

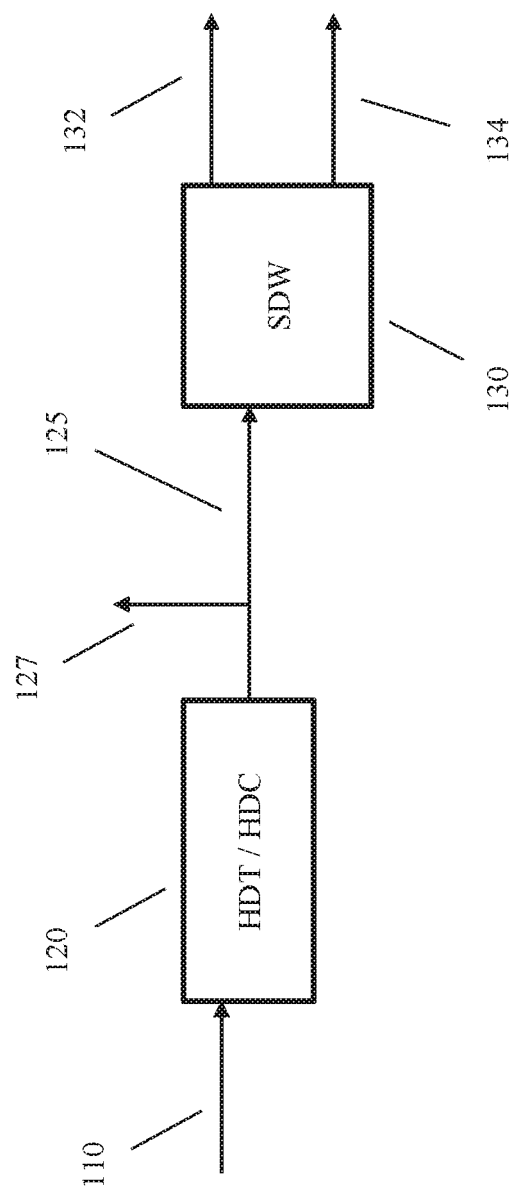


FIG. 1

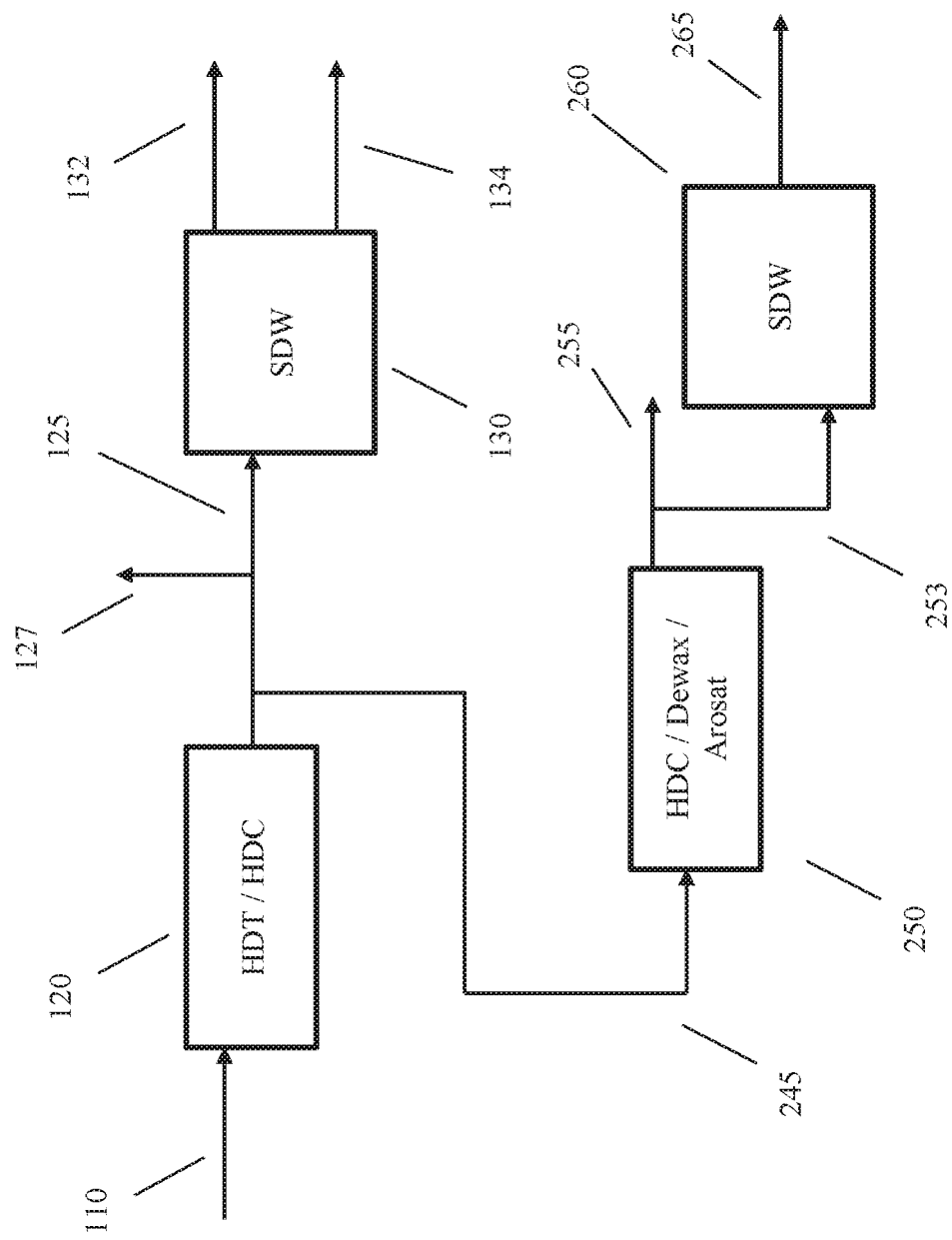


FIG. 2

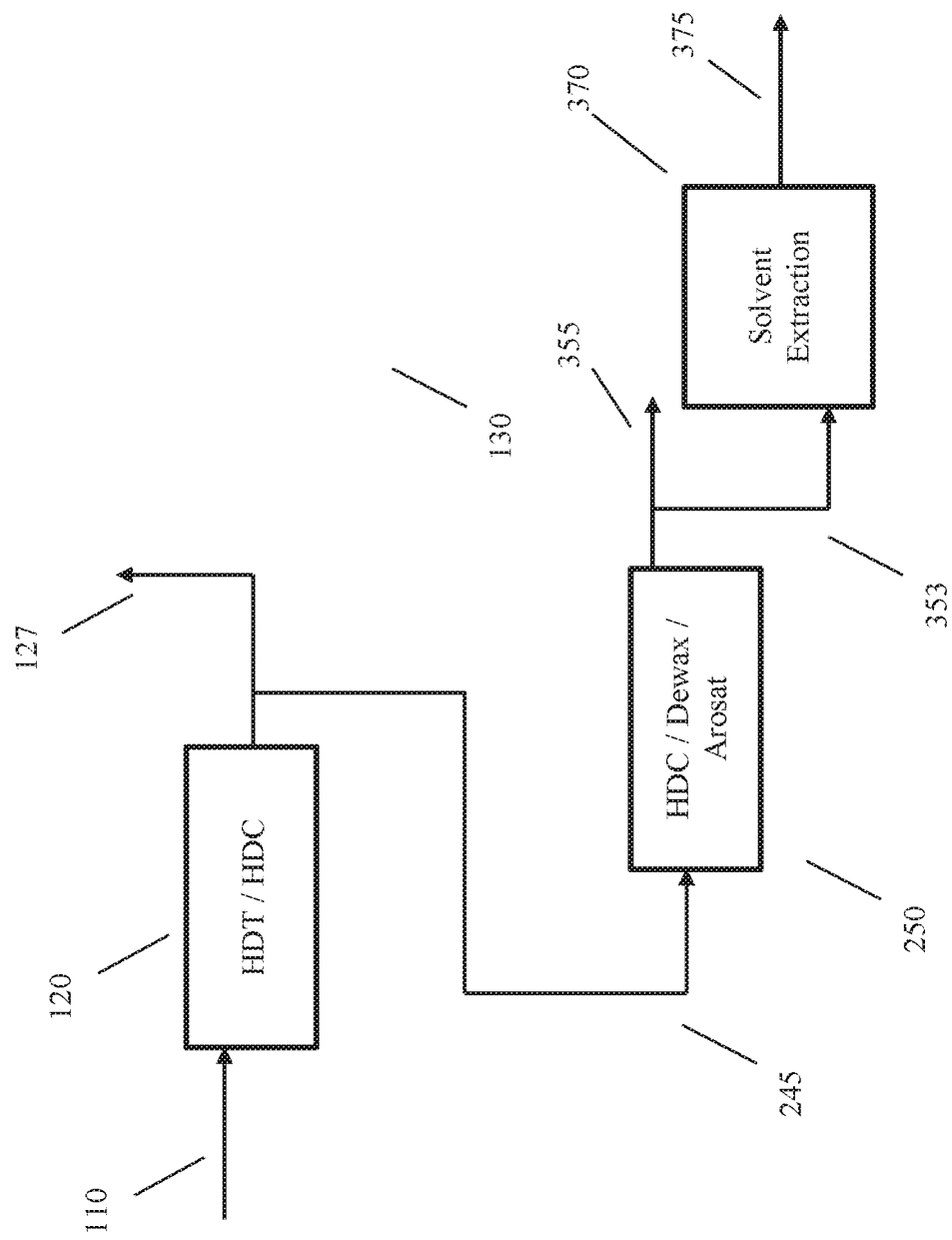


FIG. 3

C5 DAO (340°C TT) & C5 DAO+VGO STAGE 1: SDWed LUBE VI & KV VS. 510°C+ CONVERSION

2250 GSIG, 0.2 LHSV, 8000 SCF/B

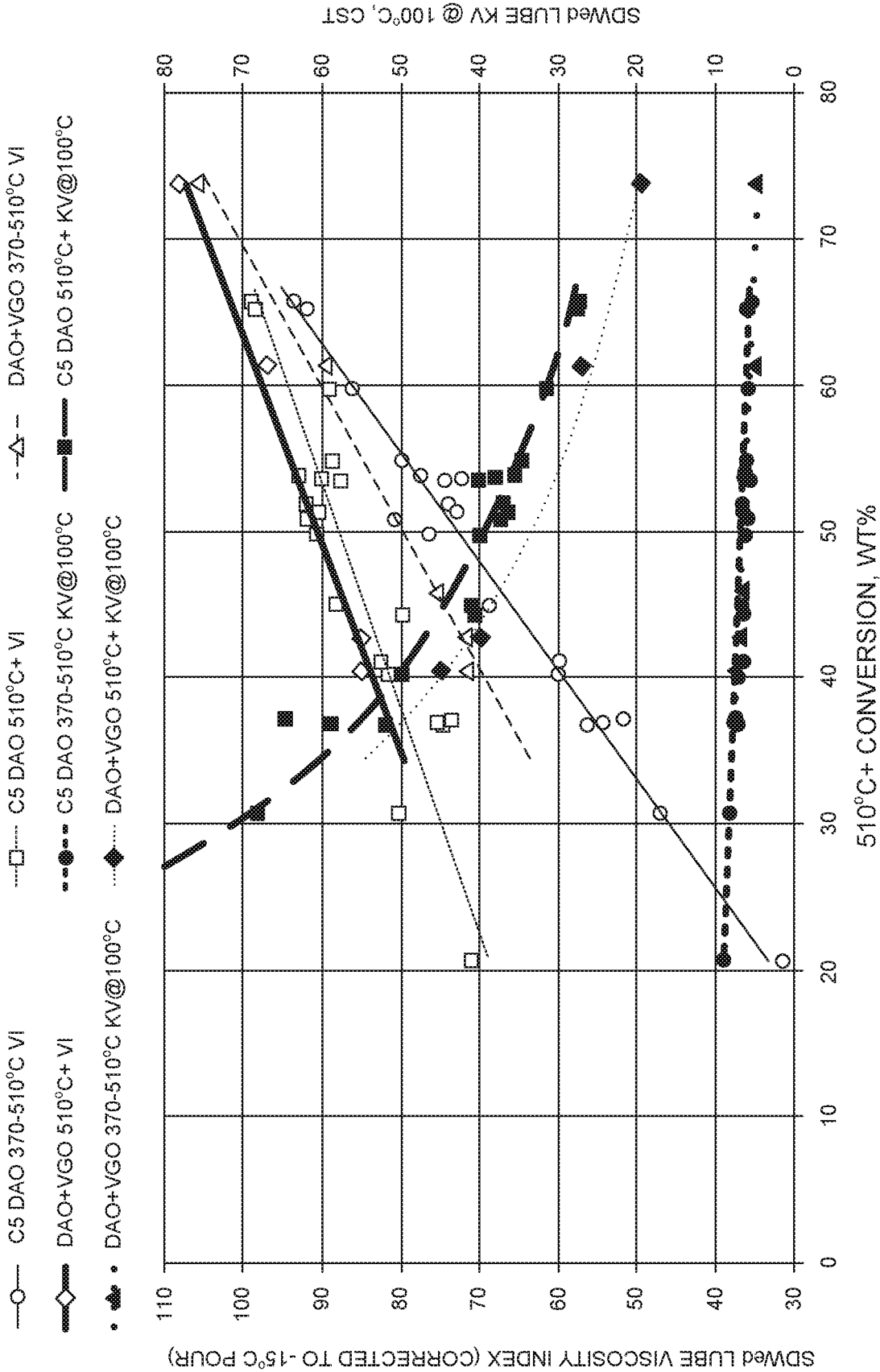


FIG. 4

HDW/HDF AND HDC/HDW/HDF OF 370°C+ HDC'ED 75% YIELD C5 DAO+HVGO+MVGO
VI PROFILE AND LUBE YIELDS FOR Feed 1 (ALL HDC IN ST. 1) VS. 2 STAGE HC (HDC IN ST. 1 & 2)

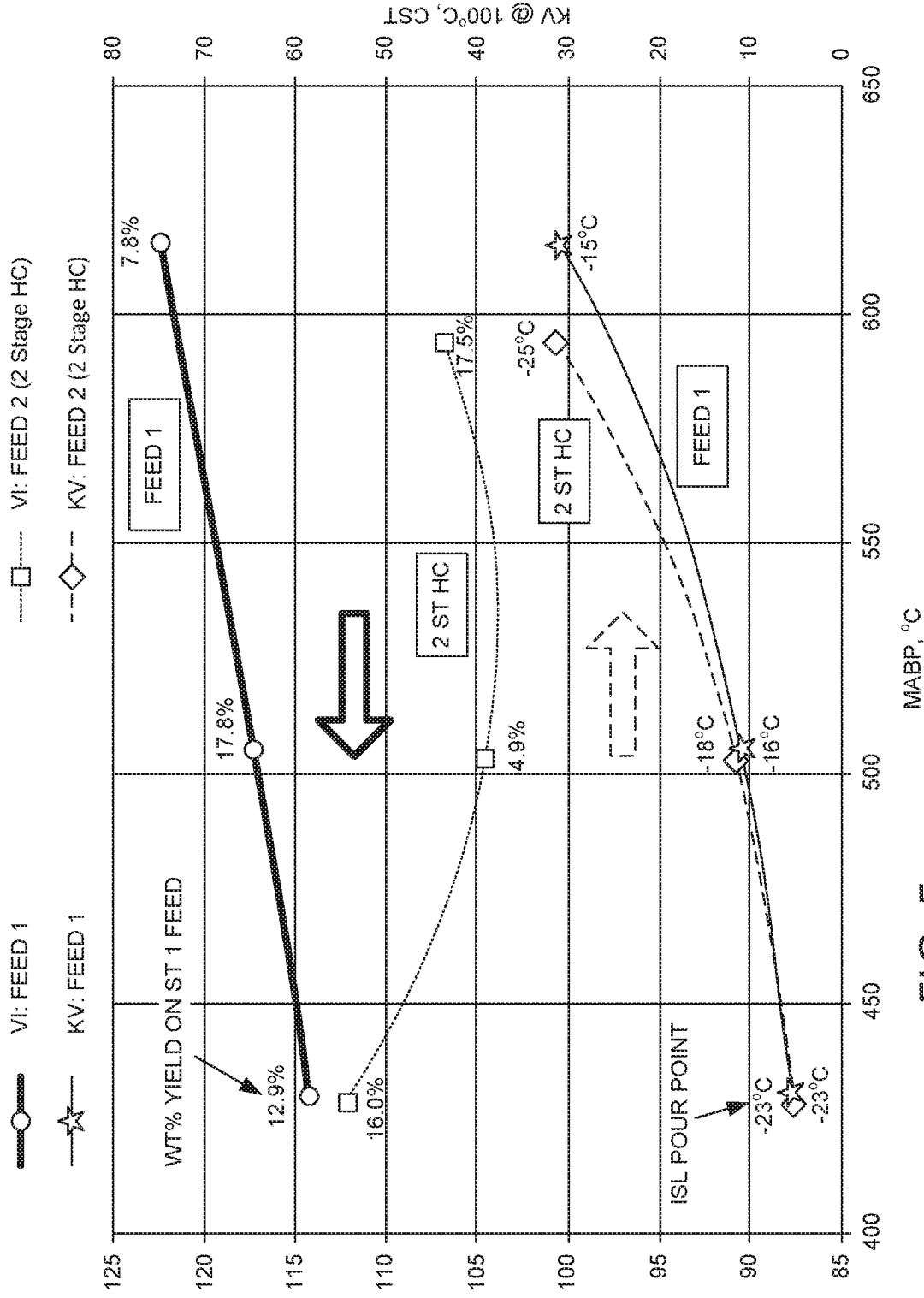


FIG. 5

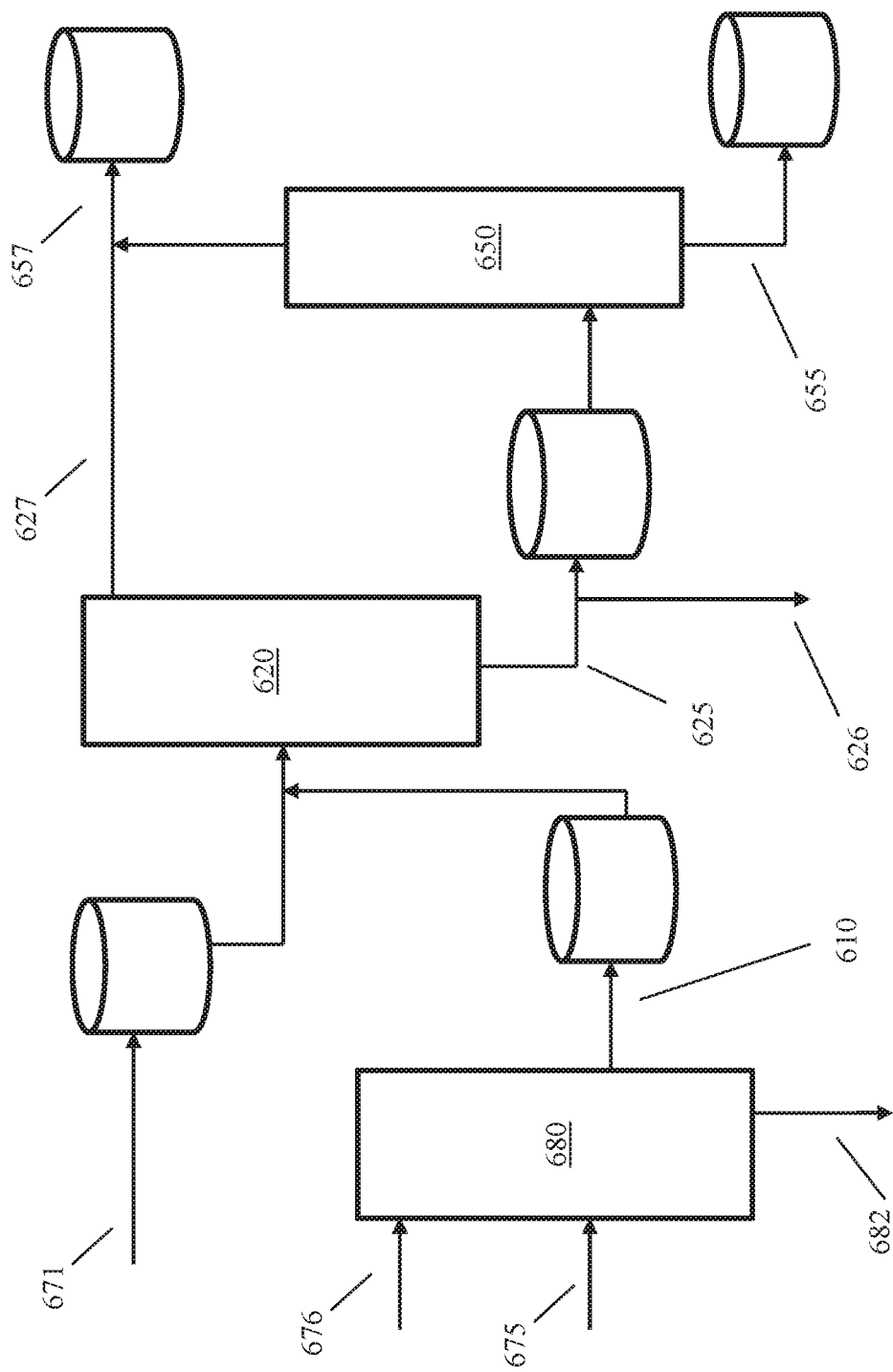


FIG. 6

Jet + Diesel			
Property	Units	SOR	EOR
API Gravity		34.0	34.8
Specific Gravity @ 60F		0.8550	0.8509
Density @ 60F	kg/m ³	854.2	850.1
Hydrogen	wt%	13.7	13.5
Sulfur	Wppm	<1	<1
Nitrogen	Wppm	<1	<1
Cetane Index		46.1	44.4
KV @ 40C	cSt	4.48	3.57
Composition, Total P/O/N/A			
Total Paraffins	wt%	16.0	17.8
Total Olefins	wt%	0.0	0.0
Total Naphthenes	wt%	77.4	67.5
Total Aromatics	wt%	6.6	14.8
Composition by SFC			
Paraffins	wt%	16.0	17.8
1 Ring Naphthenes	wt%	25.9	29.0
2+ Ring Naphthenes	wt%	51.5	38.5
1 Ring Aromatics	wt%	6.2	12.5
2 Ring Aromatics	wt%	0.4	2.0
3+ Ring Aromatics	wt%	0.0	0.3
GC Simulated Distillation			
Initial Boiling Point	°C	145	141
5% Off	°C	175	171
10% Off	°C	192	184
30% Off	°C	234	222
50% Off	°C	277	260
70% Off	°C	312	299
90% Off	°C	353	344
95% Off	°C	364	360
End Point	°C	381	379

Naphtha			
Property	Units	SOR	EOR
API Gravity		59.1	58.0
Specific Gravity @ 60°F		0.7424	0.7467
Density @ 60°F	kg/m ³	741.7	746.0
Hydrogen	wt%	15.0	14.8
Sulfur	wppm	<1	<1
Nitrogen	wppm	<1	<1
Research Octane Number		41.7	46.1
Motor Octane Number		58.7	60.7
Benzene	vol%	0.18	0.49
Reid Vapor Pressure	PSI	1.8	1.8
Bromine Number	g/100g	0.0	0.0
Composition, Total P/O/N/A			
Total Paraffins	wt%	51.0	48.0
Total Olefins	wt%	0.0	0.0
Total Naphthenes	wt%	46.7	46.3
Total Aromatics	wt%	2.3	5.7
Distillation, D86			
Initial Boiling Point	°C	83	83
5% Off	°C	88	88
10% Off	°C	92	92
30% Off	°C	114	114
50% Off	°C	125	124
70% Off	°C	135	134
90% Off	°C	152	152
95% Off	°C	160	159
End Point	°C	170	170

FIG. 7

Jet				Diesel			
Property	Units	SOR	EOR	Property	Units	SOR	EOR
API Gravity		40.0	39.6	API Gravity		30.1	30.6
Specific Gravity @ 60F		0.8251	0.8270	Specific Gravity @ 60F		0.8756	0.8729
Density @ 60F	kg/m ³	824.3	826.2	Density @ 60F	kg/m ³	874.8	872.1
Hydrogen	wt%	14.0	13.8	Hydrogen	wt%	13.5	13.3
Sulfur	Wppm	<1	<1	Sulfur	Wppm	<1	<1
Nitrogen	Wppm	<1	<1	Nitrogen	Wppm	<1	<1
Cetane Index		40.4	38.7	Cetane Index		45.8	45.8
KV @ 40C	cSt	2.00	1.89	KV @ 40C	cSt	8.63	7.06
Composition, Total P/O/N/A				Composition, Total P/O/N/A			
Total Paraffins	wt%	20.5	20.0	Total Paraffins	wt%	13.1	15.8
Total Olefins	wt%	0.0	0.0	Total Olefins	wt%	0.0	0.0
Total Naphthenes	wt%	74.2	68.1	Total Naphthenes	wt%	79.5	66.9
Total Aromatics	wt%	5.3	11.8	Total Aromatics	wt%	7.4	17.4
Composition by SFC				Composition by SFC			
Paraffins	wt%	20.5	20.0	Paraffins	wt%	13.1	15.8
1 Ring Naphthenes	wt%	35.0	35.9	1 Ring Naphthenes	wt%	20.0	22.9
2+ Ring Naphthenes	wt%	39.2	32.3	2+ Ring Naphthenes	wt%	59.6	43.9
1 Ring Aromatics	wt%	5.2	11.5	1 Ring Aromatics	wt%	6.8	13.4
2 Ring Aromatics	wt%	0.1	0.4	2 Ring Aromatics	wt%	0.5	3.5
3+ Ring Aromatics	wt%	0.0	0.0	3+ Ring Aromatics	wt%	0.1	0.6
GC Simulated Distillation				GC Simulated Distillation			
Initial Boiling Point	°C	131	130	Initial Boiling Point	°C	222	220
5% Off	°C	161	159	5% Off	°C	253	250
10% Off	°C	174	173	10% Off	°C	264	260
30% Off	°C	198	195	30% Off	°C	290	286
50% Off	°C	215	213	50% Off	°C	312	306
70% Off	°C	231	229	70% Off	°C	336	330
90% Off	°C	253	252	90% Off	°C	362	359
95% Off	°C	259	258	95% Off	°C	369	367
End Point	°C	276	275	End Point	°C	385	383

FIG. 8

~390°C+ Bottoms					~550°C+ Bottoms				
Property	Units	SOR	EOR		Property	Units	SOR	EOR	
API Gravity		27.79	29.65		API Gravity		28.89	30.54	
Specific Gravity @ 60F		0.8883	0.8781		Specific Gravity @ 60F		0.8822	0.8732	
Density @ 60F	kg/m ³	887.5	877.2		Density @ 60F	kg/m ³	881.4	872.4	
Density @ 70°C	g/CC	0.8516	0.8411		Density @ 70°C	g/CC	0.8454	0.8361	
Hydrogen	wt%	13.69	13.78		Hydrogen	wt%	13.74	13.88	
Sulfur	wppm	<1	26		Sulfur	wppm	<1	54	
Nitrogen	wppm	2.2	11.3		Nitrogen	wppm	5.0	23.8	
Carbon Residue (CCR)	wt%	0.12	0.73		Carbon Residue (CCR)	wt%	0.24	1.37	
KV @ 54°C	cSt	156	92		KV @ 54°C	cSt	714	290	
KV @ 100°C	cSt	26	18		KV @ 100°C	cSt	79	42	
Composition, Total P/O/N/A					Total Paraffins				
Total Paraffins	wt%	31.1	42.3		Total Paraffins	wt%	37.3	49.0	
Total Naphthenes	wt%	61.2	41.3		Total Naphthenes	wt%	52.9	30.5	
Total Aromatics	wt%	7.7	16.4		Total Aromatics	wt%	9.7	20.5	
Composition					Saturates				
Saturates	wt%	92.3	83.6		Saturates	wt%	90.3	79.5	
Arc 1	wt%	6.1	9.7		Arc 1	wt%	7.2	11.9	
Arc 2	wt%	1.1	3.6		Arc 2	wt%	1.7	4.8	
Arc 3	wt%	0.4	1.9		Arc 3	wt%	0.6	2.3	
Arc 4	wt%	0.1	1.0		Arc 4	wt%	0.2	1.4	
Sulfides	wt%	0.0	0.0		Sulfides	wt%	0.0	0.1	
Polars	wt%	0.0	0.0		Polars	wt%	0.0	0.0	
GC Simulated Distillation					GC Simulated Distillation				
Initial Boiling Point	°C	360	359		Initial Boiling Point	°C	520	520	
5% Off	°C	393	393		5% Off	°C	544	543	
10% Off	°C	410	410		10% Off	°C	553	552	
30% Off	°C	481	491		30% Off	°C	574	572	
50% Off	°C	540	544		50% Off	°C	586	584	
70% Off	°C	576	576		70% Off	°C	603	599	
90% Off	°C	614	616		90% Off	°C	649	667	
95% Off	°C	644	662		95% Off	°C	684	705	
End Point	°C	769	773		End Point	°C	798	795	
CCAI (calculation)		756	752		CCAI (calculation)		734	734	
BMCI (calculation)		23.8	18.6		BMCI (calculation)		17.7	13.6	

FIG. 9

Property	Units	Jet	Diesel
Composition by 2D-GC	wt%		
Paraffins	wt%	19.15%	13.97%
1R-Naphth	wt%	41.88%	31.72%
2R-Naphth	wt%	26.32%	25.17%
Total Naphthenes	wt%	68.20%	56.89%
1.0-Ring-ARO	wt%	8.66%	16.62%
1.5-Ring-ARO	wt%	3.80%	8.31%
2.0-Ring-ARO	wt%	0.18%	2.63%
2.5-Ring-ARO	wt%	0.00%	0.89%
3.0-Ring-ARO	wt%	0.00%	0.52%
3.5-Ring-ARO	wt%	0.00%	0.17%
4.0-Ring-ARO	wt%	0.00%	0.00%
4.5-Ring-ARO	wt%	0.00%	0.00%
5.0-Ring-ARO	wt%	0.00%	0.00%
5.5-Ring-ARO	wt%	0.00%	0.00%
Total Aromatics	wt%	12.65%	29.14%
Flash Point, D93	°C		144
Distillation, D86			
Initial Boiling Point		188.3	283.5
5% vol recovered	°C	196.4	290.6
10% vol recovered	°C	198.6	293.6
20% vol recovered	°C	202.6	296.7
30% vol recovered	°C	207.3	300.7
40% vol recovered	°C	211.7	305.7
50% vol recovered	°C	216.4	311.8
60% vol recovered	°C	221.6	318.3
70% vol recovered	°C	227.3	325.7
80% vol recovered	°C	234	334.2
90% vol recovered	°C	241.9	344
95% vol recovered	°C	247.1	352.1
End Point	°C	253.2	358.9
Freezing Point, D5972	°C	-66.8	
Density of Liquids, 60 F	C	0.8282	0.8602
Kinematic Viscosity @ 40°C, D445	C	1.643	6.381

FIG. 10

Pressure, psig	2400	2400	2400	2400
Reactor 1 LHSV	1.25	1.25	1.25	1.25
Reactor 2 LHSV	1	1	1	1
Reactor 3 LHSV	1	1	1	1
Overall LHSV	0.36	0.36	0.36	0.36
H2 Circulation, scf/B	5000	5000	5000	5000
Reactor 1 Temp., °C	384	384	384	384
Reactor 2 Temp., °C	332	332	332	332
Reactor 3 Temp., °C	238	238	238	238
Liquid Fraction → Property ↓	IBP- 150 °C	150- 200 °C	200- 300 °C	300C+ 300 °C
Density @ 15.6 °C, g/cc	0.747	0.796	0.820	0.839
Nitrogen, mg/kg	0.09	0.08	0.09	1
Sulfur, mg/kg	0.3	0.34	0.32	<5
KV @ 100 °C, cSt				2.312
KV @ 40 °C, cSt				8.061
Pour Point, °C				-47
Cloud Point, °C				-37.9
Freeze Point, °C				
Smoke Point, mm				
DCN D6890				
Paraffins (wt%)				
1 Ring Naphthenes				
2+ Ring Naphthenes				
1 Ring Aromatics				
2 Ring Aromatics				
3+ Ring Aromatics				
Total Naphthenes				
Total Aromatics				
IBP °C (D86)				
5.0% vol recovered				
10.0% vol recovered				
30.0% vol recovered				
50.0% vol recovered				
70.0% vol recovered				
90.0% vol recovered				
95.0% vol recovered				
End Point				

FIG. 12