Stream tables

Design case

TOFA HVO SOR

Rev.	Description	Date	Made by	Chd.	Appd.
1	Final issue	23-Sep-2022	LUYG	-	-

Stream Name		**1000**	**1400**	**1450**	**1500**	**1860**	**1880**
		Renewable feed	Feed pump discharge	HDO reactor feed	HDO reactor outlet	Recycle oil	Recycle oil+TG heater outlet
Phase		Liquid	Liquid	Mixed	Mixed	Liquid	Mixed
Total stream properties							
Rate	kmol/h	67.5	67.5	3860.1	3636.8	227.0	949.1
	kg/h	41666.7	41666.7	84894.4	112849.4	53750.1	57204.0
Std. liquid rate	m3/HR	45.9	45.9	200.9	220.8	68.9	92.2
Temperature	°C	50.0	76.1	265.0	344.8	118.4	282.2
Pressure	barg	4.8	70.8	66.4	63.1	71.8	66.8
Molecular weight		617.69	617.69	21.99	31.03	236.83	60.27
Vapor phase properties							
Rate	kmol/h	0.0	0.0	3612.3	3363.7	0.0	706.5
	kg/h	N/A	N/A	22877.7	56954.4	N/A	5485.2
	m3/h	N/A	N/A	2469	2771	N/A	496
Std. vapor rate	m3/h	N/A	N/A	80965	75393	N/A	15836
Std. vapor density	kg/m3	N/A	N/A	0	1	N/A	0
Z factor		N/A	N/A	1	1	N/A	1
Molecular weight		N/A	N/A	6	17	N/A	8
Enthalpy	KJ/KG	N/A	N/A	1613	1601	N/A	1565
Entropy	KJ/KG-C	N/A	N/A	29	16	N/A	25
Heat capacity	KJ/KG-C	N/A	N/A	6	4	N/A	5
Cp/Cv ratio		N/A	N/A	1	1	N/A	1
Density	kg/m3	N/A	N/A	9	21	N/A	11
Thermal conductivity	W/M-C	N/A	N/A	0	0.12	N/A	0.15
Viscosity	CP	N/A	N/A	0	0.0	N/A	0.0
Liquid phase properties							
Rate	kmol/h	67.5	67.5	247.9	273.1	227.0	242.6
	kg/h	41666.7	41666.7	62016.6	55895.0	53750.1	51718.8
	m3/h	46.8	46.9	95.5	110.1	73.4	86.0
Std. liquid rate	m3/h	45.9	45.9	77.5	72.2	68.9	66.9
Std. liquid density	kg/m3	907.7	907.7	800.0	773.8	780.6	773.3
Specific gravity (H2O=1.0)		0.9	0.9	0.8	0.8	0.8	0.8
Molecular weight		617.7	617.7	250.2	204.7	236.8	213.2
Enthalpy	KJ/KG	20.4	93.5	665.8	945.7	279.3	741.2
Entropy	KJ/KG-C	6.8	7.0	8.7	9.3	7.9	8.9
Heat capacity	KJ/KG-C	2.4	2.4	3.0	3.3	2.5	3.1
Density	kg/m3	890.1	888.7	649.3	507.8	732.5	601.5
Surface tension	DYNE/CM	0.0	0.0	0.0	0.0	0.0	0.0
Thermal conductivity	W/M-C	0.1	0.1	0.1	0.1	0.1	0.1
Viscosity	CP	229.9	28.2	0.2	0.1	0.8	0.2
Composition							
Component weight rate	kg/h						
Water		0.0	0.0	98.4	5401.0	7.1	25.4
NH_3		0.0	0.0	3.5	12.1	0.5	1.1
H_2S		0.0	0.0	493.4	563.9	61.4	147.8
CO		0.0	0.0	550.4	576.0	1.3	111.1
CO_2		0.0	0.0	2296.2	2420.7	64.5	510.8
HCL		0.0	0.0	0.0	0.9	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		0.0	0.0	6244.4	4893.7	2.0	1250.5
Methane		0.0	0.0	6193.2	6441.2	57.8	1284.9
Ethane		0.0	0.0	907.5	997.0	70.1	237.6
Propane		0.0	0.0	698.1	810.0	158.0	266.1
Iso-butane		0.0	0.0	140.7	142.4	45.0	64.1
N-butane		0.0	0.0	89.3	95.1	33.6	44.7
Iso-pentane		0.0	0.0	37.4	39.9	18.4	22.2
N-pentane		0.0	0.0	43.3	53.8	26.1	29.6
N-hexane		0.0	0.0	43.2	57.6	31.5	33.9
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		0.0	0.0	32.3	49.8	28.5	29.3
Kerosene fraction		0.0	0.0	3242.2	5502.7	3238.4	3239.1
Diesel fraction		41666.7	41666.7	63780.9	84791.5	49905.8	49905.8

Project Phoenix update for SAF processing

HALDOR TOPSOE

Document ID			LUYG	23-Sep-2022
S-10491-1		0	1	
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Stream	Name		1920	2000	2120	2200	2230	2235
			1-st stage stripper feed	MUG from BL	MUG	Recycle gas	Purge gas	Purge gas to 1-st stage stripper
	Phase		Mixed	Vapor	Vapor	Mixed	Vapor	Mixed
Total stream properties								
Rate		kmol/h	158.6	758.6	566.7	734.7	0.0	18.7
		kg/h	37573.0	1550.7	1158.5	1651.2	0.0	89.6
Std. liquid rate		m3/HR	48.1	21.7	16.2	21.2	0.0	0.6
Temperature		°C	219.5	30.0	100.2	41.0	41.0	41.1
Pressure		barg	8.0	28.5	72.4	57.2	6.0	57.2
Molecular weight			236.83	2.04	2.04	2.25	5.42	4.78
Vapor phase properties								
Rate		kmol/h	2.3	758.6	566.7	734.3	0.0	18.7
		kg/h	67.1	1550.7	1158.5	1642.7	N/A	89.6
		m3/h	10	660	249	341	N/A	9
Std. vapor rate		m3/h	52	17002	12702	16458	N/A	420
Std. vapor density		kg/m3	1	0	0	0	N/A	0
Z factor			1	1	1	1	N/A	1
Molecular weight			29	2	2	2	N/A	5
Enthalpy		KJ/KG	792	260	1290	444	N/A	359
Entropy		KJ/KG-C	10	74	73	66	N/A	33
Heat capacity		KJ/KG-C	2	14	14	13	N/A	6
Cp/Cv ratio			1	1	1	1	N/A	1
Density		kg/m3	6	2	5	5	N/A	10
Thermal conductivity		W/M-C	0.06	0.15	0	0	N/A	0
Viscosity		CP	0.0	0.0	0	0	N/A	0
Liquid phase properties								
Rate		kmol/h	156.3	0.0	0.0	0.5	0.0	0.0
		kg/h	37505.9	N/A	N/A	8.5	N/A	N/A
		m3/h	57.3	N/A	N/A	0.0	N/A	N/A
Std. liquid rate		m3/h	48.0	N/A	N/A	0.0	N/A	N/A
Std. liquid density		kg/m3	781.5	N/A	N/A	993.7	N/A	N/A
Specific gravity (H2O=1.0)			0.8	N/A	N/A	1.0	N/A	N/A
Molecular weight			239.9	N/A	N/A	18.1	N/A	N/A
Enthalpy		KJ/KG	541.7	N/A	N/A	181.4	N/A	N/A
Entropy		KJ/KG-C	8.5	N/A	N/A	5.3	N/A	N/A
Heat capacity		KJ/KG-C	2.9	N/A	N/A	4.3	N/A	N/A
Density		kg/m3	654.1	N/A	N/A	978.2	N/A	N/A
Surface tension		DYNE/CM	0.0	N/A	N/A	0.0	N/A	N/A
Thermal conductivity		W/M-C	0.1	N/A	N/A	0.3	N/A	N/A
Viscosity		CP	0.3	N/A	N/A	0.5	N/A	N/A
Composition								
Component weight rate		kg/h						
Water			5.0	0.0	0.0	17.9	0.0	0.5
NH_3			0.4	0.0	0.0	0.5	0.0	0.0
H_2S			42.9	0.0	0.0	1.4	0.0	2.2
CO			0.9	0.0	0.0	2.0	0.0	2.8
CO_2			45.1	0.3	0.2	2.0	0.0	11.6
HCL			0.0	0.0	0.0	0.0	0.0	0.0
MDEA			0.0	0.0	0.0	0.0	0.0	0.0
H_2			1.4	1526.1	1140.2	1470.2	0.0	32.4
Methane			40.4	24.2	18.1	30.8	0.0	31.8
Ethane			49.0	0.0	0.0	7.3	0.0	4.3
Propane			110.5	0.0	0.0	31.5	0.0	2.8
Iso-butane			31.4	0.0	0.0	34.2	0.0	0.5
N-butane			23.5	0.0	0.0	20.2	0.0	0.3
Iso-pentane			12.9	0.0	0.0	11.0	0.0	0.1
N-pentane			18.3	0.0	0.0	8.4	0.0	0.1
N-hexane			22.0	0.0	0.0	7.9	0.0	0.1
TBPS			0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen			0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction			19.9	0.0	0.0	2.5	0.0	0.0
Kerosene fraction			2263.7	0.0	0.0	3.3	0.0	0.0
Diesel fraction			34885.7	0.0	0.0	0.0	0.0	0.0

Project Phoenix update for SAF processing

HALDOR TOPSØE

Document ID			LUYG	23-Sep-2022
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Stream Name		**2250**	**2321**	**2600**	**2640**	**4100**	**4200**
		Vapor from HPCS	Treat gas	Gas to LP amine absorber	Treated off-gas	1-st stage stripper bottom	ISOM feed+RO
Phase		Vapor	Vapor	Mixed	Vapor	Liquid	Liquid
Total stream properties							
Rate	kmol/h	2928.9	3610.7	67.7	0.0	149.1	148.9
	kg/h	15871.0	17269.3	1038.6	0.3	37202.1	37200.5
Std. liquid rate	m3/HR	97.3	116.8	3.1	0.0	47.4	47.4
Temperature	°C	41.5	168.3	40.1	41.9	218.6	219.4
Pressure	barg	57.2	71.8	3.5	2.5	4.5	72.9
Molecular weight		5.42	4.78	15.35	16.16	249.55	249.79
Vapor phase properties							
Rate	kmol/h	2928.9	3610.7	67.7	0.0	0.0	0.0
	kg/h	15871.0	17269.3	1037.8	0.3	N/A	N/A
	m3/h	1354	1882	389	0	N/A	N/A
Std. vapor rate	m3/h	65648	80931	1517	0	N/A	N/A
Std. vapor density	kg/m3	0	0	1	1	N/A	N/A
Z factor		1	1	1	1	N/A	N/A
Molecular weight		5	5	15	16	N/A	N/A
Enthalpy	KJ/KG	347	1195	413	365	N/A	N/A
Entropy	KJ/KG-C	29	34	15	14	N/A	N/A
Heat capacity	KJ/KG-C	6	7	3	2	N/A	N/A
Cp/Cv ratio		1	1	1	1	N/A	N/A
Density	kg/m3	12	9	3	2	N/A	N/A
Thermal conductivity	W/M-C	0	0	0	0	N/A	N/A
Viscosity	CP	0	0	0	0	N/A	N/A
Liquid phase properties							
Rate	kmol/h	0.0	0.0	0.0	0.0	149.1	148.9
	kg/h	N/A	N/A	N/A	N/A	37202.1	37200.5
	m3/h	N/A	N/A	N/A	N/A	56.3	54.2
Std. liquid rate	m3/h	N/A	N/A	N/A	N/A	47.4	47.4
Std. liquid density	kg/m3	N/A	N/A	N/A	N/A	784.5	784.5
Specific gravity (H2O=1.0)		N/A	N/A	N/A	N/A	0.8	0.8
Molecular weight		N/A	N/A	N/A	N/A	249.5	249.8
Enthalpy	KJ/KG	N/A	N/A	N/A	N/A	538.1	548.5
Entropy	KJ/KG-C	N/A	N/A	N/A	N/A	8.5	8.5
Heat capacity	KJ/KG-C	N/A	N/A	N/A	N/A	2.9	2.8
Density	kg/m3	N/A	N/A	N/A	N/A	661.3	686.8
Surface tension	DYNE/CM	N/A	N/A	N/A	N/A	0.0	0.0
Thermal conductivity	W/M-C	N/A	N/A	N/A	N/A	0.1	0.1
Viscosity	CP	N/A	N/A	N/A	N/A	0.4	0.4
Composition							
Component weight rate	kg/h						
Water		74.7	91.3	11.1	0.0	0.1	0.1
NH_3		2.5	3.0	0.2	0.0	0.0	0.0
H_2S		436.9	432.0	63.6	0.0	0.9	0.9
CO		555.2	549.2	10.9	0.0	0.3	0.3
CO_2		2262.4	2231.7	127.6	0.0	2.4	2.3
HCL		0.0	0.0	0.0	0.0	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		4863.7	6242.5	75.9	0.0	2.5	2.2
Methane		6194.5	6135.4	212.8	0.2	5.2	5.0
Ethane		842.4	837.4	89.3	0.0	1.5	1.4
Propane		516.5	540.1	162.4	0.0	2.1	2.1
Iso-butane		62.9	95.7	88.8	0.0	1.5	1.5
N-butane		36.3	55.7	61.5	0.0	1.8	1.8
Iso-pentane		8.2	18.9	45.0	0.0	3.0	3.0
N-pentane		9.0	17.2	42.4	0.0	5.1	5.1
N-hexane		3.9	11.6	33.2	0.0	12.3	12.2
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		1.3	3.8	9.0	0.0	15.6	15.6
Kerosene fraction		0.6	3.8	4.3	0.0	2262.0	2261.9
Diesel fraction		0.1	0.1	0.6	0.0	34885.7	34885.1

Stream Name		4260	4300	4400	4450	4600	5060
		ISOM reactor feed	ISOM reactor outlet	HC reactor feed	HC reactor outlet	Diesel product	Wild naphtha
Phase		Mixed	Mixed	Mixed	Mixed	Liquid	Liquid
Total stream properties							
Rate	kmol/h	782.6	808.3	852.9	893.1	144.2	4.3
	kg/h	38495.9	38579.5	38670.7	38752.8	36531.2	359.6
Std. liquid rate	m3/HR	65.6	66.2	67.5	68.6	46.3	0.5
Temperature	°C	324.7	318.6	299.9	297.9	39.9	39.6
Pressure	barg	65.8	64.1	63.3	60.9	6.0	14.0
Molecular weight		49.19	47.73	45.34	43.39	253.26	83.35
Vapor phase properties							
Rate	kmol/h	625.0	667.1	706.9	749.2	0.0	0.0
	kg/h	5030.8	7772.3	6378.4	6672.2	N/A	N/A
	m3/h	480	521	540	592	N/A	N/A
Std. vapor rate	m3/h	14008	14953	15845	16792	N/A	N/A
Std. vapor density	kg/m3	0	1	0	0	N/A	N/A
Z factor		1	1	1	1	N/A	N/A
Molecular weight		8	12	9	9	N/A	N/A
Enthalpy	KJ/KG	1932	1576	1656	1655	N/A	N/A
Entropy	KJ/KG-C	27	20	23	24	N/A	N/A
Heat capacity	KJ/KG-C	6	5	5	5	N/A	N/A
Cp/Cv ratio		1	1	1	1	N/A	N/A
Density	kg/m3	10	15	12	11	N/A	N/A
Thermal conductivity	W/M-C	0	0	0	0	N/A	N/A
Viscosity	CP	0	0	0	0	N/A	N/A
Liquid phase properties							
Rate	kmol/h	157.6	141.2	146.0	143.9	144.2	4.3
	kg/h	33465.0	30807.2	32292.4	32080.7	36531.2	359.6
	m3/h	58.9	54.7	55.2	54.6	47.1	0.6
Std. liquid rate	m3/h	43.3	39.6	41.4	41.1	46.3	0.5
Std. liquid density	kg/m3	773.6	778.4	779.4	779.9	788.6	656.3
Specific gravity (H2O=1.0)		0.8	0.8	0.8	0.8	0.8	0.7
Molecular weight		212.3	218.2	221.1	222.9	253.3	83.3
Enthalpy	KJ/KG	877.0	813.8	754.2	747.5	48.5	87.7
Entropy	KJ/KG-C	9.2	7.3	7.1	7.1	5.4	6.2
Heat capacity	KJ/KG-C	3.2	3.2	3.1	3.1	2.3	2.3
Density	kg/m3	567.9	562.9	584.9	587.3	775.3	636.0
Surface tension	DYNE/CM	0.0	0.0	0.0	0.0	0.0	0.0
Thermal conductivity	W/M-C	0.1	0.1	0.1	0.1	0.1	0.1
Viscosity	CP	0.1	0.1	0.1	0.1	2.4	0.2
Composition							
Component weight rate	kg/h						
Water		0.1	0.1	0.1	1.2	0.6	0.4
NH_3		0.0	0.0	0.0	0.0	0.0	0.0
H_2S		0.9	0.9	0.9	0.9	0.0	0.0
CO		0.3	0.3	0.3	2.1	0.0	0.0
CO_2		2.6	2.7	2.7	0.0	0.0	0.0
HCL		0.0	0.0	0.0	0.0	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		1277.0	1314.5	1404.3	1484.9	0.0	0.0
Methane		25.2	29.7	31.2	32.4	0.0	0.0
Ethane		1.4	9.4	9.4	9.4	0.0	0.1
Propane		2.1	61.7	61.7	61.7	0.0	3.9
Iso-butane		1.5	109.0	109.0	109.0	0.0	19.4
N-butane		1.8	76.5	76.5	76.5	0.1	18.5
Iso-pentane		3.0	88.1	88.1	88.1	2.8	39.6
N-pentane		5.1	84.1	84.1	84.1	4.9	42.1
N-hexane		12.2	211.6	211.6	211.6	77.7	102.8
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		15.6	173.2	173.2	173.2	115.2	50.9
Kerosene fraction		2261.9	10459.0	10459.0	10459.0	10371.7	81.6
Diesel fraction		34885.1	25958.5	25958.5	25958.5	25958.2	0.2

Stream Name		5360	5475	5600	7210	7400	8000
		Stabilized naphtha	Jet product	Fractionator recycle oil	Sour water from HPCS	Sour water to BL	Lean amine
Phase		Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Total stream properties							
Rate	kmol/h	0.0	0.0	0.0	955.3	312.9	312.0
	kg/h	0.0	0.0	0.0	17221.3	5639.4	8000.0
Std. liquid rate	m3/HR	0.0	0.0	0.0	17.3	5.7	7.9
Temperature	°C	30.4	40.0	158.5	40.2	41.2	45.0
Pressure	barg	6.0	6.0	7.7	57.4	5.0	6.0
Molecular weight		101.37	244.68	273.39	18.03	18.02	25.64
Vapor phase properties							
Rate	kmol/h	0.0	0.0	0.0	0.0	0.0	0.0
	kg/h	N/A	N/A	N/A	N/A	N/A	N/A
	m3/h	N/A	N/A	N/A	N/A	N/A	N/A
Std. vapor rate	m3/h	N/A	N/A	N/A	N/A	N/A	N/A
Std. vapor density	kg/m3	N/A	N/A	N/A	N/A	N/A	N/A
Z factor		N/A	N/A	N/A	N/A	N/A	N/A
Molecular weight		N/A	N/A	N/A	N/A	N/A	N/A
Enthalpy	KJ/KG	N/A	N/A	N/A	N/A	N/A	N/A
Entropy	KJ/KG-C	N/A	N/A	N/A	N/A	N/A	N/A
Heat capacity	KJ/KG-C	N/A	N/A	N/A	N/A	N/A	N/A
Cp/Cv ratio		N/A	N/A	N/A	N/A	N/A	N/A
Density	kg/m3	N/A	N/A	N/A	N/A	N/A	N/A
Thermal conductivity	W/M-C	N/A	N/A	N/A	N/A	N/A	N/A
Viscosity	CP	N/A	N/A	N/A	N/A	N/A	N/A
Liquid phase properties							
Rate	kmol/h	0.0	0.0	0.0	955.3	312.9	312.0
	kg/h	0.0	0.0	N/A	17221.3	5639.2	8000.0
	m3/h	0.0	0.0	N/A	17.5	5.8	8.1
Std. liquid rate	m3/h	0.0	0.0	N/A	17.3	5.7	7.9
Std. liquid density	kg/m3	693.7	786.1	793.9	997.2	997.7	1013.3
Specific gravity (H2O=1.0)		0.7	0.8	0.8	1.0	1.0	1.0
Molecular weight		101.4	244.7	273.4	18.0	18.0	25.6
Enthalpy	KJ/KG	62.7	50.2	46.4	181.7	180.8	329.2
Entropy	KJ/KG-C	4.8	5.4	5.5	5.2	5.3	6.3
Heat capacity	KJ/KG-C	2.3	2.3	2.3	4.3	4.3	3.9
Density	kg/m3	682.9	772.6	781.2	985.9	975.7	987.8
Surface tension	DYNE/CM	0.0	0.0	0.0	0.0	0.1	0.1
Thermal conductivity	W/M-C	0.1	0.1	0.1	0.3	0.3	0.2
Viscosity	CP	0.4	2.2	3.0	0.5	0.5	0.5
Composition							
Component weight rate	kg/h						
Water		0.0	0.0	0.0	17162.2	5623.5	5193.6
NH_3		0.0	0.0	0.0	28.1	8.5	0.0
H_2S		0.0	0.0	0.0	8.9	2.9	8.8
CO		0.0	0.0	0.0	0.1	0.0	0.0
CO_2		0.0	0.0	0.0	17.3	3.5	1.1
HCL		0.0	0.0	0.0	2.8	0.9	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	2796.5
H_2		0.0	0.0	0.0	0.3	0.1	0.0
Methane		0.0	0.0	0.0	1.4	0.1	0.0
Ethane		0.0	0.0	0.0	0.1	0.0	0.0
Propane		0.0	0.0	0.0	0.2	0.0	0.0
Iso-butane		0.0	0.0	0.0	0.0	0.0	0.0
N-butane		0.0	0.0	0.0	0.0	0.0	0.0
Iso-pentane		0.0	0.0	0.0	0.0	0.0	0.0
N-pentane		0.0	0.0	0.0	0.0	0.0	0.0
N-hexane		0.0	0.0	0.0	0.0	0.0	0.0
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		0.0	0.0	0.0	0.0	0.0	0.0
Kerosene fraction		0.0	0.0	0.0	0.0	0.0	0.0
Diesel fraction		0.0	0.0	0.0	0.0	0.0	0.0

Stream	Name		8170	9000	9100	7500	1630	4000
			Rich amine	Fuel gas to heaters	Fuel gas	MP steam	HDO reactor effluent	1-st stage stripper OH
	Phase		Liquid	Vapor	Vapor	Vapor	Mixed	Vapor
Total stream properties								
Rate		kmol/h	313.7	138.3	58.6	19.4	3636.8	29.1
		kg/h	8075.7	2013.1	1053.2	350.0	112849.4	612.4
Std. liquid rate		m3/HR	8.0	6.3	3.3	0.4	220.8	1.5
Temperature		°C	47.1	45.4	38.0	252.0	239.9	220.2
Pressure		barg	5.0	3.3	2.5	14.1	58.8	4.3
Molecular weight			25.74	14.56	17.96	18.02	31.03	21.04
Vapor phase properties								
Rate		kmol/h	0.0	138.3	58.6	19.4	3233.5	29.1
		kg/h	N/A	2013.1	1053.2	350.0	25107.3	612.4
		m3/h	N/A	848	429	53	2356	225
Std. vapor rate		m3/h	N/A	1	1	0	29	0
Std. vapor density		kg/m3	N/A	1	1	1	0	1
Z factor			N/A	1	1	1	1	1
Molecular weight			N/A	15	18	18	8	21
Enthalpy		KJ/KG	N/A	455	283	2928	1698	906
Entropy		KJ/KG-C	N/A	15	12	7	24	14
Heat capacity		KJ/KG-C	N/A	3	2	2	5	3
Cp/Cv ratio			N/A	1	1	1	1	1
Density		kg/m3	N/A	2	2	7	11	3
Thermal conductivity		W/M-C	N/A	0	0	0	0	0
Viscosity		CP	N/A	0	0	0	0	0
Liquid phase properties								
Rate		kmol/h	313.7	0.0	0.0	0.0	403.3	0.0
		kg/h	8075.5	N/A	N/A	N/A	87742.2	N/A
		m3/h	8.2	N/A	N/A	N/A	138.5	N/A
Std. liquid rate		m3/h	8.0	N/A	N/A	N/A	112.9	N/A
Std. liquid density		kg/m3	1010.3	N/A	N/A	N/A	776.9	N/A
Specific gravity (H2O=1.0)			1.0	N/A	N/A	N/A	0.8	N/A
Molecular weight			25.7	N/A	N/A	N/A	217.6	N/A
Enthalpy		KJ/KG	333.5	N/A	N/A	N/A	615.5	N/A
Entropy		KJ/KG-C	6.3	N/A	N/A	N/A	8.6	N/A
Heat capacity		KJ/KG-C	3.9	N/A	N/A	N/A	2.9	N/A
Density		kg/m3	982.9	N/A	N/A	N/A	633.4	N/A
Surface tension		DYNE/CM	0.1	N/A	N/A	N/A	0.0	N/A
Thermal conductivity		W/M-C	0.2	N/A	N/A	N/A	0.1	N/A
Viscosity		CP	0.5	N/A	N/A	N/A	0.2	N/A
Composition								
Component weight rate		kg/h						
	Water		5179.5	52.7	0.0	350.0	5401.0	5.8
	NH_3		0.2	0.0	0.0	0.0	12.1293	0.3834
	H_2S		72.1	0.5	0.0	0.0	563.9	44.6
	CO		0.0	22.8	0.0	0.0	576.0	3.4
	CO_2		26.8	213.6	32.3	0.0	2420.7	54.4
	HCL		0.0	0.0	0.0	0.0	0.8893	0.0005
	MDEA		2796.5	0.0	0.0	0.0	0.0	0.0
	H_2		0.0	159.1	0.0	0.0	4893.7	31.3
	Methane		0.1	445.9	847.0	0.0	6441.2	67.1
	Ethane		0.1	187.1	88.0	0.0	997.0	52.1
	Propane		0.1	340.0	30.5	0.0	810.0	112.3
	Iso-butane		0.1	186.1	6.1	0.0	142.4	31.2
	N-butane		0.1	128.8	8.2	0.0	95.1	22.8
	Iso-pentane		0.0	94.3	2.5	0.0	39.9	10.8
	N-pentane		0.0	88.9	2.5	0.0	53.8	14.6
	N-hexane		0.0	93.2	5.1	0.0	57.6	12.9
	TBPS		0.0	0.0	0.0	0.0	0.0	0.0
	Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
	Naphtha fraction		0.0	0.0	31.0	0.0	49.8	8.2
	Kerosene fraction		0.0	0.0	0.0	0.0	5502.7	28.5
	Diesel fraction		0.0	0.0	0.0	0.0	84791.5	112.2

Stream Name		**4465** HC reactor effluent	**5000** 2-nd stage strippe r OH
Phase		Mixed	Vapor
Total stream properties			
Rate	kmol/h	893.1	48.3
	kg/h	38752.8	2325.2
Std. liquid rate	m3/HR	68.6	3.6
Temperature	°C	187.6	130.2
Pressure	barg	58.3	4.1
Molecular weight		43.39	48.12
Vapor phase properties			
Rate	kmol/h	735.5	48.3
	kg/h	2400.0	2325.2
	m3/h	489	306
Std. vapor rate	m3/h	7	0
Std. vapor density	kg/m3	0	2
Z factor		1	1
Molecular weight		3	48
Enthalpy	KJ/KG	1843	875
Entropy	KJ/KG-C	51	8
Heat capacity	KJ/KG-C	10	2
Cp/Cv ratio		1	1
Density	kg/m3	5	8
Thermal conductivity	W/M-C	0	0
Viscosity	CP	0	0
Liquid phase properties			
Rate	kmol/h	157.6	0.0
	kg/h	36391.5	N/A
	m3/h	53.3	N/A
Std. liquid rate	m3/h	46.5	N/A
Std. liquid density	kg/m3	782.2	N/A
Specific gravity (H2O=1.0)		0.8	N/A
Molecular weight		231.0	N/A
Enthalpy	KJ/KG	425.8	N/A
Entropy	KJ/KG-C	6.5	N/A
Heat capacity	KJ/KG-C	2.7	N/A
Density	kg/m3	682.9	N/A
Surface tension	DYNE/CM	0.0	N/A
Thermal conductivity	W/M-C	0.1	N/A
Viscosity	CP	0.3	N/A
Composition			
Component weight rate	kg/h		
Water		1.2	285.1
NH_3		0.0067	0.3024
H_2S		0.9	0.8
CO		2.1	0.1
CO_2		0.0	0.3
HCL		0.0139	0.0008
MDEA		0.0	0.0
H_2		1484.9	14.8
Methane		32.4	1.9
Ethane		9.4	2.6
Propane		61.7	46.0
Iso-butane		109.0	153.0
N-butane		76.5	130.9
Iso-pentane		88.1	234.0
N-pentane		84.1	240.5
N-hexane		211.6	540.4
TBPS		0.0	0.0
Nitrogen		0.0	0.0
Naphtha fraction		173.2	260.7
Kerosene fraction		10459.0	412.8
Diesel fraction		25958.5	1.1

Stream tables

Design case

UCO SAF EOR

Rev.	Description	Date	Made by	Chd.	Appd.
1	Final issue	23-Sep-2022	LUYG	-	-

Project Phoenix update for SAF processing

HALDOR TOPSØE

Document ID		LUYG	23-Sep-2022
S-10491-1	**0**	**1**	
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Stream Name		**1000**	**1400**	**1450**	**1500**	**1860**	**1880**
		Renewable feed	Feed pump discharge	HDO reactor feed	HDO reactor outlet	Recycle oil	Recycle oil+TG heater outlet
Phase		Liquid	Liquid	Mixed	Vapor	Liquid	Mixed
Total stream properties							
Rate	kmol/h	70.0	70.0	4046.2	3750.1	263.8	1010.9
	kg/h	41666.7	41677.7	104258.8	118252.5	51779.2	56718.3
Std. liquid rate	m3/HR	45.3	45.3	230.5	235.2	67.9	94.4
Temperature	°C	50.0	76.2	318.0	400.8	143.9	388.3
Pressure	barg	4.8	74.9	70.5	63.1	75.9	71.0
Molecular weight		595.32	595.09	25.77	31.53	196.31	56.11
Vapor phase properties							
Rate	kmol/h	0.0	0.0	3832.6	3750.1	0.0	854.7
	kg/h	N/A	N/A	44028.9	118252.5	N/A	27546.9
	m3/h	N/A	N/A	2719	3359	N/A	673
Std. vapor rate	m3/h	N/A	N/A	85904	84055	N/A	19157
Std. vapor density	kg/m3	N/A	N/A	1	1	N/A	1
Z factor		N/A	N/A	1	1	N/A	1
Molecular weight		N/A	N/A	11	32	N/A	32
Enthalpy	KJ/KG	N/A	N/A	1512	1532	N/A	1426
Entropy	KJ/KG-C	N/A	N/A	20	13	N/A	13
Heat capacity	KJ/KG-C	N/A	N/A	4	4	N/A	4
Cp/Cv ratio		N/A	N/A	1	1	N/A	1
Density	kg/m3	N/A	N/A	16	35	N/A	41
Thermal conductivity	W/M-C	N/A	N/A	0	0.14	N/A	0.18
Viscosity	CP	N/A	N/A	0	0.0	N/A	0.0
Liquid phase properties							
Rate	kmol/h	70.0	70.0	213.6	0.0	263.8	156.2
	kg/h	41666.7	41677.7	60229.8	N/A	51779.2	29171.4
	m3/h	46.1	46.2	94.4	N/A	75.1	54.9
Std. liquid rate	m3/h	45.3	45.3	72.4	N/A	67.9	38.1
Std. liquid density	kg/m3	920.7	920.8	831.8	N/A	762.7	765.6
Specific gravity (H2O=1.0)		0.9	0.9	0.8	N/A	0.8	0.8
Molecular weight		595.3	595.1	281.9	N/A	196.3	186.7
Enthalpy	KJ/KG	16.9	90.0	796.9	N/A	344.5	1091.9
Entropy	KJ/KG-C	6.6	6.8	8.7	N/A	8.0	9.5
Heat capacity	KJ/KG-C	2.4	2.4	3.1	N/A	2.6	3.5
Density	kg/m3	902.9	901.2	638.2	N/A	689.3	531.8
Surface tension	DYNE/CM	0.0	0.0	0.0	N/A	0.0	0.0
Thermal conductivity	W/M-C	0.1	0.1	0.1	N/A	0.1	0.1
Viscosity	CP	317.3	28.2	0.2	N/A	0.4	0.1
Composition							
Component weight rate	kg/h						
Water		0.0	0.0	104.2	5174.4	7.6	26.9
NH_3		0.0	0.0	2.2	7.3	0.4	0.7
H_2S		0.0	0.0	31.7	35.9	4.1	9.6
CO		0.0	0.0	507.9	536.9	1.0	102.4
CO_2		0.0	0.0	1142.4	1268.1	30.9	253.2
HCL		0.0	0.0	0.0	0.7	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		0.0	0.0	6029.7	4483.8	1.5	1207.1
Methane		0.0	0.0	7653.5	8204.3	63.9	1581.8
Ethane		0.0	0.0	1838.5	2088.4	142.9	482.0
Propane		0.0	0.0	8665.2	10785.3	2107.9	3419.3
Iso-butane		0.0	0.0	811.0	817.9	258.9	369.3
N-butane		0.0	0.0	472.4	480.5	169.8	230.3
Iso-pentane		0.0	0.0	190.6	193.9	88.7	109.1
N-pentane		0.0	0.0	109.3	121.9	58.4	68.6
N-hexane		0.0	0.0	87.8	105.1	56.7	63.0
TBPS		0.0	11.0	18.3	3.7	11.0	11.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		0.0	0.0	88.2	109.2	61.5	66.8
Kerosene fraction		0.0	0.0	6644.7	11411.0	6630.0	6633.0
Diesel fraction		41666.7	41666.7	69861.1	72424.2	42084.1	42084.1

Stream	Name		1920	2000	2120	2200	2230	2235
			1-st stage stripper feed	MUG from BL	MUG	Recycle gas	Purge gas	Purge gas to 1-st stage stripper
	Phase		Mixed	Vapor	Vapor	Mixed	Vapor	Vapor
Total stream properties								
Rate		kmol/h	190.1	992.5	769.4	895.6	90.1	15.1
		kg/h	37320.9	2028.9	1572.9	2598.9	700.0	100.0
Std. liquid rate		m3/HR	48.9	28.4	22.0	26.6	3.4	0.5
Temperature		°C	221.5	30.0	104.0	41.0	38.5	41.0
Pressure		barg	8.0	28.5	77.3	57.2	6.0	6.0
Molecular weight			196.30	2.04	2.04	2.90	7.77	6.61
Vapor phase properties								
Rate		kmol/h	33.0	992.5	769.4	895.1	90.1	15.1
		kg/h	1500.5	2028.9	1572.9	2588.5	700.0	100.0
		m3/h	147	864	321	416	334	57
Std. vapor rate		m3/h	740	22246	17246	20062	2020	339
Std. vapor density		kg/m3	2	0	0	0	0	0
Z factor			1	1	1	1	1	1
Molecular weight			45	2	2	3	8	7
Enthalpy		KJ/KG	835	260	1348	441	364	381
Entropy		KJ/KG-C	9	74	73	52	24	28
Heat capacity		KJ/KG-C	3	14	14	10	4	5
Cp/Cv ratio			1	1	1	1	1	1
Density		kg/m3	10	2	5	6	2	2
Thermal conductivity		W/M-C	0.05	0.15	0	0	0	0
Viscosity		CP	0.0	0.0	0	0	0	0
Liquid phase properties								
Rate		kmol/h	157.1	0.0	0.0	0.6	0.0	0.0
		kg/h	35820.4	N/A	N/A	10.4	N/A	N/A
		m3/h	55.6	N/A	N/A	0.0	N/A	N/A
Std. liquid rate		m3/h	46.0	N/A	N/A	0.0	N/A	N/A
Std. liquid density		kg/m3	778.3	N/A	N/A	996.1	N/A	N/A
Specific gravity (H2O=1.0)			0.8	N/A	N/A	1.0	N/A	N/A
Molecular weight			228.0	N/A	N/A	18.0	N/A	N/A
Enthalpy		KJ/KG	546.2	N/A	N/A	185.1	N/A	N/A
Entropy		KJ/KG-C	8.4	N/A	N/A	5.3	N/A	N/A
Heat capacity		KJ/KG-C	2.9	N/A	N/A	4.3	N/A	N/A
Density		kg/m3	644.1	N/A	N/A	982.7	N/A	N/A
Surface tension		DYNE/CM	0.0	N/A	N/A	0.0	N/A	N/A
Thermal conductivity		W/M-C	0.1	N/A	N/A	0.3	N/A	N/A
Viscosity		CP	0.3	N/A	N/A	0.5	N/A	N/A
Composition								
Component weight rate		kg/h						
Water			5.5	0.0	0.0	22.1	2.4	0.4
NH_3			0.3	0.0	0.0	0.3	0.0	0.0
H_2S			2.9	0.0	0.0	0.1	0.9	0.1
CO			0.7	0.1	0.0	1.2	16.0	2.1
CO_2			22.3	0.4	0.3	0.9	35.1	4.5
HCL			0.0	0.0	0.0	0.0	0.0	0.0
MDEA			0.0	0.0	0.0	0.0	0.0	0.0
H_2			1.1	1996.7	1547.9	1768.5	135.3	24.4
Methane			46.1	31.7	24.6	49.8	238.6	30.7
Ethane			103.0	0.0	0.0	36.1	52.5	6.9
Propane			1519.6	0.0	0.0	200.8	201.2	26.6
Iso-butane			186.6	0.0	0.0	222.3	10.5	2.2
N-butane			122.4	0.0	0.0	136.3	5.3	1.2
Iso-pentane			63.9	0.0	0.0	65.9	1.2	0.4
N-pentane			42.1	0.0	0.0	32.2	0.6	0.2
N-hexane			40.9	0.0	0.0	24.6	0.2	0.1
TBPS			0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen			0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction			44.3	0.0	0.0	23.9	0.1	0.1
Kerosene fraction			4779.7	0.0	0.0	13.8	0.0	0.1
Diesel fraction			30339.4	0.0	0.0	0.0	0.0	0.0

Project Phoenix update for SAF processing

HALDOR TOPSØE

Document ID		LUYG	23-Sep-2022
S-10491-1	**0**	**1**	
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Stream Name		**2250**	**2321**	**2600**	**2640**	**4100**	**4200**
		Vapor from HPCS	Treat gas	Gas to LP amine absorber	Treated off-gas	1-st stage stripper bottom	ISOM feed+RO
Phase		Vapor	Vapor	Vapor	Vapor	Liquid	Liquid
Total stream properties							
Rate	kmol/h	2872.1	3735.8	246.9	187.2	143.2	205.8
	kg/h	22307.7	24695.3	5669.4	4276.8	35227.2	53209.6
Std. liquid rate	m3/HR	107.0	132.5	14.2	10.7	44.8	67.3
Temperature	°C	41.7	163.8	38.2	44.0	215.6	186.8
Pressure	barg	57.2	76.0	3.5	3.3	4.5	77.8
Molecular weight		7.77	6.61	22.96	22.85	246.06	258.57
Vapor phase properties							
Rate	kmol/h	2872.1	3735.8	246.9	187.2	0.0	0.0
	kg/h	22307.7	24695.3	5669.4	4276.8	N/A	N/A
	m3/h	1316	1826	1398	1132	N/A	N/A
Std. vapor rate	m3/h	64375	83734	5534	4196	N/A	N/A
Std. vapor density	kg/m3	0	0	1	1	N/A	N/A
Z factor		1	1	1	1	N/A	N/A
Molecular weight		8	7	23	23	N/A	N/A
Enthalpy	KJ/KG	364	1016	428	466	N/A	N/A
Entropy	KJ/KG-C	22	27	12	12	N/A	N/A
Heat capacity	KJ/KG-C	4	5	2	2	N/A	N/A
Cp/Cv ratio		1	1	1	1	N/A	N/A
Density	kg/m3	17	14	4	4	N/A	N/A
Thermal conductivity	W/M-C	0	0	0	0	N/A	N/A
Viscosity	CP	0	0	0	0	N/A	N/A
Liquid phase properties							
Rate	kmol/h	0.0	0.0	0.0	0.0	143.2	205.8
	kg/h	N/A	N/A	N/A	N/A	35227.2	53209.6
	m3/h	N/A	N/A	N/A	N/A	53.1	74.9
Std. liquid rate	m3/h	N/A	N/A	N/A	N/A	44.8	67.3
Std. liquid density	kg/m3	N/A	N/A	N/A	N/A	786.0	790.3
Specific gravity (H2O=1.0)		N/A	N/A	N/A	N/A	0.8	0.8
Molecular weight		N/A	N/A	N/A	N/A	246.1	258.6
Enthalpy	KJ/KG	N/A	N/A	N/A	N/A	527.6	443.6
Entropy	KJ/KG-C	N/A	N/A	N/A	N/A	8.4	7.7
Heat capacity	KJ/KG-C	N/A	N/A	N/A	N/A	2.8	2.7
Density	kg/m3	N/A	N/A	N/A	N/A	663.8	710.4
Surface tension	DYNE/CM	N/A	N/A	N/A	N/A	0.0	0.0
Thermal conductivity	W/M-C	N/A	N/A	N/A	N/A	0.1	0.1
Viscosity	CP	N/A	N/A	N/A	N/A	0.4	0.5
Composition							
Component weight rate	kg/h						
Water		75.4	96.6	25.9	67.3	0.1	0.1
NH_3		1.5	1.9	0.3	0.0	0.0	0.0
H_2S		27.8	27.6	5.9	0.6	0.1	0.1
CO		510.0	506.9	27.7	20.7	0.2	0.2
CO_2		1120.1	1111.5	116.3	78.1	1.1	1.1
HCL		0.0	0.0	0.0	0.0	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		4311.3	6028.2	219.9	164.7	2.1	2.1
Methane		7604.7	7589.6	565.1	423.2	6.0	6.0
Ethane		1674.0	1695.6	291.0	217.9	2.8	2.8
Propane		6412.6	6557.4	2526.9	1891.8	20.4	20.4
Iso-butane		334.5	552.1	773.6	579.3	5.5	5.5
N-butane		168.9	302.6	535.4	400.9	5.5	5.5
Iso-pentane		36.9	101.9	334.7	250.6	9.4	9.4
N-pentane		19.1	50.9	166.1	124.4	7.8	7.8
N-hexane		6.7	31.1	52.2	57.3	18.6	18.6
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		3.0	26.7	23.3	0.0	31.8	31.8
Kerosene fraction		1.0	14.7	5.0	0.0	4776.4	10928.5
Diesel fraction		0.1	0.1	0.0	0.0	30339.4	42169.6

Project Phoenix update for SAF processing

HALDOR TOPSOE

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Stream Name		**4260**	**4300**	**4400**	**4450**	**4600**	**5060**
		ISOM reactor feed	ISOM reactor outlet	HC reactor feed	HC reactor outlet	Diesel product	Wild naphtha
Phase		Mixed	Mixed	Mixed	Mixed	Liquid	Liquid
Total stream properties							
Rate	kmol/h	1051.0	1094.2	1138.8	1196.3	0.0	16.1
	kg/h	54937.6	55029.0	55120.2	55238.8	0.0	1100.0
Std. liquid rate	m3/HR	91.5	93.0	94.3	96.2	0.0	1.8
Temperature	°C	352.9	350.2	345.2	344.4	40.1	39.7
Pressure	barg	70.7	66.6	65.8	60.9	6.0	14.0
Molecular weight		52.27	50.29	48.40	46.17	286.77	68.25
Vapor phase properties							
Rate	kmol/h	844.3	914.9	958.6	1073.7	0.0	0.0
	kg/h	10834.8	17958.0	17588.9	30459.3	N/A	N/A
	m3/h	636	726	763	912	N/A	N/A
Std. vapor rate	m3/h	18924	20507	21487	24067	N/A	N/A
Std. vapor density	kg/m3	1	1	1	1	N/A	N/A
Z factor		1	1	1	1	N/A	N/A
Molecular weight		13	20	18	28	N/A	N/A
Enthalpy	KJ/KG	1714	1467	1475	1301	N/A	N/A
Entropy	KJ/KG-C	20	15	15	12	N/A	N/A
Heat capacity	KJ/KG-C	5	4	4	4	N/A	N/A
Cp/Cv ratio		1	1	1	1	N/A	1
Density	kg/m3	17	25	23	33	N/A	N/A
Thermal conductivity	W/M-C	0	0	0	0	N/A	N/A
Viscosity	CP	0	0	0	0	N/A	N/A
Liquid phase properties							
Rate	kmol/h	206.7	179.3	180.2	122.6	0.0	16.1
	kg/h	44102.7	37071.0	37531.4	24779.5	0.0	1100.0
	m3/h	79.8	68.9	70.0	47.6	0.0	1.9
Std. liquid rate	m3/h	56.7	47.8	48.4	32.0	0.0	1.8
Std. liquid density	kg/m3	778.1	775.4	776.0	773.6	799.0	614.6
Specific gravity (H2O=1.0)		0.8	0.8	0.8	0.8	0.8	0.6
Molecular weight		213.3	206.8	208.3	202.1	286.8	68.3
Enthalpy	KJ/KG	952.8	936.1	919.0	902.3	43.5	92.7
Entropy	KJ/KG-C	8.8	8.3	8.2	7.5	5.7	6.7
Heat capacity	KJ/KG-C	3.3	3.3	3.3	3.3	2.3	2.4
Density	kg/m3	552.5	538.0	536.5	521.0	785.9	590.4
Surface tension	DYNE/CM	0.0	0.0	0.0	0.0	0.0	0.0
Thermal conductivity	W/M-C	0.1	0.1	0.1	0.1	0.1	0.1
Viscosity	CP	0.1	0.1	0.1	0.1	3.3	0.2
Composition							
Component weight rate	kg/h						
Water		0.1	0.1	0.1	0.7	0.0	2.4
NH_3		0.0	0.0	0.0	0.0	0.0	0.0
H_2S		0.1	0.1	0.1	0.1	0.0	0.0
CO		0.3	0.3	0.3	1.3	0.0	0.0
CO_2		1.4	1.5	1.5	0.0	0.0	0.0
HCL		0.0	0.0	0.0	0.0	0.0	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	0.0
H_2		1702.7	1704.5	1794.2	1795.5	0.0	0.0
Methane		33.0	41.6	43.0	54.2	0.0	0.0
Ethane		2.8	24.3	24.3	52.5	0.0	0.8
Propane		20.4	224.8	224.8	492.8	0.0	36.1
Iso-butane		5.5	416.6	416.6	955.6	0.0	182.3
N-butane		5.5	311.8	311.8	713.4	0.0	176.8
Iso-pentane		9.4	333.0	333.0	757.2	0.0	288.6
N-pentane		7.8	205.7	205.7	465.1	0.0	167.3
N-hexane		18.6	431.4	431.4	972.6	0.0	116.4
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		31.8	995.9	995.9	2260.0	0.0	90.2
Kerosene fraction		10928.5	17623.6	17623.6	29940.2	0.0	38.9
Diesel fraction		42169.6	32714.1	32714.1	16777.6	0.0	0.0

Project Phoenix update for SAF processing

HALDOR TOPSØE

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UCO SAF EOR

Stream Name		**5360**	**5475**	**5600**	**7210**	**7400**	**8000**
		Stabilized naphtha	Jet product	Fractionator recycle oil	Sour water from HPCS	Sour water to BL	Lean amine
Phase		Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Total stream properties							
Rate	kmol/h	36.7	144.4	62.6	934.1	314.5	312.0
	kg/h	3438.9	28450.4	17982.4	16831.7	5668.0	8000.0
Std. liquid rate	m3/HR	5.0	36.9	22.5	16.9	5.7	7.9
Temperature	°C	30.4	40.0	124.3	40.1	41.4	45.0
Pressure	barg	6.0	6.0	8.8	57.4	5.0	6.0
Molecular weight		93.69	196.96	287.17	18.02	18.02	25.64
Vapor phase properties							
Rate	kmol/h	0.0	0.0	0.0	0.0	0.0	0.0
	kg/h	N/A	N/A	N/A	N/A	N/A	N/A
	m3/h	N/A	N/A	N/A	N/A	N/A	N/A
Std. vapor rate	m3/h	N/A	N/A	N/A	N/A	N/A	N/A
Std. vapor density	kg/m3	N/A	N/A	N/A	N/A	N/A	N/A
Z factor		N/A	N/A	N/A	N/A	N/A	N/A
Molecular weight		N/A	N/A	N/A	N/A	N/A	N/A
Enthalpy	KJ/KG	N/A	N/A	N/A	N/A	N/A	N/A
Entropy	KJ/KG-C	N/A	N/A	N/A	N/A	N/A	N/A
Heat capacity	KJ/KG-C	N/A	N/A	N/A	N/A	N/A	N/A
Cp/Cv ratio		N/A	N/A	N/A	N/A	N/A	N/A
Density	kg/m3	N/A	N/A	N/A	N/A	N/A	N/A
Thermal conductivity	W/M-C	N/A	N/A	N/A	N/A	N/A	N/A
Viscosity	CP	N/A	N/A	N/A	N/A	N/A	N/A
Liquid phase properties							
Rate	kmol/h	36.7	144.4	62.6	934.1	314.5	312.0
	kg/h	3438.9	28450.4	17982.4	16831.7	5667.7	8000.0
	m3/h	5.1	37.7	24.4	17.1	5.8	8.1
Std. liquid rate	m3/h	5.0	36.9	22.5	16.9	5.7	7.9
Std. liquid density	kg/m3	681.2	770.1	799.1	997.7	998.2	1013.3
Specific gravity (H2O=1.0)		0.7	0.8	0.8	1.0	1.0	1.0
Molecular weight		93.7	197.0	287.2	18.0	18.0	25.6
Enthalpy	KJ/KG	64.5	57.9	247.3	182.2	182.2	329.2
Entropy	KJ/KG-C	4.9	5.1	6.2	5.2	5.3	6.3
Heat capacity	KJ/KG-C	2.3	2.3	2.5	4.3	4.3	3.9
Density	kg/m3	669.8	755.6	738.4	986.9	976.1	987.8
Surface tension	DYNE/CM	0.0	0.0	0.0	0.0	0.1	0.1
Thermal conductivity	W/M-C	0.1	0.1	0.1	0.3	0.3	0.2
Viscosity	CP	0.3	1.2	0.9	0.5	0.5	0.5
Composition							
Component weight rate	kg/h						
Water		3.3	0.0	0.0	16800.0	5659.5	5193.6
NH_3		0.0	0.0	0.0	16.6	4.8	0.0
H_2S		0.0	0.0	0.0	0.5	0.2	8.8
CO		0.0	0.0	0.0	0.1	0.0	0.0
CO_2		0.0	0.0	0.0	8.3	2.2	1.1
HCL		0.0	0.0	0.0	2.1	0.7	0.0
MDEA		0.0	0.0	0.0	0.0	0.0	2796.5
H_2		0.0	0.0	0.0	0.3	0.0	0.0
Methane		0.0	0.0	0.0	1.6	0.1	0.0
Ethane		0.0	0.0	0.0	0.3	0.0	0.0
Propane		0.0	0.0	0.0	1.7	0.3	0.0
Iso-butane		0.5	0.0	0.0	0.0	0.0	0.0
N-butane		2.4	0.0	0.0	0.1	0.1	0.0
Iso-pentane		127.2	0.3	0.0	0.0	0.0	0.0
N-pentane		135.9	0.4	0.0	0.0	0.0	0.0
N-hexane		783.5	18.9	0.0	0.0	0.0	0.0
TBPS		0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
Naphtha fraction		1857.3	278.4	0.0	0.0	0.0	0.0
Kerosene fraction		528.8	23205.0	6152.1	0.0	0.0	0.0
Diesel fraction		0.0	4947.3	11830.3	0.0	0.0	0.0

Stream	Name		8170	9000	9100	7500	1630	4000
			Rich amine	Fuel gas to heaters	Fuel gas	MP steam	HDO reactor effluent	1-st stage stripper OH
	Phase		Liquid	Vapor	Vapor	Vapor	Mixed	Vapor
Total stream properties								
Rate		kmol/h	309.0	62.8	0.0	34.4	3750.1	65.3
		kg/h	7954.7	1434.0	0.0	620.0	118252.5	2652.8
Std. liquid rate		m3/HR	7.9	3.6	0.0	0.6	235.2	5.3
Temperature		°C	38.6	44.0	50.0	252.0	239.7	219.1
Pressure		barg	5.0	3.3	3.5	14.1	58.8	4.3
Molecular weight			25.75	22.85	35.89	18.02	31.53	40.62
Vapor phase properties								
Rate		kmol/h	0.0	62.8	0.0	34.4	3360.6	65.3
		kg/h	N/A	1434.0	0.0	620.0	37132.1	2652.8
		m3/h	N/A	379	0	94	2443	497
Std. vapor rate		m3/h	N/A	1	0	0	31	1
Std. vapor density		kg/m3	N/A	1	2	1	0	2
Z factor			N/A	1	1	1	1	1
Molecular weight			N/A	23	36	18	11	41
Enthalpy		KJ/KG	N/A	466	477	2928	1401	848
Entropy		KJ/KG-C	N/A	12	9	7	19	10
Heat capacity		KJ/KG-C	N/A	2	2	2	4	3
Cp/Cv ratio			N/A	1	1	1	1	1
Density		kg/m3	N/A	4	6	7	15	5
Thermal conductivity		W/M-C	N/A	0	0	0	0	0
Viscosity		CP	N/A	0	0	0	0	0
Liquid phase properties								
Rate		kmol/h	309.0	0.0	0.0	0.0	389.5	0.0
		kg/h	7954.5	N/A	N/A	N/A	81120.5	N/A
		m3/h	8.0	N/A	N/A	N/A	129.9	N/A
Std. liquid rate		m3/h	7.9	N/A	N/A	N/A	104.8	N/A
Std. liquid density		kg/m3	1012.7	N/A	N/A	N/A	774.4	N/A
Specific gravity (H2O=1.0)			1.0	N/A	N/A	N/A	0.8	N/A
Molecular weight			25.7	N/A	N/A	N/A	208.2	N/A
Enthalpy		KJ/KG	304.0	N/A	N/A	N/A	613.1	N/A
Entropy		KJ/KG-C	6.2	N/A	N/A	N/A	8.6	N/A
Heat capacity		KJ/KG-C	3.9	N/A	N/A	N/A	2.9	N/A
Density		kg/m3	992.8	N/A	N/A	N/A	624.7	N/A
Surface tension		DYNE/CM	0.1	N/A	N/A	N/A	0.0	N/A
Thermal conductivity		W/M-C	0.2	N/A	N/A	N/A	0.1	N/A
Viscosity		CP	0.5	N/A	N/A	N/A	0.2	N/A
Composition								
Component weight rate		kg/h						
	Water		5129.6	22.6	0.0	620.0	5174.4	6.2
	NH_3		0.3	0.0	0.0	0.0	7.2814	0.2576
	H_2S		13.9	0.2	0.0	0.0	35.9	3.1
	CO		0.0	6.9	0.0	0.0	536.9	2.5
	CO_2		13.1	26.2	0.0	0.0	1268.1	25.9
	HCL		0.0	0.0	0.0	0.0	0.6658	0.0004
	MDEA		2796.5	0.0	0.0	0.0	0.0	0.0
	H_2		0.0	55.2	0.0	0.0	4483.8	23.3
	Methane		0.1	141.9	0.0	0.0	8204.3	70.9
	Ethane		0.1	73.1	0.0	0.0	2088.4	107.7
	Propane		0.7	634.3	0.0	0.0	10785.3	1558.4
	Iso-butane		0.2	194.2	0.0	0.0	817.9	192.4
	N-butane		0.2	134.4	0.0	0.0	480.5	126.1
	Iso-pentane		0.1	84.0	0.0	0.0	193.9	63.5
	N-pentane		0.0	41.7	0.0	0.0	121.9	41.3
	N-hexane		0.0	19.2	0.0	0.0	105.1	35.4
	TBPS		0.0	0.0	0.0	0.0	3.7	0.0
	Nitrogen		0.0	0.0	0.0	0.0	0.0	0.0
	Naphtha fraction		0.0	0.0	0.0	0.0	109.2	31.3
	Kerosene fraction		0.0	0.0	0.0	0.0	11411.0	116.4
	Diesel fraction		0.0	0.0	0.0	0.0	72424.2	248.1

Stream Name		**4465** HC reactor effluent	**5000** 2-nd stage strippe r OH
Phase		Mixed	Vapor
Total stream properties			
Rate	kmol/h	1196.3	446.6
	kg/h	55238.8	27898.0
Std. liquid rate	m3/HR	96.2	45.6
Temperature	°C	164.7	96.8
Pressure	barg	58.3	4.1
Molecular weight		46.17	62.47
Vapor phase properties			
Rate	kmol/h	932.1	446.6
	kg/h	6046.4	27898.0
	m3/h	590	2468
Std. vapor rate	m3/h	8	4
Std. vapor density	kg/m3	0	3
Z factor		1	1
Molecular weight		6	62
Enthalpy	KJ/KG	1130	580
Entropy	KJ/KG-C	28	8
Heat capacity	KJ/KG-C	6	2
Cp/Cv ratio		1	1
Density	kg/m3	10	11
Thermal conductivity	W/M-C	0	0
Viscosity	CP	0	0
Liquid phase properties			
Rate	kmol/h	264.3	0.0
	kg/h	49237.0	N/A
	m3/h	73.9	N/A
Std. liquid rate	m3/h	64.4	N/A
Std. liquid density	kg/m3	764.7	N/A
Specific gravity (H2O=1.0)		0.8	N/A
Molecular weight		186.3	N/A
Enthalpy	KJ/KG	371.2	N/A
Entropy	KJ/KG-C	6.3	N/A
Heat capacity	KJ/KG-C	2.6	N/A
Density	kg/m3	666.4	N/A
Surface tension	DYNE/CM	0.0	N/A
Thermal conductivity	W/M-C	0.1	N/A
Viscosity	CP	0.3	N/A
Composition			
Component weight rate	kg/h		
Water		0.7	554.4
NH_3		0.0037	0.4019
H_2S		0.1	0.1
CO		1.3	0.1
CO_2		0.0	0.2
HCL		0.0181	0.0006
MDEA		0.0	0.0
H_2		1795.5	28.0
Methane		54.2	5.6
Ethane		52.5	35.4
Propane		492.8	1100.0
Iso-butane		955.6	4809.6
N-butane		713.4	4530.1
Iso-pentane		757.2	7019.4
N-pentane		465.1	4038.5
N-hexane		972.6	2749.4
TBPS		0.0	0.0
Nitrogen		0.0	0.0
Naphtha fraction		2260.0	2116.7
Kerosene fraction		29940.2	910.2
Diesel fraction		16777.6	0.1