

RUN NO:

AF-R10.8 TITLE: LPIBOH over Cs-Promoted BASF S3-86 CATALYST with SHELL SYNGAS

T	F	FRESH MAKE-UP	RECYCLE	HP H2 MAKEUP	DRY FEED	ALCOHOL INJECT.	REACT FEED	REACT EFFL	22.10 VAPOR	PURGE 1 PIC-201	PURGE 2 22.11	PURGE 3 07.20	LIQUID PROD
P	psig	255.2 753.3	128.7 883.1	63.3 830.3	404.9 1310.2	100.0 1310.2	439.0 1310.2	566.6 1300.0	73.1 716.9	62.5 691.4	54.3 31.6	114.6 136.5	80.0 1.0
Comp	H2	32.83	29.08	100.00	29.95	0.00	27.61	26.72	28.61	29.08	6.93	4.55	0.00
	CO	66.28	65.74	0.00	65.86	0.00	60.72	57.68	64.84	65.74	51.79	29.55	0.00
	N2	0.81	1.26	0.00	1.15	0.00	1.06	1.08	1.23	1.26	1.36	0.38	0.00
	CH4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO2	0.08	3.92	0.00	3.04	0.00	2.81	4.82	5.32	3.92	32.27	68.74	0.00
	DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.78	0.00
	MeAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53
	MeAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53
	EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	MeFn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MeOH	0.00	0.00	0.00	0.00	90.20	7.03	8.23	0.00	0.00	7.36	1.00	84.98
	H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	1.26
	EtOh	0.00	0.00	0.00	0.00	3.65	0.28	0.33	0.00	0.00	0.00	0.00	3.18
	1-Proh	0.00	0.00	0.00	0.00	6.12	0.48	0.55	0.00	0.00	0.00	0.00	5.11
	Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	0.00	2.38
	1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.37
	2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09
	2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.23
	1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.15
	2-Methyl 1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
	1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.41
	2-Methyl 1-Isobutyrate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
	others	0.00	0.00	0.00	0.00	0.04	0.00	0.18	0.00	0.00	0.00	0.00	0.06
	TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Mole Wt lb/lb mole	19.490	21.081	2.020	20.713	34.282	21.771	22.670	21.425	21.081	31.719	37.207	36.554
Flow	SCFH	22572	73550	0	96122	8128	104251	102334	89417	13740	53	2165	10300
	lb mole/hr	58.38	190.23	0.00	248.61	21.02	269.63	264.67	231.26	35.54	0.14	5.60	26.64
	lb/hr	1137.8	4010.1	0.0	5149.5	720.7	5870.2	6000.0	4954.9	749.1	4.4	208.3	973.8

RUN NO:

AF-R10.9

TITLE: LPIBOH over Cs-Promoted BASF S3-86 CATALYST with SHELL SYNGAS

Balance Period:

Start Date	4/7/94	16:00	Time From Start of Run (hr)	Start	256.92
End Date	4/8/94	4:00		End	268.92

Reaction Conditions

Temperature (°F)	572	Catalyst Weight (lb oxide)	1100
Pressure (psig)	1300	Slurry Concentration (wt %)	39.1
Space Velocity (sL/kg-hr)	5154	Slurry Level (%)	91
Vg (inlet)	0.36	Gas Holdup (vol %)	37.9

Performance Results

CO Conversion (%)	11.2	Atom Balance Closure (% of inlet)	C	0.94
H2 Conversion (%)	37.1		H	-0.21
H2 Conversion (%)	37.1		H	-0.21
Syngas Conversion (%)	19.5		O	0.69
MeOH Production (g/kg-oxide-hr)	424.5		N	0.07
IBOH Production (g/kg oxide-hr)	18.4			
C2-C6 OH Production (g/kg oxide-hr)	79.4			

Liquid Product Analysis (wt%)

	Sample#	Sample#	Sample#	Sample#	Sample#	Sample#
	16:30 A	16:30 B	1:20 A	1:20 B	4:15 A	4:15 B
Methanol	79.413	79.338	83.034	82.999	84.184	84.182
Ethanol	3.522	3.594	4.138	4.134	4.033	4.025
1-Propanol	5.629	5.638	5.936	5.930	6.097	6.106
iso-Propanol	0.026	0.028	0.023	0.021	0.021	0.020
1-Butanol	0.710	0.713	0.498	0.495	0.396	0.396
2-Butanol	0.170	0.169	0.116	0.115	0.104	0.103
iso-Butanol	3.719	3.719	2.031	2.031	1.629	1.628
2-Methyl-1-Butanol	0.591	0.586	0.249	0.246	0.182	0.181
1-Pentanol	0.346	0.345	0.183	0.182	0.140	0.140
2-Methyl-1-Pentanol	0.313	0.315	0.127	0.125	0.091	0.088
1-Hexanol	0.139	0.139	0.097	0.099	0.078	0.076
2-Methyl-1-isobutylrate	0.240	0.240	0.091	0.092	0.061	0.065
Methyl Acetate	0.878	0.874	0.738	0.745	0.622	0.622
Ethyl Acetate	0.030	0.022	0.022	0.032	0.000	0.000
Methyl Formate	0.000	0.000	0.000	0.000	0.000	0.000
DME	0.000	0.000	0.000	0.000	0.000	0.000
CO2	0.000	0.000	0.000	0.000	0.000	0.000
Water	0.691	0.688	0.650	0.660	0.619	0.622
Oil + Others (*)	0.522	0.522	0.539	0.539	0.532	0.532
Total	96.939	96.930	98.472	98.445	98.789	98.786

The balance of each sample comprises mainly higher alcohol isomers which are not individually analyzed. Assumed to average C6-OH.

(*) Standard oil analysis by evaporation yielded higher than typical results. Actual oil is probably 0.1-0.2 wt%. Balance is presumably other, less volatile higher alcohols.

RUN NO:

AF-R10.9 TITLE: LPIBOH over Cs-Promoted BASF S3-86 CATALYST with SHELL SYNGAS

T	F	FRESH MAKE-UP	RECYCLE	HP H2 MAKEUP	DRY FEED	ALCOHOL INJECT.	REACT FEED	REACT EFFL	22.10 VAPOR	PURGE 1 PIC-201	PURGE 2 22.11	PURGE 3 07.20	LIQUID PROD
P	psig	269.6	136.3	68.1	376.3	100.0	461.4	557.0	76.3	66.3	61.2	198.6	80.0
		759.5	883.0	837.7	1309.6	1309.6	1309.6	1300.0	720.6	699.0	31.3	124.3	1.0
Comp	H2	49.16	23.80	100.00	30.67	0.00	30.18	21.65	23.45	23.80	6.93	4.87	0.00
	CO	50.19	71.76	0.00	65.92	0.00	64.86	65.72	71.25	71.76	51.79	41.72	0.00
	N2	0.58	2.14	0.00	1.72	0.00	1.69	1.93	2.10	2.14	1.36	0.80	0.00
	CH4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO2	0.06	2.30	0.00	1.69	0.00	1.66	2.93	3.20	2.30	32.27	49.28	0.00
	DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.73	0.00
	MeAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
	MeAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35
	EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MeOH	0.00	0.00	0.00	0.00	81.76	1.32	6.58	0.00	0.00	7.36	2.59	89.43
	H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	1.27
	EtoH	0.00	0.00	0.00	0.00	7.07	0.11	0.24	0.00	0.00	0.00	0.00	2.96
	1-Proh	0.00	0.00	0.00	0.00	11.14	0.18	0.26	0.00	0.00	0.00	0.00	3.42
	Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	1.16
	1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.25
	2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.13
	1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.09
	2-Methyl 1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70
	2-Methyl 1-Isobutyrate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	others	0.00	0.00	0.00	0.00	0.04	0.00	0.53	0.00	0.00	0.00	0.00	0.06
	TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Mole Wt lb/lb mole	15.243	22.191	2.020	20.308	36.168	20.564	23.515	22.427	22.191	31.719	34.865	34.716
Flow	SCFH	26589	69646	0	96235	1580	97814	85697	76387	6772	80	1452	6786
	lb mole/hr	68.77	180.13	0.00	248.90	4.09	252.98	221.64	202.74	17.52	0.21	3.76	17.55
	lb/hr	1048.2	3997.3	0.0	5054.5	147.8	5202.2	5211.9	4546.8	388.7	6.5	130.9	609.3

Balance Period:
 Start Date 4/8/94 19:00 283.92
 End Date 4/9/94 8:00 296.92

Reaction Conditions
 Temperature (°F) 1100
 Pressure (psig) 40.8
 Space Velocity (sL/kg-hr) 91
 Vg (inlet) 42.1

Slurry Data
 Catalyst Weight (lb oxide) 1100
 Slurry Concentration (wt %) 40.8
 Slurry Level (%) 91
 Gas Holdup (vol %) 42.1

Performance Results
 CO Conversion (%) 2.0
 H2 Conversion (%) 9.3
 H2 Conversion (%) 9.3
 Syngas Conversion (%) 4.3
 MeOH Production (g/kg-oxide-hr) 76.3
 IBOH Production (g/kg oxide-hr) 0.0
 C2-C6 OH Production (g/kg oxide-hr) 0.0

Atom Balance Closure (% of inlet)
 C 0.30
 H 7.6
 H 0.78
 O 0.55
 N 0.65

The balance of each sample comprises mainly higher alcohol isomers which are not individually analyzed. Assumed to average C6-OH.

Liquid Product Analysis (wt%)	Sample# 5:40 A	Sample# 5:40 B	Sample#	Sample#	Sample#	Sample#
Methanol	84.932	84.897				
Ethanol	3.674	3.715				
1-Propanol	7.851	7.907				
iso-Propanol	0.060	0.060				
1-Butanol	0.101	0.082				
2-Butanol	0.072	0.071				
iso-Butanol	0.789	0.792				
2-Methyl-1-Butanol	0.088	0.089				
1-Pentanol	0.033	0.032				
2-Methyl-1-Pentanol	0.054	0.041				
1-Hexanol	0.015	0.019				
2-Methyl-1-Isobutyrate	0.025	0.024				
Methyl Acetate	0.257	0.258				
Ethyl Acetate	0.000	0.000				
Methyl Formate	0.000	0.000				
DME	0.000	0.000				
CO2	0.000	0.000				
Water	0.939	0.927				
Oil	0.200	0.200				
Total	99.090	99.114				

RUN NO:

AF-R10.10 TITLE: LPIBOH over Cs-Promoted BASF S3-86 CATALYST with SHELL SYNGAS

T	F	psig	FRESH MAKE-UP	RECYCLE	HP H2 MAKEUP	DRY FEED	ALCOHOL INJECT.	REACT FEED	REACT EFFL	22.10 VAPOR	PURGE 1 PIC-201	PURGE 2 22.11	PURGE 3 07.20	LIQUID PROD
	284.8	805.7	130.9	845.0	74.3	398.3	100.0	473.5	567.2	82.1	71.4	69.0	162.3	80.0
P					851.9	777.3	777.3	777.3	749.9	714.8	691.4	29.8	125.1	1.0
Comp	H2		29.51		100.00	30.40	0.00	30.40	28.46	29.14	29.51	28.32	6.07	0.00
	CO		67.40		0.00	65.83	0.00	65.83	66.52	66.96	67.40	66.46	39.12	0.00
	N2		1.04		0.00	0.99	0.00	0.99	1.03	1.03	1.04	1.35	0.41	0.00
	CH4		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO2		2.05		0.00	2.77	0.00	2.77	2.81	2.85	2.05	2.52	47.58	0.00
	DME		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MeAc		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00
	MeAc		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
	EtAc		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
	MeFm		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MeOH		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	H2O		0.00		0.00	0.00	0.00	0.00	1.09	0.00	0.00	1.35	6.63	90.07
	EtOh		0.00		0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	1.76
	1-Proh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.72
	iso-Proh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.45
	IBOH		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	1-Buoh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
	2-Buoh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	2-Methyl 1-Buoh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	1-Peoh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	2-Methyl 1-Peoh		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	1-hexanol		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	2-Methyl 1-Isobutyrate		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30
	others		0.00		0.00	0.00	100.00	0.00	0.10	0.00	0.00	0.00	0.00	0.01
	TOTAL		100.00		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Mole Wt	19.965		20.668		2.020	20.551	58.883	20.551	21.137	20.891	20.668	21.106	34.347	33.931
lb/lb mole														
Flow	15598		80582		0	96180	0	96180	93249	92261	10029	4	1766	1207
SCFH	40.34		208.41		0.00	248.76	0.00	248.76	241.17	238.62	25.94	0.01	4.57	3.12
lb mole/hr	805.4		4307.6		0.0	5112.3	0.0	5112.3	5097.7	4985.1	536.1	0.2	156.9	105.9
lb/hr														

APPENDIX D

LABORATORY RESULTS FOR PARALLEL RUN PLAN

300ccc #2 AUTOCLAVE RUN SUMMARY**Catalyst:** BASF S3-86 C CsLaporte Sample13465-26**Liquid:** Drakeol 10**Run Description:** mixed alcohols

Run#: 13458-73B	Gas Type: Shell	Feed MeOH Rate (ml/hr): 0
Date: 3/7/94	Press (psig): 748	Feed EtOH Rate (ml/hr): 0
Hrs: 49	Temp. (C): 299.9	Feed PrOH Rate (ml/hr): 0
Cat wt (g): 30.01	Inlet Flow (sccm): 2596.6	Syngas GHSV (sl/kg-hr): 5191.5
Liq wt (g): 120.03	Exit Flow (sccm): 2310.7	Total GHSV (sl/kg-hr): 5191.5

BUULK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.583	1.018	65.194	3.063		99.86
Exit:	24.183	1.144	65.004	5.721	0.0497	99.82

ORGANNIC PRODUCTS

Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)	Material balances (Element Recoveries - %)	
						Nitrogen(N):	Oxygen(O):
methanol	30626.830	6.311	202.225	82.420	72.221	100.0	
ethanol	1075.120	0.222	10.207	2.893	3.645	98.8	
1-propanol	1009.570	0.208	12.497	2.717	4.463	96.1	
isobutanol	1494.140	0.308	22.822	4.021	8.151	99.9	
2-butanol	77.160	0.016	1.179	0.208	0.421		
1-butanol	178.140	0.037	2.721	0.479	0.972		
2-methyl-1-butanol	340.630	0.070	6.188	0.917	2.210		
1-pentanol	88.670	0.018	1.611	0.239	0.575		
2-methyl-1-pentanol	308.900	0.064	6.504	0.831	2.323		
1-hexanol	67.210	0.014	1.415	0.181	0.505		
DME	87.570	0.018	0.831	0.236	0.297		
methane	930.470	0.192	3.076	2.504	1.099		
ethane	389.640	0.080	2.414	1.049	0.862		
propane	89.590	0.018	0.814	0.241	0.291		
butane	1.980	0.000	0.024	0.005	0.008		
pentane	16.450	0.003	0.245	0.044	0.087		
hexane	0.000	0.000	0.000	0.000	0.000		
methyl formate	182.000	0.038	2.252	0.490	0.804		
methyl acetate	195.580	0.040	2.986	0.526	1.066		
methyl isobutyrate	138.220	0.028	2.909	0.372	1.039		
ethyl acetate	19.020	0.004	0.345	0.051	0.123		
TOTAL	37159.65	7.657	280.009	100.000	100.000		
Sum C1-C6 Alcohols	35266.370	7.267	267.367	94.905	95.485		
Sum C2-C6 Alcohols	4639.540	0.956	65.142	12.485	23.264		
Sum C2-C5 Alcohols	4263.430	0.879	57.223	11.473	20.436		
Sum C1-C3 Alcohols	32711.520	6.741	224.928	88.030	80.329		
Sum C4-C6 Alcohols	2554.850	0.526	42.439	6.875	15.156		
EtOH+PrOH	2084.690	0.430	22.703	5.610	8.108		
EtOH+PrOH+iBuOH	3578.830	0.737	45.526	9.631	16.259		
Sum C1-C6 HCs	1428.130	0.294	6.573	3.843	2.347		
Sum Esters	534.820	0.110	8.492	1.439	3.033		

Calculations:

CO conv. (%):	11.2
H2 conv. (%):	29.6
CO+H2 conv. (%):	17.1
Net CO2 rate	
gmol/kg-hr):	4.7

300cc #2 AUTOCLAVE RUN SUMMARY

Catalyst: BASF S3-86 Cs'sLaporte Sample13465-26

Liquid: Drakeol 10

Run Description: mixed alcohols

Run#: 13458-73C	Gas Type:	Shell	Feed MeOH Rate (ml/hr):	0
Date: 3/8/94	Presss (psig):	750	Feed EtOH Rate (ml/hr):	0
Hrs: 69	Temp. (C):	300	Feed PrOH Rate (ml/hr):	0
Cat wt (g): 30.01	Inlet Flow ν (sccm):	1566.3	Syngas GHSV (sl/kg-hr):	3131.6
Liq wt (g): 120.03	Exit Flow ν (sccm):	1370.89	Total GHSV (sl/kg-hr):	3131.6

BULLK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.552	1.017	65.110	3.024		99.70
Exit:	23.723	1.162	64.443	6.518	0.0576	99.77

ORGANIC PRODUCTS

Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	Material balances: (Element Recoveries - %)	
				CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)
methanol	30418.950	3.719	119.161	78.584	67.089
ethanol	1061.480	0.130	5.978	2.742	3.366
1-propanol	1150.400	0.141	8.448	2.972	4.756
isobutanol	2125.400	0.260	19.260	5.491	10.844
2-butanol	87.300	0.011	0.791	0.226	0.445
1-butanol	199.200	0.024	1.805	0.515	1.016
2-methyl-1-butanol	455.440	0.056	4.908	1.177	2.763
1-pentanol	97.700	0.012	1.053	0.252	0.593
2-methyl-1-pentanol	466.960	0.057	5.833	1.206	3.284
1-hexanol	83.780	0.010	1.047	0.216	0.589
DME	116.780	0.014	0.658	0.302	0.370
methane	1411.840	0.173	2.769	3.647	1.559
ethane	498.820	0.061	1.834	1.289	1.032
propane	126.990	0.016	0.685	0.328	0.385
butane	2.470	0.000	0.018	0.006	0.010
pentane	23.890	0.003	0.211	0.062	0.119
hexane	0.000	0.000	0.000	0.000	0.000
methyl formate	172.890	0.021	1.269	0.447	0.715
methyl acetate	208.570	0.025	1.889	0.539	1.064
methyl isobutyrate	198.700	0.024	2.481	0.513	1.397
ethyl acetate	25.400	0.003	0.274	0.066	0.154
TOTAL	38708.86	4.732	177.618	100.000	100.000
Sum C1-C6 Alcohols	36146.610	4.419	168.286	93.381	94.746
Sum C2-C6 Alcohols	5727.660	0.700	49.124	14.797	27.657
Sum C2-C5 Alcohols	5176.920	0.633	42.245	13.374	23.784
Sum C1-C3 Alcohols	32630.830	3.989	133.588	84.298	75.211
Sum C4-C6 Alcohols	3515.780	0.430	34.698	9.083	19.535
EtOH+PrOH	2211.880	0.270	14.427	5.714	8.122
EtOH+PrOH+iBuOH	4337.280	0.530	33.687	11.205	18.966
Sum C1-C6 HCs	2064.010	0.252	5.516	5.332	3.105
Sum Esters	605.560	0.074	5.913	1.564	3.329

Calculations:
CO conv. (%): 13.37
H2 conv. (%): 32.04
CO+H2 conv. (%): 19.34
Net CO2 rate
gmol/kg-hr): 3.74

300ccc #2 AUTOCLAVE RUN SUMMARY**Catalyst:** BASF S3-86 C CsLaporte Sample13465-26**Liquid:** Drakeol 10**Run Description:** mixed alcohols

Run#: 13458-73E	G Gas Type: Shell	Feed MeOH Rate (ml/hr): 0
Date: 3/10/94	Press (psig): 750	Feed EtOH Rate (ml/hr): 0
Hrs: 116.8	T/Temp. (C): 300.3	Feed PrOH Rate (ml/hr): 0
Cat wt (g): 30.01	Inlet Floww (sccm): 4252.5	Syngas GHSV (sl/kg-hr): 8502.2
Liq wt (g): 120.03	Exit Floww (sccm): 3870.23	Total GHSV (sl/kg-hr): 8502.2

BUULK GASES						Totals
Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	(%)
Inlet:	30.461	1.012	64.835	3.011		99.32
Exit:	24.852	1.112	65.191	4.519	0.0411	99.24

ORGANIC PRODUCTS						Material balances
Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)	(Element Recoveries - %)
						Nitrogen(N): 100.0
methanol	30979.230	10.692	342.607	87.948	80.380	Carbon(C): 99.3
ethanol	944.210	0.326	15.014	2.681	3.522	Hydrogen(H): 97.8
1-propanol	750.320	0.259	15.556	2.130	3.650	Oxygen(O): 99.8
isobutanol	804.550	0.278	20.583	2.284	4.829	
2-butanol	55.960	0.019	1.432	0.159	0.336	Calculations
1-butanol	126.800	0.044	3.244	0.360	0.761	CO conv. (%): 8.4
2-methyl-1-butanol	182.330	0.063	5.547	0.518	1.301	H2 conv. (%): 25.7
1-pentanol	64.400	0.022	1.959	0.183	0.460	CO+H2 conv. (%): 14.0
2-methyl-1-pentanol	121.420	0.042	4.282	0.345	1.005	Net CO2 rate
1-hexanol	39.900	0.014	1.407	0.113	0.330	gmol/kg-hr): 4.1
DME	58.010	0.020	0.922	0.165	0.216	
methane	505.450	0.174	2.799	1.435	0.657	
ethane	186.430	0.064	1.935	0.529	0.454	
propane	40.270	0.014	0.613	0.114	0.144	
butane	0.000	0.000	0.000	0.000	0.000	
pentane	3.350	0.001	0.083	0.010	0.020	
hexane	0.000	0.000	0.000	0.000	0.000	
methyl formate	207.850	0.072	4.308	0.590	1.011	
methyl acetate	154.170	0.053	3.942	0.438	0.925	
methyl isobutyrate	55.920	0.019	1.971	0.159	0.462	
ethyl acetate	7.510	0.003	0.228	0.021	0.054	
TOTAL	35224.65	12.158	426.234	100.000	100.000	
Sum C1-C6 Alcohols	34069.120	11.759	411.631	96.720	96.574	
Sum C2-C6 Alcohols	3089.890	1.066	69.024	8.772	16.194	
Sum C2-C5 Alcohols	2928.570	1.011	63.335	8.314	14.859	
Sum C1-C3 Alcohols	32673.760	11.277	373.177	92.758	87.552	
Sum C4-C6 Alcohols	1395.360	0.482	38.455	3.961	9.022	
EtOH+PrOH	1694.530	0.585	30.570	4.811	7.172	
EtOH+PrOH+iBuOH	2499.080	0.863	51.153	7.095	12.001	
Sum C1-C6 HCs	735.500	0.254	5.430	2.088	1.274	
Sum Esters	425.450	0.147	10.450	1.208	2.452	

300cc #2 AUTOCLAVE RUN SUMMARY

Catalyst: BASF S3-86 Cs/Laporte Sample13465-26

Liquid: Drakeol 10

Run Description: mixed alcohols

Run#: 13458-73G	Gas Type:	Shell	Feed MeOH Rate (ml/hr):	0
Date: 3/12/94	Presss (psig):	1301	Feed EtOH Rate (ml/hr):	0
Hrs: 165.5	Temp. (C):	300.3	Feed PrOH Rate (ml/hr):	0
Cat wt (g): 30.01	Inlet Flow v (sccm):	4090.47	Syngas GHSV (sl/kg-hr):	8178.2
Liq wt (g): 120.03	Exit Flow v (sccm):	3490.83	Total GHSV (sl/kg-hr):	8178.2

BULLK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.830	1.036	66.403	3.105		101.37
Exit:	20.344	1.214	67.450	5.335	0.0460	101.09

ORGANIC PRODUCTS

Product	Conc. (ppm)	Molar Rate (gmole/kg-hr)	Weight Rate (g/kg-hr)	CO2-free	CO2-free
				Molar Select. (mol%)	Weight Select. (wt%)
methanol	59962.700	18.667	598.134	89.478	82.746
ethanol	1592.850	0.496	22.844	2.377	3.160
1-propanol	1258.820	0.392	23.540	1.878	3.257
isobutanol	1074.390	0.334	24.792	1.603	3.430
2-butanol	79.150	0.025	1.826	0.118	0.253
1-butanol	211.600	0.066	4.883	0.316	0.675
2-methyl-1-butanol	219.460	0.068	6.022	0.327	0.833
1-pentanol	91.370	0.028	2.507	0.136	0.347
2-methyl-1-pentanol	140.390	0.044	4.466	0.209	0.618
1-hexanol	60.490	0.019	1.924	0.090	0.266
DME	188.890	0.059	2.709	0.282	0.375
methane	797.660	0.248	3.984	1.190	0.551
ethane	145.210	0.045	1.359	0.217	0.188
propane	34.870	0.011	0.479	0.052	0.066
butane	0.000	0.000	0.000	0.000	0.000
pentane	11.460	0.004	0.257	0.017	0.036
hexane	5.130	0.002	0.138	0.008	0.019
methyl formate	755.030	0.235	14.115	1.127	1.953
methyl acetate	384.750	0.120	8.873	0.574	1.228
methyl isobutyrate	101.400	0.032	3.224	0.151	0.446
ethyl acetate	8.050	0.003	0.221	0.012	0.031
TOTAL	67014.22	20.862	722.854	100.000	100.000
Sum C1-C6 Alcohols	64691.220	20.139	690.940	96.534	95.585
Sum C2-C6 Alcohols	4728.520	1.472	92.806	7.056	12.839
Sum C2-C5 Alcohols	4527.640	1.410	86.416	6.756	11.955
Sum C1-C3 Alcohols	62814.370	19.555	644.519	93.733	89.163
Sum C4-C6 Alcohols	1876.850	0.584	46.421	2.801	6.422
EtOH+PrOH	2851.670	0.888	46.385	4.255	6.417
EtOH+PrOH+iBuOH	3926.060	1.222	71.177	5.859	9.847
Sum C1-C6 HCs	994.330	0.310	6.217	1.484	0.860
Sum Esters	1249.230	0.389	26.433	1.864	3.657

**Material balances:
(Element Recoveries - %)**

Nitrogen(N):	100.00
Carbon(C):	99.19
Hydrogen(H):	96.82
Oxygen(O):	99.79

Calculations:

CO conv. (%):	13.31
H2 conv. (%):	43.69
CO+H2 conv. (%):	22.94
Net CO2 rate gmol/kg-hr):	5.28

300ccc #2 AUTOCLAVE RUN SUMMARY**Catalyst:** BASF S3-86 C CsLaporte Sample13465-26**Liquid:** Drakeol 10**Run Description:** mixed alcohols

Run#: 13458-73H	G Gas Type: Shell	Feed MeOH Rate (ml/hr): 0
Date: 3/14/94	Press (psig): 1734	Feed EtOH Rate (ml/hr): 0
Hrs: 212	T Temp. (C): 299.7	Feed PrOH Rate (ml/hr): 0
Cat wt (g): 30.01	Inlet Flow (sccm): 4146.27	Syngas GHSV (sl/kg-hr): 8289.8
Liq wt (g): 120.03	Exit Flow (sccm): 3391.79	Total GHSV (sl/kg-hr): 8289.8

BUULK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.641	1.016	65.153	3.039		99.85
Exit:	17.046	1.242	66.662	5.597	0.0386	99.21

ORGANNIC PRODUCTS

Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)	Material balances (Element Recoveries - %)	
						Nitrogen(N):	Oxygen(O):
methanol	77421.510	23.419	750.377	89.821	83.271	100.0	
ethanol	1852.440	0.560	25.814	2.149	2.865	98.8	
1-propanol	1502.870	0.455	27.307	1.744	3.030	95.2	
isobutanol	1169.980	0.354	26.232	1.357	2.911	99.4	
2-butanol	86.850	0.026	1.947	0.101	0.216		
1-butanol	255.420	0.077	5.727	0.296	0.636		
2-methyl-1-butanol	225.450	0.068	6.011	0.262	0.667		
1-pentanol	110.700	0.033	2.952	0.128	0.328		
2-methyl-1-pentanol	157.810	0.048	4.877	0.183	0.541		
1-hexanol	67.940	0.021	2.100	0.079	0.233		
DME	324.790	0.098	4.526	0.377	0.502		
methane	957.960	0.290	4.649	1.111	0.516		
ethane	117.090	0.035	1.065	0.136	0.118		
propane	31.620	0.010	0.422	0.037	0.047		
butane	0.000	0.000	0.000	0.000	0.000		
pentane	7.200	0.002	0.157	0.008	0.017		
hexane	5.920	0.002	0.154	0.007	0.017		
methyl formate	1358.440	0.411	24.675	1.576	2.738		
methyl acetate	541.370	0.164	12.131	0.628	1.346		
methyl isobutyrate	113.240	0.034	3.498	0.131	0.388		
ethyl acetate	13.440	0.004	0.358	0.016	0.040		
TOTAL	86195.36	26.072	901.122	100.000	100.000		
Sum C1-C6 Alcohols	82850.970	25.061	853.343	96.120	94.698		
Sum C2-C6 Alcohols	5429.460	1.642	102.966	6.299	11.426		
Sum C2-C5 Alcohols	5203.710	1.574	95.989	6.037	10.652		
Sum C1-C3 Alcohols	80776.820	24.433	803.497	93.714	89.166		
Sum C4-C6 Alcohols	2074.150	0.627	49.846	2.406	5.532		
EtOH+PrOH	3355.310	1.015	53.120	3.893	5.895		
EtOH+PrOH+iBuOH	4525.290	1.369	79.352	5.250	8.806		
Sum C1-C6 HCs	1119.790	0.339	6.447	1.299	0.715		
Sum Esters	2026.490	0.613	40.663	2.351	4.512		

Calculations

CO conv. (%):	16.3
H2 conv. (%):	54.4
CO+H2 conv. (%):	28.5
Net CO2 rate gmol/kg-hr:	5.6

300cc #2 AUTOCLAVE RUN SUMMARY

Catalyst: BASF S3-86 Cs/Laporte Sample13465-26

Liquid: Drakeol 10

Run Description: mixed alcohols :

Run#: 13458-73J	Gas Type: Shell	Feed MeOH Rate (ml/hr): 0
Date: 3/15/94	Presss (psig): 1730	Feed EtOH Rate (ml/hr): 0
Hrs: 238.5	Temp. (C): 300.3	Feed PrOH Rate (ml/hr): 0
Cat wt (g): 30.01	Inlet Flow v (sccm): 1594.58	Syngas GHSV (sl/kg-hr): 3188.1
Liq wt (g): 120.03	Exit Flow v (sccm): 1248.12	Total GHSV (sl/kg-hr): 3188.1

BULLK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.484	1.005	64.369	3.038		98.90
Exit:	15.634	1.284	64.349	8.265	0.0516	98.19

ORGANIC PRODUCTS**Material balances:****(Element Recoveries - %)**

Product	Conc. (ppm)	Molar Rate (gmole/kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)	
methanol	70909.340	7.893	252.900	82.348	72.389	Nitrogen(N): 100.00
ethanol	2024.080	0.225	10.379	2.351	2.971	Carbon(C): 97.89
1-propanol	2462.470	0.274	16.464	2.860	4.713	Hydrogen(H): 91.85
isobutanol	3355.550	0.373	27.685	3.897	7.924	Oxygen(O): 99.54
2-butanol	137.470	0.015	1.134	0.160	0.325	
1-butanol	381.120	0.042	3.144	0.443	0.900	
2-methyl-1-butanol	562.320	0.063	5.517	0.653	1.579	
1-pentanol	171.520	0.019	1.683	0.199	0.482	
2-methyl-1-pentanol	326.200	0.036	3.710	0.379	1.062	
1-hexanol	143.830	0.016	1.636	0.167	0.468	
DME	697.970	0.078	3.579	0.811	1.024	
methane	2400.050	0.267	4.286	2.787	1.227	
ethane	264.840	0.029	0.886	0.308	0.254	
propane	85.230	0.009	0.418	0.099	0.120	
butane	0.000	0.000	0.000	0.000	0.000	
pentane	29.700	0.003	0.239	0.034	0.068	
hexane	12.540	0.001	0.120	0.015	0.034	
methyl formate	1347.640	0.150	9.008	1.565	2.578	
methyl acetate	797.190	0.089	6.573	0.926	1.882	
methyl isobutyrate	531.770	0.059	6.045	0.618	1.730	
ethyl acetate	0.000	0.000	0.000	0.000	0.000	
TOTAL	86109.06	9.585	349.363	100.000	100.000	
Sum C1-C6 Alcohols	80473.900	8.957	324.253	93.456	92.813	
Sum C2-C6 Alcohols	9564.560	1.065	71.353	11.107	20.424	
Sum C2-C5 Alcohols	9094.530	1.012	66.007	10.562	18.894	
Sum C1-C3 Alcohols	75395.890	8.392	279.743	87.559	80.073	
Sum C4-C6 Alcohols	5078.010	0.565	44.509	5.897	12.740	
EtOH+PrOH	4486.550	0.499	26.844	5.210	7.684	
EtOH+PrOH+IBuOH	7842.100	0.873	54.528	9.107	15.608	
Sum C1-C6 HCs	2792.360	0.311	5.949	3.243	1.703	
Sum Esters	2676.600	0.298	21.627	3.108	6.190	

Calculations:

CO conv. (%):	21.75
H2 conv. (%):	59.86
CO+H2 conv. (%):	34.00
Net CO2 rate gmol/kg-hr):	4.88

300ccc #2 AUTOCLAVE RUN SUMMARY

Catalyst:	BASF S3-86 G CsLaporte Sample13465-26		Liquid:	Drakeol 10	
Run Description:	mixed alcohols				
Run#:	13458-73K	G Gas Type:	Shell	Feed MeOH Rate (ml/hr):	0
Date:	3/16/94	Press (psig):	1302	Feed EtOH Rate (ml/hr):	0
Hrs:	260.5	TTemp. (C):	299.8	Feed PrOH Rate (ml/hr):	0
Cat wt (g):	30.01	Inlet Floww (sccm):	2613.62	Syngas GHSV (sl/kg-hr):	5225.5
Liq wt (g):	120.03	Exit Floww (sccm):	2208.48	Total GHSV (sl/kg-hr):	5225.5

BUULK GASES						Totals
Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	(%)
Inlet:	30.348	1.025	65.651	3.001		100.03
Exit:	19.613	1.213	66.349	5.735	0.0407	99.73

ORGANNIC PRODUCTS						Material balances
Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)	(Element Recoveries - %)
						Nitrogen(N): 100.0 Carbon(C): 99.1 Hydrogen(H): 96.8 Oxygen(O): 99.8
methanol	59152.540	11.650	373.298	87.211	79.186	Calculations CO conv. (%): 14.6 H2 conv. (%): 45.3 CO+H2 conv. (%): 24.3 Net CO2 rate gmol/kg-hr): 4.3
ethanol	1603.280	0.316	14.547	2.364	3.086	
1-propanol	1554.120	0.306	18.386	2.291	3.900	
isobutanol	1578.980	0.311	23.051	2.328	4.890	
2-butanol	88.250	0.017	1.288	0.130	0.273	
1-butanol	252.650	0.050	3.688	0.372	0.782	
2-methyl-1-butanol	298.440	0.059	5.181	0.440	1.099	
1-pentanol	117.820	0.023	2.046	0.174	0.434	
2-methyl-1-pentanol	276.260	0.054	5.559	0.407	1.179	
1-hexanol	78.160	0.015	1.573	0.115	0.334	
DME	257.240	0.051	2.334	0.379	0.495	
methane	1158.480	0.228	3.660	1.708	0.776	
ethane	164.050	0.032	0.972	0.242	0.206	
propane	43.470	0.009	0.378	0.064	0.080	
butane	0.000	0.000	0.000	0.000	0.000	
pentane	12.420	0.002	0.176	0.018	0.037	
hexane	6.800	0.001	0.115	0.010	0.024	
methyl formate	765.030	0.151	9.048	1.128	1.919	
methyl acetate	419.030	0.083	6.114	0.618	1.297	
methyl isobutyrate	157.500	0.031	3.168	0.232	0.672	
ethyl acetate	12.560	0.002	0.218	0.019	0.046	
TOTAL	67827.02	13.359	471.416	100.000	100.000	
Sum C1-C6 Alcohols	65000.500	12.802	448.619	95.833	95.164	
Sum C2-C6 Alcohols	5847.960	1.152	75.321	8.622	15.978	
Sum C2-C5 Alcohols	5493.540	1.082	68.188	8.099	14.465	
Sum C1-C3 Alcohols	62309.940	12.272	406.232	91.866	86.173	
Sum C4-C6 Alcohols	2690.560	0.530	42.387	3.967	8.991	
EtOH+PrOH	3157.400	0.622	32.934	4.655	6.986	
EtOH+PrOH+iBuOH	4736.380	0.933	55.985	6.983	11.876	
Sum C1-C6 HCs	1385.220	0.273	5.301	2.042	1.125	
Sum Esters	1354.120	0.267	18.548	1.996	3.935	

300cc #2 AUTOCLAVE RUN SUMMARY

Catalyst: BASF S3-86 Cs'sLaporte Sample13465-26		Liquid: Drakeol 10				
Run Description: mixed alcohols						
Run#: 13458-73L	Gas Type: Shell	Feed MeOH Rate (ml/hr):	23.9216			
Date: 3/17/94	Presss (psig): 1299	Feed EtOH Rate (ml/hr):	1.448507			
Hrs: 289	Temp. (C): 300.4	Feed PrOH Rate (ml/hr):	3.429895			
Cat wt (g): 30.01	Inlet Flow ψ (sccm): 2588.86	Syngas GHSV (sl/kg-hr):	5176.0			
Liq wt (g): 120.03	Exit Flow ψ (sccm): 2677.09	Total GHSV (sl/kg-hr):	5670.0			
BULLK GASES						
Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.218	1.031	66.094	2.987		100.33
Exit:	24.733	0.997	58.610	5.098	0.0589	100.41
ORGANIC PRODUCTS						Material balances: (Element Recoveries - %)
Product	Conc. (ppm)	Molar Rate (gmole /kg-hr)	Weight Rate (g/kg-hr)	CO2-free	CO2-free	Nitrogen(N): 100.00
				Molar Select. (mol%)	Weight Select. (wt%)	
methanol	90743.700	21.664	694.174	83.166	72.902	Hydrogen(H): 101.51
ethanol	3683.520	0.879	40.514	3.376	4.255	Oxygen(O): 101.21
1-propanol	6328.990	1.511	90.765	5.801	9.532	Calculations:
isobutanol	3451.600	0.824	61.081	3.163	6.415	CO conv. (%): 8.30
2-butanol	104.480	0.025	1.849	0.096	0.194	H2 conv. (%): 15.36
1-butanol	362.680	0.087	6.418	0.332	0.674	CO+H2 conv. (%): 10.52
2-methyl-1-butanol	250.870	0.060	5.280	0.230	0.554	Net CO2 rate gmol/kg-hr): 5.27
1-pentanol	149.670	0.036	3.150	0.137	0.331	
2-methyl-1-pentanol	230.560	0.055	5.624	0.211	0.591	
1-hexanol	97.530	0.023	2.379	0.089	0.250	
DME	277.820	0.066	3.056	0.255	0.321	
methane	1187.110	0.283	4.547	1.088	0.478	
ethane	208.440	0.050	1.496	0.191	0.157	
propane	70.840	0.017	0.746	0.065	0.078	
butane	0.000	0.000	0.000	0.000	0.000	
pentane	11.190	0.003	0.193	0.010	0.020	
hexane	11.310	0.003	0.233	0.010	0.024	
methyl formate	1082.760	0.259	15.524	0.992	1.630	
methyl acetate	857.830	0.205	15.172	0.786	1.593	
methyl isobutyrate	253.650	0.061	6.185	0.232	0.650	
ethyl acetate	42.690	0.010	0.898	0.039	0.094	
TOTAL	109110.9	26.050	952.198	100.000	100.000	
Sum C1-C6 Alcohols	105403.600	25.164	911.233	96.602	95.698	
Sum C2-C6 Alcohols	14659.900	3.500	217.059	13.436	22.796	
Sum C2-C5 Alcohols	14331.810	3.422	209.056	13.135	21.955	
Sum C1-C3 Alcohols	100756.210	24.055	825.452	92.343	86.689	
Sum C4-C6 Alcohols	4647.390	1.110	85.781	4.259	9.009	
EtOH+PrOH	10012.510	2.390	131.279	9.176	13.787	
EtOH+PrOH+iBuOH	13464.110	3.214	192.359	12.340	20.202	
Sum C1-C6 HCs	1488.890	0.355	7.214	1.365	0.758	
Sum Esters	2236.930	0.534	37.778	2.050	3.967	

300ccc #2 AUTOCLAVE RUN SUMMARY

Catalyst: BASF S3-86 C CsLaporte Sample13465-26

Liquid: Drakeol 10

Run Description: mixed alcohols

Run#: 13458-73M	G Gas Type: Shell	Feed MeOH Rate (ml/hr): 6.553796
Date: 3/18/94	Press (psig): 1299	Feed EtOH Rate (ml/hr): 0.986254
Hrs: 312.25	T Temp. (C): 300	Feed PrOH Rate (ml/hr): 1.85995
Cat wt (g): 30.01	Inlet Floww (sccm): 2629.12	Syngas GHSV (sl/kg-hr): 5256.5
Liq wt (g): 120.03	Exit Floww (sccm): 2371.09	Total GHSV (sl/kg-hr): 5408.6

BULK GASES

Stream	H2(%)	N2(%)	CO(%)	CO2(%)	H2O(%)	Totals (%)
Inlet:	30.257	1.020	65.343	3.006		99.63
Exit:	21.471	1.131	63.413	5.410	0.0466	99.67

ORGANIC PRODUCTS

Product	Conc. (ppm)	Molar Rate (gmole/kg-hr)	Weight Rate (g/kg-hr)	CO2-free Molar Select. (mol%)	CO2-free Weight Select. (wt%)
methanol	67990.530	14.377	460.665	82.902	72.478
ethanol	2702.880	0.572	26.330	3.296	4.143
1-propanol	4183.910	0.885	53.143	5.102	8.361
isobutanol	2899.830	0.613	45.451	3.536	7.151
2-butanol	92.810	0.020	1.455	0.113	0.229
1-butanol	299.960	0.063	4.701	0.366	0.740
2-methyl-1-butanol	267.640	0.057	4.989	0.326	0.785
1-pentanol	132.180	0.028	2.464	0.161	0.388
2-methyl-1-pentanol	251.130	0.053	5.426	0.306	0.854
1-hexanol	90.370	0.019	1.953	0.110	0.307
DME	227.750	0.048	2.219	0.278	0.349
methane	1103.780	0.233	3.744	1.346	0.589
ethane	189.930	0.040	1.208	0.232	0.190
propane	62.350	0.013	0.581	0.076	0.091
butane	0.000	0.000	0.000	0.000	0.000
pentane	9.990	0.002	0.152	0.012	0.024
hexane	9.260	0.002	0.169	0.011	0.027
methyl formate	853.950	0.181	10.844	1.041	1.706
methyl acetate	644.920	0.136	10.102	0.786	1.589
methyl isobutyrate	235.910	0.050	5.095	0.288	0.802
ethyl acetate	30.320	0.006	0.565	0.037	0.089
TOTAL	82013.17	17.342	635.596	100.000	100.000
Sum C1-C6 Alcohols	78911.240	16.686	606.576	96.218	95.434
Sum C2-C6 Alcohols	10920.710	2.309	145.912	13.316	22.957
Sum C2-C5 Alcohols	10579.210	2.237	138.533	12.899	21.796
Sum C1-C3 Alcohols	74877.320	15.833	540.138	91.299	84.981
Sum C4-C6 Alcohols	4033.920	0.853	66.438	4.919	10.453
EtOH+PrOH	6886.790	1.456	79.474	8.397	12.504
EtOH+PrOH+iBuOH	9786.620	2.069	124.924	11.933	19.655
Sum C1-C6 HCs	1375.310	0.291	5.855	1.677	0.921
Sum Esters	1765.100	0.373	26.606	2.152	4.186

Material balances (Element Recoveries - %)

Nitrogen(N):	100.0%
Carbon(C):	99.7%
Hydrogen(H):	98.9%
Oxygen(O):	100.2%

Calculations

CO conv. (%):	12.4%
H2 conv. (%):	36.0%
CO+H2 conv. (%):	19.9%
Net CO2 rate gmol/kg-hr):	4.3%