

Data of Sumulation Results for Indirect and Direct DME Syntheses

Table 1. Simulation results of DME synthesis through indirect process at methanol reactor pressure of 40 bar and recycled gas flow rate of 1 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	WK kW	SPC kW/Ton
195	0	0	0	0	
204	5,750414	3,475691	0,036892	75	515
213	17,54108	10,53691	0,110592	75	170
222	16,85724	10,17987	0,106548	75	176
231	16,21888	9,848835	0,102781	75	182
240	15,65062	9,553696	0,0995	75	187
249	15,15421	9,299231	0,096705	75	193
258	14,73256	9,084472	0,094426	75	197
267	14,3717	8,901176	0,09261	75	201
276	14,06601	8,748957	0,091238	75	205
285	13,80761	8,622268	0,090289	75	208
312	13,22866	8,267023	0,089492	75	217
339	12,7735	7,964162	0,091769	75	225
366	12,28545	7,634219	0,096904	75	235

Table 2. Simulation results of DME synthesis through indirect process at methanol reactor pressure of 40 bar and recycled gas flow rate of 3 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	WK kW	SPC kW/Ton
195	0	0	0	0	
204	5,8477	3,5381	0,0332	224	1517
213	20,1905	12,0365	0,1117	224	446
222	19,5576	11,6592	0,1085	224	460
231	18,8388	11,2351	0,1048	224	478
240	18,2127	10,8931	0,1016	224	493
249	17,6576	10,6052	0,0989	224	506
258	17,1887	10,3631	0,0967	224	518
267	16,7896	10,1602	0,0950	224	528
276	16,4496	9,9895	0,0937	224	537
285	16,1686	9,8497	0,0926	224	545
312	15,5280	9,5504	0,0918	224	562
339	15,0065	9,3479	0,0940	224	575
366	14,4388	9,0167	0,0989	224	596

Table 3. Simulation results of DME synthesis through indirect process at methanol reactor pressure of 40 bar and recycled gas flow rate of 5 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	WK kW	SPC kW/Ton
195	0	0	0	0	
204	6,0838	3,6889	0,0310	373	2425
213	22,6432	13,5029	0,1116	373	662
222	22,2792	13,2806	0,1100	373	673
231	21,4870	12,8082	0,1064	373	698
240	20,8005	12,3993	0,1033	373	721
249	20,2002	12,0417	0,1007	373	743
258	19,6857	11,7357	0,0986	373	762
267	19,2443	11,4744	0,0967	373	779
276	18,8707	11,2635	0,0955	373	794
285	18,5506	11,0988	0,0947	373	806
312	17,8512	10,7658	0,0938	373	831
339	17,2740	10,5334	0,0958	373	850
366	16,6242	10,3104	0,1004	373	868

Table 4. Simulation results of DME synthesis through indirect process at methanol reactor pressure of 40 bar and recycled gas flow rate of 7 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	WK kW	SPC kW/Ton
195	0	0	0	0	
204	6,1889	3,7561	0,0286	522	3334
213	24,6138	14,7114	0,1093	522	851
222	25,0255	14,9171	0,1111	522	839
231	24,1648	14,4049	0,1076	522	869
240	23,4115	13,9557	0,1045	522	897
249	22,7581	13,5662	0,1020	521	923
258	22,1961	13,2311	0,0999	522	946
267	21,7185	12,9464	0,0981	522	967
276	21,3137	12,7052	0,0970	522	985
285	20,9633	12,4968	0,0962	522	1002
312	20,2434	12,0685	0,0951	522	1037
339	19,5710	11,7346	0,0972	522	1067
366	18,8414	11,4757	0,1015	522	1092

Table 5. Simulation results of DME synthesis through direct process at dual DME-methanol reactor pressure of 40 bar and recycled gas flow rate of 1 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	S-DME	S-MeOH	WK	SPC
195	0,0000	0,0000	0,0000	0,0000	0,0000	0	
204	13,4282	0,1917	0,0949	0,0186	0,9793	21,5	2693
213	15,1559	0,9874	0,1132	0,0723	0,9232	23,0	559
222	13,8768	1,8121	0,1112	0,1337	0,8604	24,5	324
231	12,6031	2,8006	0,1105	0,2067	0,7854	26,3	225
240	11,3725	4,0205	0,1121	0,2917	0,6981	28,5	170
249	9,9555	5,7633	0,1166	0,4004	0,5857	31,8	132
258	8,6552	7,7636	0,1243	0,5051	0,4765	35,4	110
267	7,7108	9,4428	0,1321	0,5772	0,3984	38,5	98
276	7,3785	9,9066	0,1348	0,5953	0,3734	39,4	95
285	7,3388	9,8250	0,1344	0,5886	0,3723	39,2	96
312	7,4163	9,0729	0,1325	0,5475	0,3806	37,8	100
339	7,4794	8,2174	0,1330	0,4955	0,3812	36,2	106
366	7,4882	7,3730	0,1358	0,4334	0,3720	34,7	113

Table 6. Simulation results of DME synthesis through direct process at dual DME-methanol reactor pressure of 40 bar and recycled gas flow rate of 3 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	S-DME	S-MeOH	WK	SPC
195	0,0000	0,0000	0,0000	0,0000	0,0000	0	
204	13,3776	0,1635	0,0836	0,0167	0,9817	63,8	9363
213	17,6249	0,9983	0,1152	0,0634	0,9318	65,4	1571
222	16,2109	1,8834	0,1130	0,1206	0,8731	67,0	854
231	14,8208	2,9227	0,1121	0,1876	0,8041	68,9	566
240	13,4641	4,2135	0,1132	0,2669	0,7224	71,3	406
249	11,8810	6,0608	0,1171	0,3702	0,6152	74,7	296
258	10,3443	8,3335	0,1241	0,4779	0,5027	78,9	227
267	9,0455	10,6061	0,1330	0,5658	0,4084	83,1	188
276	8,4767	11,5248	0,1376	0,5974	0,3694	84,8	177
285	8,3767	11,5126	0,1380	0,5945	0,3640	84,8	177
312	8,4697	10,7295	0,1361	0,5537	0,3698	83,3	186
339	8,5516	9,8834	0,1365	0,5010	0,3689	81,7	198
366	8,5704	8,8638	0,1391	0,4380	0,3582	79,7	216

Table 7. Simulation results of DME synthesis through direct process at dual DME-methanol reactor pressure of 40 bar and recycled gas flow rate of 5 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	S-DME	S-MeOH	WK	SPC
195	0,0000	0,0000	0,0000	0,0000	0,0000	0	
204	12,8677	0,1405	0,0723	0,0156	0,9832	106,0	18116
213	20,1212	0,9942	0,1166	0,0557	0,9392	107,8	2602
222	18,5910	1,9290	0,1144	0,1090	0,8844	109,5	1362
231	17,1157	3,0084	0,1134	0,1707	0,8207	111,5	889
240	15,5984	4,3763	0,1141	0,2458	0,7429	114,0	625
249	13,9232	6,2419	0,1172	0,3405	0,6445	117,4	452
258	12,1447	8,7538	0,1235	0,4501	0,5298	122,1	335
267	10,5146	11,5248	0,1327	0,5489	0,4243	127,3	265
276	9,6273	13,1556	0,1390	0,5960	0,3690	130,3	238
285	9,4238	13,2648	0,1404	0,5984	0,3578	130,5	236
312	9,5211	12,4894	0,1388	0,5582	0,3613	129,0	248
339	9,6201	11,5132	0,1391	0,5046	0,3590	127,1	265
366	9,6481	10,3648	0,1415	0,4403	0,3469	124,8	289

Table 8. Simulation results of DME synthesis through direct process at dual DME-methanol reactor pressure of 40 bar and recycled gas flow rate of 7 MMSCFD

T (°C)	MeOH (Tons/d)	DME (Tons/d)	CO ₂ Conv	S-DME	S-MeOH	WK	SPC
195	0,0000	0,0000	0,0000	0,0000	0,0000	0	
204	12,4479	0,1239	0,0636	0,0150	0,9840	148,3	28718
213	22,6467	0,9637	0,1176	0,0493	0,9454	150,2	3741
222	20,9865	1,9701	0,1153	0,0995	0,8935	152,0	1852
231	19,3882	3,0960	0,1141	0,1573	0,8337	154,1	1194
240	17,7531	4,5256	0,1145	0,2283	0,7599	156,7	831
249	16,0011	6,4177	0,1171	0,3158	0,6687	160,2	599
258	14,0469	9,0098	0,1229	0,4214	0,5579	165,0	440
267	12,1012	12,2315	0,1317	0,5286	0,4436	171,1	336
276	10,8476	14,5529	0,1396	0,5906	0,3728	175,4	289
285	10,5183	14,9192	0,1419	0,5987	0,3555	176,1	283
312	10,5743	14,2023	0,1405	0,5612	0,3539	174,6	295
339	10,6853	13,1427	0,1410	0,5068	0,3507	172,5	315
366	10,7214	11,9564	0,1432	0,4415	0,3376	170,1	341