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Research Article

Improving Energy Efficiency with Energy Recovery for Propylene Production

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Table S1. Mass and Energy Balance of the modified process

HEAT AND MATERIAL BALANCE													
Stream Number	**Unit**	**Feed**	**1**	**Vap1**	**F1**	**F3**	**F4**	**F2**	**F3**	**F6**	**F7**	**Vap2**	
Total Phase Properties													
Vapour Fraction		0	0	1	1	1	1	1	1	1	0	1	
Temperature	*C*	40.00	57.05	57.05	200.00	511.70	300.80	735.90	511.70	558.60	50.00	50.00	
Pressure	*bar*	7.00	6.50	6.50	1.10	0.90	0.85	1.00	0.90	31.00	31.00	31.00	
Molar Flow	*kgmole/h*	60	2955	0	2966	2970	2970	2955	2970	2970	2970	0	
Mass Flow	*kg/h*	3.403E+03	1.698E+05	0.000E+00	1.698E+05	1.698E+05	1.698.E+05	1.698E+05	1.698E+05	1.698E+05	1.698E+05	0.000E+00	
Liquid Volume Flow	*m3/h*	5.559	289.5	0	289.5	290.4	290.4	289.5	104.7473111	290.4	290.4	0	
Heat Flow	*kJ/h*	-3.782E+06	-3.452E+08	0.000E+00	-2.354E+08	-7.992E+07	-1.897.E+08	5.575E+07	-7.992E+07	-5.529E+07	-3.465E+08	0.000E+00	
Stream Number	**Unit**	**Feed**	**1**	**Vap1**	**F1**	**F3**	**F4**	**F2**	**F3**	**F6**	**F7**	**Vap2**	
Composition													
Comp Mole Frac (n-Butane)	*mole %*	0.3	0.7902	0.737	0.7902	0.7862	0.7862	0.7902	0.7862	0.7862	0.7862	0.7861	
Comp Mole Frac (1-Butene)	*mole %*	0	0.1001	0.1096	0.1001	0.1006	0.1006	0.1001	0.1006	0.1006	0.1006	0.1007	
Comp Mole Frac (2-Butene)	*mole %*	0.7	0.0738	0.0637	0.0738	0.0602	0.0602	0.0738	0.0602	0.0602	0.0602	0.0602	
Comp Mole Frac (Propene)	*mole %*	0	0.0247	0.0715	0.0247	0.0355	0.0355	0.0247	0.0355	0.0355	0.0355	0.0355	
Comp Mole Frac (2-Pentene)	*mole %*	0	0.01	0.0036	0.01	0.0107	0.0107	0.01	0.0107	0.0107	0.0107	0.0107	
Comp Mole Frac (Ethylene)	*mole %*	0	0.0012	0.0147	0.0012	0.0065	0.0065	0.0012	0.0065	0.0065	0.0065	0.0066	
Comp Mole Frac (3-Hexene)	*mole %*	0	0	0	0	0.0003	0.0003	0	0.0003	0.0003	0.0003	0.0003	
Total	*mole %*	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	

Stream Number	**Unit**	**F8**	**S13**	**Ethylene**	**F9**	**Propylene**	**F10**	**F11**	**Recycle**	**2-PENTHENE**	**3-HEXANE**	**F5**
Total Phase Properties												
Vapour Fraction		0	0	0	0	0	0	0	0	0	0	0
Temperature	*C*	50.00	57.37	-11.45	139.10	35.00	125.00	120.50	57.34	66.35	112.20	580.20
Pressure	*bar*	31.00	6.50	31.00	33.00	25.50	25.50	7.50	6.50	2.50	3.50	391.60
Molar Flow	*kgmole/h*	2970	2895	5.162	2965	45.27	2950	2.993	2917	2.092	0.9005	2970
Mass Flow	*kg/h*	1.698E+05	1.664.E+05	145.6	1.696E+05	1781	1.679E+05	222.5	1.673E+05	146.8	75.66	1.698E+05
Liquid Volume Flow	*m3/h*	290.4	283.9	0.3783	290	3.602	286.4	0.3334	286.1	0.2226	0.1108	290.4
Heat Flow	*kJ/h*	-3.465E+08	-3.414E+08	2.105E+05	-2.969E+08	5.447E+05	-3.085E+08	-1.340E+05	-3.440E+08	-1.017E+05	-5.385E+04	-5.529E+07
Stream Number	**Unit**	**F8**	**S13**	**Ethylene**	**F9**	**Propylene**	**F10**	**F11**	**Recycle**	**2-PENTHENE**	**3-HEXANE**	**F5**
Composition												
Comp Mole Frac (n-Butane)	*mole %*	0.7862	0.8003	0.0006	0.7875	0.0174	0.7995	0	0.8003	0	0	0.7562
Comp Mole Frac (1-Butene)	*mole %*	0.1006	0.1021	0	0.1008	0.0163	0.1021	0	0.1022	0	0	0.1006
Comp Mole Frac (2-Butene)	*mole %*	0.0602	0.0609	0	0.0603	0.0005	0.0612	0	0.0613	0	0	0.0602
Comp Mole Frac (Propene)	*mole %*	0.0355	0.0253	0.0093	0.0356	0.7335	0.0247	0	0.0248	0	0	0.0355
Comp Mole Frac (2-Pentene)	*mole %*	0.0107	0.0102	0	0.0107	0	0.0109	0.7004	0.0102	0.9976	0.01	0.0107
Comp Mole Frac (Ethylene)	*mole %*	0.0065	0.0012	0.99	0.0048	0.2322	0.0013	0	0.0013	0	0	0.0065
Comp Mole Frac (3-Hexene)	*mole %*	0.0003	0	0.0001	0.0003	0.0001	0.0003	0.2996	0	0.0024	0.99	0.0003
Total	*mole %*	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**