

Table 4: Process Configurations and Operating Conditions

Ethylene feed distribution mol % ^A	Example	CI temperature [°C]	Peak temperature [°C]	Start/re-initiation temp [°C]	Conversion [%]	Reactor inlet Pressure [bar]	Reactor inside diameter [mm]	Reactor length [m]
100/0/0/0	CP1	NA	290/290/290/290	150/251/256/262	31.9	2800	54/54/54/54	374/323/374/337 (total length 1408)
	CP1.1	NA	240/302/302/302	150/211/263/270	31.9	2800		
	CP2	NA	290/290/290/290	150/244/246/253	31.9	2800		
	CP3	NA	290/290/290/290	150/255/253/261	31.9	2800		
40/40/20/0	CP4	40	290/290/290/290	150/169/241/224	31.9	2800	34/48/54/54	136/170/646/337 (total length 1289)
	IP4.1	40	240/240/300/300	150/141/199/233	31.9	2800		
	IP4.2(**)	40	240/240/299/299	150/140/198/231	31.9	2800		
	IP4.3(***)	40	240/240/298/298	150/140/198/230	31.9	2800		
	CP5	40	290/290/290/290	150/169/241/223	31.5	2800		
	IP5.1	40	240/240/304/304	150/141/200/236	31.5	2800		
	IP5.2(***)	40	240/240/301/301	150/140/202/233	31.5	2800		
	CP6	40	290/290/290/290	150/165/168/231	31.9	2800		
25/25/50/0	IP6.1(*)	40	258/258/296/296	150/140/148/237	31.9	2800	27/38/54/54/54 ⁴	136/153/663/337 (total length 1289)
	IP6.2	40	240/240/302/302	150/140/141/240	31.9	2800		
	IP6.3(***)	40	240/240/300/300	150/140/140/238	31.9	2800		
	IP6.4	80	240/240/307/307	150/159/157/235	31.9	2800		
	CP7	40	290/290/290/290	150/161/166/218	33.9	2800		
	IP7.1	40	240/240/303/303	150/140/139/225	33.9	2800		
	IP7.2(***)	40	240/240/301/301	150/140/139/223	33.9	2800		
	CP8	40	290/290/290/290	150/229/235/215	31.9	2800		
60/20/20/0	IP8.1	40	240/240/301/301	150/187/197/227	31.9	2800	42/48/54/54	136/136/714/337 (total length 1323)
	IP8.2(***)	40	240/240/298/298	150/186/196/225	31.9	2800		

(*) Claim boundary; (**) Fresh ethylene distribution to the side only; (***) Fresh CTA distribution to the front, and fresh ethylene distribution to the side; A) mole% of ethylene plus CTA fed to each noted polymerization zone(s), and each mole percent based on the total moles of ethylene and CTA fed to the polymerization. The first percentage represents the mole% of ethylene plus CTA fed to the first reaction zone.

Table 5: Chain Transfer Agent and Ethylene Distribution to each Reaction Zone

Ethylene feed distribution mol%	Example	MI g/10 min	CTA activity (Cs)	RZ1 [%]	RZ2	RZ3	R2	R3	Z1/Z2 ^B	Z1/Z3 ^C
100/0/0/0	CP1	1	0.33	0.333	NA	NA	NA	NA	1	1
	CP1.1	1	0.33	0.333	NA	NA	NA	NA	1	1
	CP2	10	0.33	0.333	NA	NA	NA	NA	1	1
	CP3	1	0.01	0.333	NA	NA	NA	NA	1	1
40/40/20/0	CP4	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP4.1	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP4.2	1	0.33	0	0.416	0.833	0	0	1.25	1.34
	IP4.3	1	0.33	0	0.416	0.833	0	0	1.34	1.64
	CP5	1	0.01	0.333	0.333	0.333	1	1	1	1
	IP5.1	1	0.01	0.333	0.333	0.333	1	1	1	1
25/25/50/0	IP5.2	1	0.01	0	0.416	0.833	0	0	1.26	1.54
	CP6	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP6.1	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP6.2	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP6.3	1	0.33	0	0	0.666	NA	0	1.14	1.61
	IP6.4	1	0.33	0.333	0.333	0.333	1	1	1	1
	CP7	10	0.33	0.333	0.333	0.333	1	1	1	1
	IP7.1	10	0.33	0.333	0.333	0.333	1	1	1	1
60/20/20/0	IP7.2	10	0.33	0	0	0.666	NA	0	1.07	1.68
	CP8	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP8.1	1	0.33	0.333	0.333	0.333	1	1	1	1
	IP8.2	1	0.33	0	0.833	0.833	0	0	1.31	1.61

B) Z1/Z2 is the ratio of the activity of the CTA system in the first ethylene feed (Z1) to the activity of the CTA system in the second ethylene feed (Z2). C) Z1/Z3 is the ratio of the activity of the CTA system in the first ethylene feed (Z1) to the activity of the CTA system in the third ethylene feed (Z3). The RZ1, RZ2 and RZ3 are calculated with the assumptions that 60 mol% ethylene feed is come from the high pressure recycle (HPR) flow. The rest 40% is from primary which includes fresh ethylene and low pressure recycle (LPR) flow. Fresh ethylene is 33.3 mol% which includes ethylene converted and lost by purge flow. Thus the LPR flow is 6.7 mol% which includes ethylene from LPR and secondary compressor gland leaks.

Table 6: Simulated Polymer Properties

Ethylene feed distribution mol%	Example	SCB	Final LCBf	Normalized Mw/Mn	LCBf _{40%}	LCBf _{60%}	$R_{LCBf\ 40\%}$	$R_{LCBf60\%/LCBf40\%}$
		[1/1000C]	[1/1000C]	[%]	1/1000C	1/1000C		
100/0/0	CP1	22.91	3.13	100	0.79	4.68	25.3	5.92
	CP1.1	23.08	3.32	104	0.61	5.39	17.6	8.78
	CP2	23.58	3.89	82	0.67	6.03	17.4	8.94
	CP3	24.00	3.23	160	0.81	4.84	25.1	5.98
40/40/20/0	CP4	22.69	3.19	140	1.11	4.57	34.7	4.13
	IP4.1	21.90	3.07	110	0.73	4.64	23.8	6.35
	IP4.2	21.81	3.04	91	0.73	4.59	24.0	6.29
	IP4.3	21.73	3.01	80	0.73	4.53	24.3	6.19
	CP5	23.92	3.33	234	1.15	4.77	34.5	4.77
	IP5.1	23.47	3.33	204	0.76	5.04	22.7	6.66
	IP5.2	23.26	3.24	148	0.77	4.88	23.7	6.35
	CP6	22.40	3.21	164	1.58	4.29	49.3	2.71
25/25/50/0	IP6.1	21.73	3.08	127	0.89	4.54	28.9	5.11
	IP6.2	21.80	3.14	121	0.69	4.87	21.9	6.95
	IP6.3	21.65	3.09	87	0.69	4.69	22.4	6.78
	IP6.4	22.54	3.29	132	0.73	5.00	22.3	6.81
	CP7	22.52	3.37	123	1.60	4.55	47.5	2.84
	IP7.1	22.06	3.34	91	0.72	5.08	21.7	7.01
	IP7.2	21.90	3.28	64	0.73	4.98	22.1	6.87
	CP8	22.91	3.13	128	1.26	4.38	40.2	4.38
60/20/20/0	IP8.1	21.98	2.96	106	0.73	4.62	23.8	6.33
	IP8.2	21.97	2.99	78	0.73	4.50	24.3	6.18