Heat and Mass Balance: Case 1 - Start of Life

Stream No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Stream Description		**Inlet to Slug Catcher**	**Vapour from Slug Catcher**	**Slug Catcher Vapour to HP Comp**	**Liquid from Slug Catcher**	**Liquid to 1st Stage Sep Preheater**	**Gas to HP Comp Suction Manifold**	**Gas to HP Comp Trains**	**Blanket Gas to Cargo Tanks**	**Inlet to HP1 Suction Throttling Valve**	**Inlet to HP1 Suction Scrubber**	**Gas from HP1 Scrubber**	**Condensate from HP1 Scrubber**	**Condensate from HP1 Scrubber LCV**	**Condensate from HP1 Scrubbers to 2nd Stg Sep**	**Inlet to HP1 Compressor**	**Discharge from HP1 Compressor**	**Outlet from HP1 Discharge Cooler**
Vapour Fraction	---	0.1719	1.0000	1.0000	0.0000	0.0005	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0396	0.0396	1.0000	1.0000	0.9957
Temperature	°C	40.0	40.0	39.6	40.0	40.0	38.9	38.8	38.8	38.8	38.6	38.5	38.5	38.8	38.8	38.2	123.3	30.0
Pressure	barg	11.90	11.60	10.60	11.60	9.65	10.60	10.40	10.40	10.40	9.92	9.62	9.62	1.06	1.06	8.82	24.58	23.58
Mass Flow	kg/h	1840203	188990	188990	825620	825620	196313	195652	661	97826	97826	97826	0	0	0	97826	97826	97826
Molar Flow	kgmole/h	62398	10736	10736	25831	25831	11015	10978	37	5489	5489	5489	0	0	0	5489	5489	5489
Molecular Weight	kg/kgmole	29.49	17.60	17.60	31.96	31.96	17.82	17.82	17.82	17.82	17.82	17.82	240.74	240.74	240.74	17.82	17.82	17.82
Mass Density	kg/m^3	80.28	8.72	8.02	933.73	904.12	8.15	8.00	8.00	8.00	7.67	7.46	869.31	313.68	313.68	6.89	14.03	18.35
Enthalpy	kW	-4502536	-230843	-230843	-2135856	-2135856	-237830	-237029	-801	-118515	-118515	-118515	0	0	0	-118515	-113328	-119707
Vapor																		
Mass Flow	kg/h	188762	188990	188990		217	196312	195652	661	97826	97826	97826				97826	97826	97400
Std Gas Flow	SM^3/hr	253658	253837	253837		288	260445	259569	877	129785	129785	129785				129785	129785	129227
Std Gas Flow	MMSCFD	215.0	215.1	215.1		0.2	220.7	220.0	0.7	110.0	110.0	110.0				110.0	110.0	109.5
Actual Volume Flow	m^3/hr	21153.5	21680.9	23554.7		29.2	24100.5	24441.4	82.6	12220.7	12758.0	13119.2				14190.4	6974.0	5330.6
Molecular Weight	kg/kgmole	17.59	17.60	17.60		17.82	17.82	17.82	17.82	17.82	17.82	17.82				17.82	17.82	17.82
Mass Density	kg/m^3	8.92	8.72	8.02		7.44	8.15	8.00	8.00	8.00	7.67	7.46				6.89	14.03	18.27
Mass Heat Capacity	kJ/kg-°C	2.271	2.268	2.262		2.248	2.253	2.251	2.251	2.251	2.248	2.246				2.240	2.523	2.329
Thermal Conductivity	W/m-K	0.036	0.036	0.035		0.035	0.035	0.035	0.035	0.035	0.035	0.035				0.035	0.049	0.035
Viscosity	cP	0.012	0.012	0.012		0.012	0.012	0.012	0.012	0.012	0.012	0.012				0.012	0.015	0.012
Compressibility	---	0.978	0.978	0.980		0.981	0.979	0.980	0.980	0.980	0.980	0.981				0.982	0.986	0.952
C_p/C_v	---	1.311	1.310	1.307		1.301	1.305	1.304	1.304	1.304	1.303	1.302				1.300	1.272	1.357
Enthalpy	kW	-230598	-230843	-230843		-264	-237826	-237029	-801	-118515	-118515	-118515				-118515	-113328	-117843
Total Liquid Phase																		
Mass Flow	kg/h	1651441			825620	825403	1						0	0	0			426
Actual Volume Flow	m^3/h	1768.7			884.2	884.0	0.0						0.0	0.0	0.0			0.4
Std Liq Flow	barrel/d	246156			123050	122965	0						0	0	0			63
Mass Density	kg/m^3	933.7			933.7	933.8	997.1						869.3	870.0	870.0			1003.4
Mass Heat Capacity	kJ/kg-°C	3.055			3.055	3.055	4.177						1.790	1.784	1.784			4.167
Thermal Conductivity	W/m-K	0.309			0.309	0.310	0.630						0.144	0.147	0.147			0.615
Viscosity	cP	**116.067**			**116.188**	**115.932**	0.665						4.329	4.632	4.632			0.802
Enthalpy	kW	-4271939			-2135856	-2135592	-5						0	0	0			-1865
HC Liquid Phase																		
Mass Flow	kg/h	777881			388857	388638							0	0	0			1
Actual Volume Flow	m^3/h	892.0			445.9	445.6							0.0	0.0	0.0			0.0
Std Liq Flow	barrel/d	131847			65905	65860							0	0	0			0
Mass Density	kg/m^3	872.1			872.1	872.2							869.3	870.0	870.0			766.2
Mass Heat Capacity	kJ/kg-°C	1.795			1.794	1.793							1.790	1.784	1.784			2.039
Thermal Conductivity	W/m-K	0.144			0.144	0.145							0.144	0.147	0.147			0.120
Viscosity	cP	**20.350**			**20.367**	**20.310**							4.329	4.632	4.632			0.928
Surface Tension	dyne/cm	26.00			26.04	26.23							26.01	26.97	26.97			19.35
Enthalpy	kW	-448251			-224066	-223812							0	0	0			-1
Aqueous Phase																		
Mass Flow	kg/h	873560			436763	436765	1											425
Actual Volume Flow	m^3/h	876.7			438.4	438.4	0.0											0.4
Std Liq Flow	barrel/d	129939			64968	64968	0											63
Mass Density	kg/m^3	996.4			996.4	996.3	997.1											1004.3
Mass Heat Capacity	kJ/kg-°C	4.177			4.177	4.177	4.177											4.173
Thermal Conductivity	W/m-K	0.632			0.631	0.632	0.630											0.618
Viscosity	cP	0.651			0.652	0.651	0.665											0.797
Surface Tension	dyne/cm	69.49			69.50	69.48	69.68											71.23
Enthalpy	kW	-3823688			-1911789	-1911780	-5											-1864
Composition																		
Water	Mol %	77.813	0.585	0.585	93.861	93.861	0.602	0.602	0.602	0.602	0.602	0.602	99.999	99.999	99.999	0.602	0.602	0.602
Carbon Dioxide	Mol %	0.032	0.174	0.174	0.002	0.002	0.178	0.178	0.178	0.178	0.178	0.178	0.001	0.001	0.001	0.178	0.178	0.178
Nitrogen	Mol %	0.034	0.197	0.197	0.000	0.000	0.194	0.194	0.194	0.194	0.194	0.194	0.000	0.000	0.000	0.194	0.194	0.194
Hydrogen Sulphide	Mol %	0.003	0.013	0.013	0.000	0.000	0.014	0.014	0.014	0.014	0.014	0.014	0.000	0.000	0.000	0.014	0.014	0.014
Methane	Mol %	16.224	93.028	93.028	0.263	0.263	92.451	92.451	92.451	92.451	92.451	92.451	0.000	0.000	0.000	92.451	92.451	92.451
Ethane	Mol %	0.646	3.521	3.521	0.049	0.049	3.639	3.639	3.639	3.639	3.639	3.639	0.000	0.000	0.000	3.639	3.639	3.639
Propane	Mol %	0.263	1.258	1.258	0.057	0.057	1.391	1.391	1.391	1.391	1.391	1.391	0.000	0.000	0.000	1.391	1.391	1.391
i-Butane	Mol %	0.077	0.295	0.295	0.031	0.031	0.349	0.349	0.349	0.349	0.349	0.349	0.000	0.000	0.000	0.349	0.349	0.349
n-Butane	Mol %	0.136	0.460	0.460	0.068	0.068	0.561	0.561	0.561	0.561	0.561	0.561	0.000	0.000	0.000	0.561	0.561	0.561
i-Pentane	Mol %	0.063	0.135	0.135	0.048	0.048	0.178	0.178	0.178	0.178	0.178	0.178	0.000	0.000	0.000	0.178	0.178	0.178
n-Pentane	Mol %	0.076	0.137	0.137	0.064	0.064	0.185	0.185	0.185	0.185	0.185	0.185	0.000	0.000	0.000	0.185	0.185	0.185
n-Hexane	Mol %	0.114	0.086	0.086	0.120	0.120	0.123	0.123	0.123	0.123	0.123	0.123	0.000	0.000	0.000	0.123	0.123	0.123
Benzene (Note 2)	Mol %	0.011	0.007	0.007	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.000	0.000	0.000	0.011	0.011	0.011
Toluene (Note 2)	Mol %	0.027	0.006	0.006	0.031	0.031	0.008	0.008	0.008	0.008	0.008	0.008	0.000	0.000	0.000	0.008	0.008	0.008
p-Xylene (Note 2)	Mol %	0.034	0.002	0.002	0.041	0.041	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.002	0.002	0.002
E-Benzene (Note 2)	Mol %	0.005	0.000	0.000	0.006	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
n-Heptane	Mol %	0.216	0.060	0.060	0.249	0.249	0.080	0.080	0.080	0.080	0.080	0.080	0.000	0.000	0.000	0.080	0.080	0.080
n-Octane	Mol %	0.248	0.024	0.024	0.294	0.294	0.026	0.026	0.026	0.026	0.026	0.026	0.000	0.000	0.000	0.026	0.026	0.026
n-Nonane	Mol %	0.164	0.006	0.006	0.197	0.197	0.006	0.006	0.006	0.006	0.006	0.006	0.000	0.000	0.000	0.006	0.006	0.006
n-Decane	Mol %	0.200	0.003	0.003	0.241	0.241	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.002	0.002	0.002
n-C11	Mol %	0.176	0.001	0.001	0.212	0.212	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001
LoyC12+* (Note 1)	Mol %	0.530	0.000	0.000	0.641	0.641	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SchC12+* (Note 1)	Mol %	2.907	0.000	0.000	3.511	3.511	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Notes		(3,4)			(3,4)	(3,4)			(6)									