SUPPORTING INFORMATION

Modeling Coil and Soaker Reactors for Visbreaking

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Supporting Tables

Table S1. Data used for simulation of the different cases.

	Case 1	Case 2	Case 3	Case 4
Number of coils	3	1	6	
Coil length, m	26.5/26.5/82.4	18.745	18.33	
Coil diameter, m	0.1175/0.1175/0.1207	0.114	0.006	
Tubes per coil	36 / 36 / 12	128	1	
Coil volume, m^3	10.34/10.34/11.31	24.49	5.18×10^{-4}	
Soaker volume, m^3		75	4×10^{-3}	120 *
Temp. at coil inlet, °C	343	326.5	185	300
Temp. at each reactor exit, °C	368 / 420 / 446		290/365/415/ 420/431/440	436
Temp. at soaker exit, °C		439	420	
Inlet pressure, kg/cm^2	26.7	26.7	26.7	26.7
Feed mass rate, kg/h	271625	124300	12.2	214333.5
Feed density	1.03 / 1.021	1.006	1.0199	0.9969
Weight % in feed				
S_2	--	--	--	--
S_3	1.0	--	--	--
S_4	5.0	25.2	8.0	39.0
$S_5 – S_9$	94.0	74.8	92.0	61.0
TBP cut °C				
S_2	IBP – 189	IBP - 180	IBP – 150	
S_3	189 – 423	180 – 320	150 – 350	
S_4	423 – 538	320 – 538	350 – 500	
$S_5 – S_9$	538+	538+	500 +	
Cut Specific Gravity				
S_1	0.364	0.364		
S_2	0.739	0.739		0.7246
S_3	0.806	0.806		0.8374
S_4	0.957	0.918		
$S_5 – S_9$	1.019	1.024		
Product, Weight %				
S_1	1.56	1.6 – 2.1	*1.43*	2.6
S_2	1.54	4.5 – 5.0	*1.75*	2.2
S_3	5.58	0.4	*6.69*	5.2
S_4	--	--	*8.94*	--
$S_5 – S_9$	91.32	92.4 – 93.6	*81.19*	90.0

* Only total volume of reactors is reported. The residence times for coil and soaker are taken from [2]

Table S2. Distillation curves of feed and products

	Case 1		Case 2		Case 3		Case 4	
	Vol %	T (°C)	Vol %	T (°C)	Vol %	T (°C)	Vol %	T (°C)
Feed TBP	Residue 1							
	IBP	342	IBP/5	303/409	3.75/15	28.6/100	IBP/5	408/486
	5/6.5	530/538	10/20	457/503	36/56	200-300	10/19	500/505
	Residue 2		30/50	543/585	76.1/94	400-500		
	IBP/5	432/490			97.5/100	550-568		
	10/12	526/538						
S_2								
	IBP/10	50/81					IBP/5	54/59
	50/90	132/165					10/20	68/84
	95/EBP	174/182					30/40	96/106
							50/60	115/124
							70/80	131/139
							90/95	150/210
							EBP	270
S_3								
	IBP/10	230/243					IBP/5	157/190
	50/90	280/364					10/20	197/213
	95/EBP	396/401					30/40	225/238
							50/60	253/270
							70/80	287/306
							90/95	330/350
							EBP	363
S_4 – S_9								
							8.5/9	350/360
							13.8/19	400/440
							26/32	480/510
							38	541

Table S3. Heat capacity and molecular weight of lumps

	Cp, kJ/kg-°C	*MW Case 1*	*MW Case 2*	*MW Case 3*	*MW Case 4*
S_1	3.16	34.2	31.7	28.3	31.7
S_2	3.72	113.1	113.0	103.9	113.1
S_3	3.66	228.9	228.9	196.6	228.9
S_4	3.55	448.8	424.9	358.1	405.4
S_5	3.38	546.3	536.1	373.5	552.8
S_6	3.28	615.0	586.3	381.3	559.8
S_7	3.19	665.1	632.2	389.0	680.9
S_8	3.10	711.0	680.1	399.1	774.8
S_9	3.01	772.6	753.2	497.9	885.7