Ring Nap	2 Ring Nap	3+ Ring Nap	1 Ring Arom	2 Ring Arom	3+ Ring Arom	Total	
C11-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
C12	0.1	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.5	
C13	0.6	0.1	0.3	0.0	0.0	0.3	0.0	0.0	1.3	
C14	1.1	0.1	0.2	0.0	0.0	0.2	0.0	0.0	1.6	
C15	1.0	0.1	0.2	0.0	0.0	0.1	0.0	0.0	1.3	
C16	0.9	0.0	0.1	0.0	0.0	0.1	0.0	0.0	1.0	
C17	0.7	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.8	
C18+	1.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	1.8	
Total	6.1	0.4	1.1	0.0	0.0	0.8	0.0	0.0	8.4	
650F+ CSO	Paraffin	1 Nap	2 Nap	3+ Nap	1 Arom	2 Arom	3 Arom	4+ Arom	Total	
	3.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	3.2	Coke

FIG. 14

Yields from 8 cSt GTL Lube over Ultra Low Hydrogen Transfer USY at 482°C and 3.9 Cat to Oil									
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total			
PD-HS-NB3	0.0					0.0			
C1	0.0					0.0			
C2	0.0		0.0			0.0			
C3	0.7		6.4			7.1			
C4	0.5	1.1	13.8			15.4			
C5	0.6	1.0	12.8	0.0	0.0	14.4			
Total C3-C5	1.8	2.1	33.0	0.0	0.0	36.9			
C6-450F	nPar	iPar	Ole	CyOle	Nap	Arom	Total		
C6	0.3	1.5	12.6	0.0	0.4	0.0	14.9		
C7	0.3	1.4	8.1	0.0	1.8	0.0	11.6		
C8	0.2	1.4	3.7	0.0	3.6	0.0	8.9		
C9	0.2	1.1	2.2	0.0	2.3	0.0	5.8		
C10	0.1	1.0	1.1	0.0	1.6	0.0	3.8		
C11	0.1	1.0	0.5	0.0	1.3	0.0	2.9		
C12+	0.1	1.3	0.3	0.0	1.3	0.0	3.0		
Total	1.4	8.6	28.5	0.1	12.2	0.0	50.8		
480-650F	Paraffins	Olefins	Nap	Nap	Arom	Arom	Total		
C11-	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
C12	0.1	0.0	0.4	0.0	0.0	0.0	0.5		
C13	0.5	0.1	0.9	0.0	0.0	0.0	1.5		
C14	0.9	0.1	0.7	0.0	0.0	0.0	1.6		
C15	0.8	0.1	0.5	0.0	0.0	0.0	1.4		
C16	0.7	0.0	0.3	0.0	0.0	0.0	1.1		
C17	0.6	0.0	0.2	0.0	0.0	0.0	0.9		
C18+	1.4	0.1	0.4	0.0	0.0	0.0	1.9		
Total	5.1	0.3	3.4	0.0	0.0	0.0	8.9		
650F+CSO	Paraffin	Nap	Nap	Arom	Arom	Arom	Total		
Coke	3.0	0.3	0.0	0.0	0.0	0.0	3.3		
							0.0		

FIG. 15

Yields from 8 cSt GTL Lube over High Rare Earth USY + 10 wt% ZSM-5 at 482°C and 3.9 Cat to Oil											
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total					
H ₂ -H ₂ -N ₂	0.0					0.0					
C1	0.0					0.0					
C2	0.0		0.3			0.3					
C3	0.8		6.0			6.8					
C4	0.9	4.8	11.7			17.5					
C5	0.4	3.8	4.8	0.0	0.0	9.0					
Total C3-C5	2.0	8.6	22.5	0.0	0.0	33.2					
C6-430F	nPar	iPar	Ole	CyOle	Nap	Total					
C6	0.3	4.7	2.7	0.0	0.1	8.0					
C7	0.3	3.7	1.3	0.1	0.1	5.5					
C8	0.2	3.0	0.8	0.1	0.1	4.2					
C9	0.2	2.6	0.8	0.0	0.0	3.6					
C10	0.1	2.1	0.8	0.0	0.1	3.1					
C11	0.1	2.1	0.0	0.0	0.1	2.3					
C12+	0.1	2.6	0.0	0.0	0.1	2.8					
Total	1.2	20.7	7.6	0.3	0.6	30.4					
C6-650F	Paraffins	Olefins	Nap	Nap	Arom	Total					
C11-	0.0	0.0	0.0	0.0	0.0	0.0					
C12	0.2	0.0	0.0	0.0	0.0	0.2					
C13	0.9	0.2	0.1	0.0	0.0	1.2					
C14	1.5	0.3	0.0	0.0	0.0	1.8					
C15	1.4	0.2	0.0	0.0	0.0	1.6					
C16	1.2	0.2	0.0	0.0	0.0	1.4					
C17	1.1	0.1	0.0	0.0	0.0	1.2					
C18+	2.7	0.3	0.0	0.0	0.0	3.0					
Total	9.0	1.4	0.3	0.0	0.0	10.7					
850F+CSO	Paraffin	Nap	Nap	Nap	Arom	Total					
Coke	15.9	0.3	0.0	0.0	0.1	16.3					

FIG. 16

Yields from 8 cSt GTL Lubricant over Low Rare Earth USY + 10 wt% ZSM-5 at 482°C and 3.9 Cat to Oil											
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total					
HP-HS-NB	0.0					0.0					
C1	0.0					0.0					
C2	0.0		1.5			1.5					
C3	1.2		16.0			17.1					
C4	0.7	5.2	18.5			24.4					
C5	0.8	4.3	9.0	0.0	0.0	14.1					
Total C3-	2.7	9.4	43.5	0.0	0.0	55.6					
C6-400F	nPar	iPar	Ole	CyOle	Nap	Total					
C6	0.4	2.9	7.3	0.1	0.2	10.9					
C7	0.4	2.4	2.9	0.2	0.5	6.0					
C8	0.2	1.9	1.2	0.2	0.7	4.0					
C9	0.2	1.3	0.8	0.1	0.4	2.8					
C10	0.1	1.1	0.4	0.1	0.4	2.0					
C11	0.1	1.1	0.2	0.0	0.3	2.7					
C12+	0.1	1.4	0.7	0.0	0.3	3.5					
Total	1.6	12.1	12.8	0.8	2.3	35.6					
400-650F	Paraffins	Olefins	Nap	Nap	Arom	Total					
C11-	0.0	0.0	0.0	0.0	0.0	0.0					
C12	0.1	0.0	0.1	0.0	0.0	0.2					
C13	0.5	0.0	0.1	0.0	0.0	0.6					
C14	0.8	0.0	0.1	0.0	0.0	0.9					
C15	0.7	0.0	0.1	0.0	0.0	0.8					
C16	0.5	0.0	0.0	0.0	0.0	0.5					
C17	0.4	0.0	0.0	0.0	0.0	0.4					
C18+	0.8	0.0	0.0	0.0	0.0	0.8					
Total	3.8	0.2	0.4	0.0	0.0	4.4					
650F+CSO	2.4	0.0	0.0	0.0	0.0	2.4					
Coke						0.0					

FIG. 17

Yields from 8 cSt GTL Lube over Ultra Low Hydrogen Transfer USY + 10 wt% ZSM-5 at 482°C and 3.9 Cat to Oil									
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total			
HC+H ₂ S+NH ₃	0.0					0.0			
C1	0.0					0.0			
C2	0.0		1.8			1.8			
C3	0.8		17.0			17.7			
C4	0.5	1.2	22.8			24.5			
C5	0.7	1.1	11.7	0.0	0.0	13.5			
Total C3-C5	2.0	2.3	51.4	0.0	0.0	55.7			
C6-430F CN	nPar	iPar	Ole	CyOle	Nap	Arcom	Arcom	Total	
C6	0.4	1.6	8.4	0.0	0.3	0.0		10.7	
C7	0.4	1.5	3.4	0.0	1.1	0.0		6.4	
C8	0.2	1.4	1.3	0.0	2.5	0.0		5.5	
C9	0.2	1.0	0.8	0.0	1.7	0.0		3.8	
C10	0.1	0.9	0.5	0.0	1.3	0.0		2.8	
C11	0.1	0.9	0.2	0.0	1.1	0.0		2.4	
C12+	0.1	1.2	0.1	0.0	1.1	0.0		2.4	
Total	1.5	8.6	14.7	0.1	9.1	0.0		34.1	
430-650F LCO	Paraffin	Olefins	Nap	Nap	Arcom	Arcom	Arcom	Total	
C11-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
C12	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.4	
C13	0.4	0.0	0.7	0.0	0.0	0.0	0.0	1.2	
C14	0.7	0.0	0.5	0.0	0.0	0.0	0.0	1.2	
C15	0.8	0.0	0.3	0.0	0.0	0.0	0.0	0.9	
C16	0.5	0.0	0.2	0.0	0.0	0.0	0.0	0.7	
C17	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.5	
C18+	0.7	0.0	0.2	0.0	0.0	0.0	0.0	1.0	
Total	3.4	0.2	2.4	0.0	0.0	0.0	0.0	5.9	
650F+CSO	Paraffin	Nap	Nap	Arcom	Arcom	Arcom	Arcom	Total	
Coke	2.3	0.2	0.0	0.0	0.0	0.0	0.0	2.5	
								0.0	

FIG. 18

Yields from Hydrotreated Hydraulic Oil over Low Rare Earth USY + 10 wt% ZSM-5 at 482°C and 3.9 Cat to Oil

Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total		
H ₂ +H ₂ S+N ₂	0.0					0.0		
3	0.0					0.0		
C1	0.0		2.4			2.4		
C2	1.4		11.8			13.3		
C3	0.8	7.1	11.0			18.9		
C4	0.3	5.8	1.8	0.7	0.4	9.0		
Total C1-	2.5	12.9	24.6	0.7	0.4	41.2		
C6-430F	nPar	iPar	Ole	CyOle	Nap	Arom	Total	
C6	0.1	4.2	0.3	1.0	1.2	0.7	7.6	
C7	0.1	2.3	0.1	1.4	2.0	3.1	9.0	
C8	0.1	1.6	0.0	1.7	2.2	5.7	11.2	
C9	0.0	1.0	0.0	0.5	1.1	3.4	6.1	
C10	0.0	0.7	0.0	0.0	0.5	1.5	3.2	
C11	0.0	0.6	0.0	0.1	0.7	2.8	4.2	
C12	0.0	0.5	0.0	0.1	0.6	1.6	2.8	
Total	0.4	10.9	0.5	4.8	8.4	19.2	44.2	
430-650F	Paraffin	Olefins	Nap	Nap	Nap	Arom	Arom	Total
C11-	0.0	0.0	0.0	0.1	0.0	0.2	0.4	0.7
C12	0.0	0.1	0.0	0.3	0.0	1.3	1.3	3.1
C13	0.1	0.1	0.0	0.5	0.0	1.6	1.6	3.3
C14	0.1	0.0	0.0	0.3	0.1	0.8	0.5	1.8
C15	0.1	0.0	0.0	0.1	0.2	0.3	0.3	0.8
C16	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.4
C17	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2
C18	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3
Total	0.4	0.3	0.0	1.3	0.8	4.6	3.4	10.6

	Paraffin	Nap	Nap	Nap	Arom	Arom	Arom	Total
650F+CSO	0.7	0.0	0.0	0.5	0.0	0.0	0.0	1.5
Coke								0.1

FIG. 19

Yields from Hydrotreated Hydraulic Oil over Ultra Low Hydrogen Transfer USY ~ 10 wt% ZSM-5 at 482°C and 3.9 Cat to Oil											
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total					
H ₂ +H ₂ S+N ₂	0.0					0.0					
3	0.0					0.0					
C1	0.0		3.9			3.9					
C2	0.2		16.9			17.1					
C3	0.1	0.3	19.5			20.2					
C4	0.1	0.4	4.3	1.3	0.3	6.3					
Total C3-	0.4	0.9	40.7	1.3	0.2	43.6					
C6-400F	nPar	iPar	Ole	CyOle	Nap	Total					
C6	0.1	0.3	1.8	2.3	0.8	5.6					
C7	0.0	0.3	0.6	4.3	1.3	6.8					
C8	0.0	0.2	0.2	5.2	1.6	7.8					
C9	0.0	0.2	0.1	1.4	0.8	2.9					
C10	0.0	0.1	0.0	1.3	0.6	2.3					
C11	0.0	0.1	0.0	3.5	0.3	5.0					
C12	0.0	0.1	0.0	4.4	0.7	5.6					
Total	0.2	1.3	2.8	22.5	6.6	36.0					
430-650F	Paraffin	Olefin	Nap	Nap	Arum	Arum	Total				
C11-	0.0	0.3	0.0	0.1	0.0	0.0	0.6				
C12	0.0	3.3	0.0	0.4	0.0	0.3	3.9				
C13	0.0	4.4	0.0	0.6	0.0	0.3	5.4				
C14	0.0	2.2	0.0	0.4	0.2	0.1	2.8				
C15	0.0	0.3	0.0	0.1	0.2	0.0	0.6				
C16	0.0	0.3	0.0	0.0	0.2	0.0	0.6				
C17	0.0	0.2	0.0	0.0	0.2	0.0	0.4				
C18	0.0	0.1	0.0	0.0	0.2	0.0	0.4				
Total	0.2	11.2	0.0	1.5	0.8	0.9	14.7				
650F+CSO	Paraffin	Nap	Nap	Nap	Arum	Arum	Total				
Coke	0.7	0.0	0.6	0.5	0.0	0.0	1.8				
							0.0				

FIG. 20

Yields from Hydrotreated Hydraulic Oil over Low Rare Earth USY at 482°C and 3.9 Cat to Oil									
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total			
HD-HS-NH ₃	0.0					0.0			
3	0.0					0.0			
C1	0.0		0.0			0.0			
C2	0.8		4.7			5.5			
C3	0.6	4.2	7.3			12.1			
C4	0.4	5.5	4.1	0.7	0.5	11.2			
Total C3-	1.8	9.8	16.0	0.7	0.5	28.8			
C6-430F	nPar	iPar	Ole	CyOle	Nap	Arom	Total		
C6	0.2	6.8	2.0	1.0	1.5	0.7	12.3		
C7	0.2	5.1	0.7	1.4	2.8	3.1	13.5		
C8	0.1	3.4	0.3	1.7	3.0	5.6	14.1		
C9	0.1	1.9	0.1	0.5	1.5	3.4	7.6		
C10	0.0	1.1	0.1	0.0	0.7	1.9	3.9		
C11	0.0	0.9	0.0	0.1	0.7	2.8	4.5		
C12	0.0	0.6	0.0	0.1	0.6	1.6	2.9		
Total	0.7	19.8	3.2	4.8	10.9	19.2	58.7		
40-400F	Paraffin	Olefins	Nap	Nap	Arom	Arom	Total		
C11-	0.0	0.0	0.0	0.1	0.0	0.2	0.5	0.0	0.7
C12	0.0	0.1	0.0	0.3	0.0	1.6	1.2	0.0	3.2
C13	0.1	0.1	0.0	0.4	0.0	1.7	1.0	0.0	3.4
C14	0.1	0.0	0.0	0.3	0.1	0.9	0.6	0.0	1.9
C15	0.1	0.0	0.0	0.1	0.2	0.3	0.2	0.0	0.9
C16	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.4
C17	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2
C18	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.3
Total	0.4	0.2	0.0	1.1	0.7	4.9	3.6	0.0	11.0
650F+CSO	Paraffin	Nap	Nap	Nap	Arom	Arom	Total		
Coke	0.5	0.0	0.0	0.4	0.0	0.0	0.2	0.2	1.2
									0.2

FIG. 21

Yields from fully hydrotreated 343°C+ MCB over Conventional USY at 482°C and 3.9 Cat to Oil									
Gas Yields	nPar	iPar	Ole	CyOle	Nap	Total			
H2+H2S4	0.0					0.0			
NH3	0.0					0.0			
C1	0.0		0.1			0.2			
C2	3.4		2.1			5.5			
C3	2.8	8.0	1.7			12.6			
C4	1.0	4.8	0.3	0.2	2.4	8.6			
Total C3-	7.2	12.6	4.1	0.2	2.4	26.7			
C6-430F	nPar	iPar	Ole	CyOle	Nap	Arom	Total		
C6	0.6	3.8	0.1	0.1	2.3	0.7	7.9		
C7	0.4	2.6	0.0	0.3	4.3	3.4	13.4		
C8	0.2	1.4	0.0	0.2	3.3	0.5	14.6		
C9	0.1	0.5	0.0	0.0	0.1	4.7	5.5		
C10	0.0	0.3	0.0	0.0	0.0	2.7	3.0		
C11	0.0	0.3	0.0	0.0	0.3	8.1	8.9		
C12+	0.0	0.4	0.0	0.0	0.0	3.6	4.0		
Total	1.3	9.4	0.2	0.6	11.2	34.7	57.4		
430-650F	Paraffins/Olefins		Nap	Nap	Arom	Arom	Total		
C11-	0.0	0.0	0.0	0.0	0.0	0.4	1.0	0.0	1.5
C12	0.0	0.0	0.0	0.0	0.0	2.9	2.0	0.0	5.0
C13	0.1	0.0	0.0	0.0	0.0	3.3	1.3	0.0	3.6
C14	0.4	0.0	0.0	0.0	0.1	0.3	0.3	0.0	1.1
C15	0.3	0.0	0.0	0.0	0.4	0.2	0.2	0.0	1.1
C16	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.4
C17	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
C18+	0.3	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.6
Total	1.5	0.0	0.0	0.1	0.8	6.2	4.8	0.1	13.5
650F+CSO	Paraffin	Nap	Nap	Arom	Arom	Arom	Total		
	0.3	6.0	0.0	0.9	0.0	0.1	0.1	0.5	1.9
Coke									0.3

FIG. 22

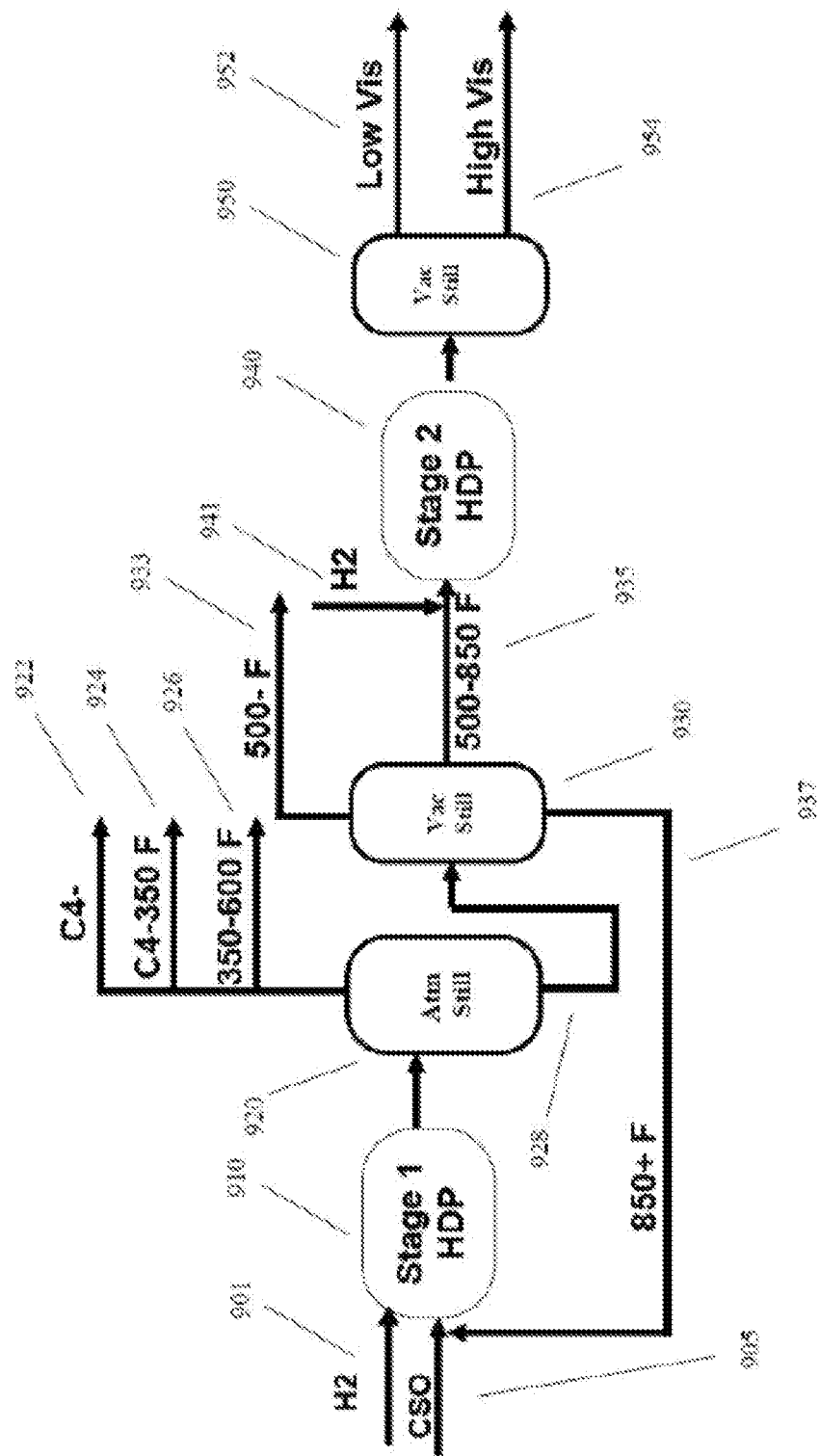


FIG. 23