

APPENDIX E

Fluid Dynamic (Methanol) Run Mass Balances

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (1 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N

Total Mass

100.01
98.85
100.24
98.70
100.09

Sample# Sample# Sample# Sample#

6:25 A 6:25 B 15:45 A 15:45 B

Sample#

Sample#

Sample#

Sample#

Methanol
Ethanol
1-Propanol
iso-Propanol
1-Butanol
2-Butanol
iso-Butanol
2-Methyl-1-Butanol
1-Pentanol
2-Methyl-1-Pentanol
1-Hexanol
2-Methyl-1-Isobutyrate
Methyl Acetate
Ethyl Acetate
Methyl Formate
DME
CO₂
Water
Oil
Total

96.75 96.14 96.363 96.108
0.899 0.933 0.849 0.867
0.32 0.319 0.297 0.297
0 0 0 0
0.171 0.165 0.149 0.15
0.056 0.059 0.055 0.061
0.051 0.048 0.045 0.049
0 0 0 0
0.078 0.081 0.071 0.079
0 0 0 0
0 0 0 0
0.223 0.225 0.195 0.191
0 0 0 0
0.936 0.937 0.905 0.908
0 0 0 0
0 0 0 0
0.457 0.454 0.433 0.432
0.2 0.2 0.2 0.2
100.141 99.561 99.562 99.342

Liquid
Product
Analysis
(wt%)

RUN NO: AF-R13.1A (Rev. 2) TITLE: LPMEOH over Baseline Catalyst with TEXACO SYNGAS : SV=7000

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	309.6 846.9	143.3 870.3	102.1 815.1	335.4 799.1	100.0 799.1	317.2 799.1	471.4 749.7	87.5 1.3	98.0 659.4	86.1 34.9	79.9 82.5	80.0 1.0
Comp	H2	8.50	25.27	100.00	35.82	0.00	35.82	22.54	25.27	25.27	35.78	0.00	0.00
(mole%)	CO	84.76	56.76	0.00	50.77	0.00	50.77	50.53	56.76	56.76	50.58	0.00	0.00
	N2	0.49	1.59	0.00	1.16	0.00	1.16	1.41	1.59	1.59	1.17	0.00	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	6.24	16.37	0.00	12.25	0.00	12.25	15.21	16.37	16.37	12.45	0.00	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	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	0.00
	EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
	H2O	0.00	0.00	0.00	0.00	0.00	0.00	10.18	0.00	0.00	0.00	0.00	97.65
	Etah	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.00	0.01	0.00	0.80
	1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.63
	Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17
	IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
	2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	0.03
	1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	0.00
	others	0.00	0.00	0.00	0.00	100.00	0.00	0.16	0.00	0.00	0.00	100.00	0.02
	TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.09	100.00	100.00	100.00	100.00	100.00
	Mole Wt lb/lb mole	26.798	24.061	2.020	20.659	60.163	20.659	25.064	24.060	24.061	20.701	60.163	32.311
Flow	SCFH	19611	100900	24531	145042	0	145042	119389	107402	6465	52	0	12647
	lb mole/hr	50.72	260.96	63.45	375.13	0.00	375.13	308.78	277.78	16.72	0.13	0.00	32.71
	lb/hr	1359.3	6279.0	128.2	7750.0	0.0	7750.0	7739.3	6683.5	402.3	2.8	0.0	1056.9

RUN NO: AF-R13.1B (Rev. 1)

TITLE: LPMEOH over Baseline Catalyst with TEXACO SYNGAS : SV=7000

Balance Period:

Start Date	6/5/95	17:00	Time From Start of Run (hr)	Start	29.00
End Date	6/6/95	12:00		End	48.00

Reaction Conditions

Temperature (°F)	484.02	Catalyst Weight (lb oxide)	1179
Pressure (psig)	750.90	Slurry Conc. based on NDG (wt %)	48.2
Space Velocity (sL/kg-hr)	7128	Slurry Level (%)	94
Vg (inlet)	0.85	Gas Holdup based on NDG (vol %)	54.7

Performance Results

CO Conversion to H₂ (%)
 CO Conversion to MeOH (%)
 Theoretical Conversion % (1 CSTR)
 Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor inlet)

C	99.91
H	98.60
O	100.16
N	98.99
Total Mass	100.01

Liquid Product Analysis (wt%)

	Sample# 0:00 A	Sample# 0:00 B	Sample# 11:45 A	Sample# 11:45 B	Sample#	Sample#
Methanol	95.487	95.811	95.582	96.114		
Ethanol	0.949	0.913	0.822	0.834		
1-Propanol	0.252	0.264	0.236	0.23		
iso-Propanol	0.023	0.019	0.02	0.019		
1-Butanol	0.166	0.164	0.174	0.164		
2-Butanol	0.055	0.062	0.055	0.053		
iso-Butanol	0.064	0.05	0.066	0.04		
2-Methyl-1-Butanol	0	0	0	0		
1-Pentanol	0.076	0.079	0.071	0.073		
2-Methyl-1-Pentanol	0	0	0	0		
1-Hexanol	0.035	0.039	0.034	0.034		
2-Methyl-1-Isobutyrate	0	0	0	0		
Methyl Acetate	0.237	0.201	0.179	0.176		
Ethyl Acetate	0	0	0	0		
Methyl Formate	0.935	0.931	0.879	0.874		
DME	0	0	0	0		
CO ₂	0	0	0	0		
Water	0.414	0.417	0.426	0.43		
Oil	0.2	0.2	0.2	0.2		
Total	98.893	99.15	98.744	99.241		

RUN NO: AF-R13.1B (Rev. 1) TITLE: LPMEOH over Baseline Catalyst with TEXACO SYNGAS : SV=7000

T	P	Comp	(mole%)	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
307.1	846.8	8.58	84.47	141.3	24.51	97.8	329.3	100.0	311.4	471.9	83.8	96.8	83.6	77.7	80.0
psig				871.4	58.13	817.6	799.6	799.6	799.6	750.9	2.2	659.1	34.9	81.3	1.0
H2															
CO															
N2															
CH4															
CO2															
DME															
MeAc															
EtAc															
MeFm															
MeOH															
H2O															
EtoH															
1-ProH															
Iso-ProH															
IBOH															
1-Buoh															
2-Buoh															
2-Methyl 1-Buoh															
1-Peoh															
2-Methyl 1-Peoh															
1-hexanol															
2-Methyl 1-Isobutyrate															
others															
TOTAL															
Mole Wt															
lb/lb mole															
Flow															
SCFH															
lb mole/hr															
lb/hr															

RUN NO: AF-R13.2A (Rev. 1)

TITLE: LPMEOH over Baseline Catalyst with KINGSFORT SYNGAS : SV=4000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

71.00
89.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

1179
41.7
94
42.3

Performance Results

CO Conversion to H2 (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (3 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N
Total Mass

99.34
97.76
100.54
100.47
99.94

Liquid Product Analysis (wt%)

	Sample# 17:00 A	Sample# 17:00 B	Sample# 03:00 A	Sample# 03:00 B	Sample#	Sample#
Methanol	96.36	97.052	97.475	96.749		
Ethanol	0.321	0.322	0.312	0.288		
1-Propanol	0.084	0.069	0.084	0.082		
iso-Propanol	0	0	0	0		
1-Butanol	0.058	0.066	0.063	0.072		
2-Butanol	0.035	0.038	0.034	0.034		
iso-Butanol	0.018	0.016	0.017	0.018		
2-Methyl-1-Butanol	0	0	0	0		
1-Pentanol	0.025	0.024	0.023	0		
2-Methyl-1-Pentanol	0	0	0	0		
1-Hexanol	0	0	0	0		
2-Methyl-1-Isobutyrate	0	0	0	0		
Methyl Acetate	0.054	0.051	0.051	0.043		
Ethyl Acetate	0	0	0	0		
Methyl Formate	0.408	0.437	0.431	0.432		
DME	0	0	0	0		
CO2	0	0	0	0		
Water	1.419	1.382	1.417	1.413		
Oil	0.2	0.2	0.2	0.2		
Total	98.982	99.657	100.107	99.331		

RUN NO: AF-R13.2A (Rev. 1) TITLE: LPMEOH over Baseline Catalyst with KINGSPORT SYNGAS : SV=4000

T	P	Comp (mole%)	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
		F	293.1	125.5	103.1	278.0	100.0	258.6	463.7	88.8	93.9	86.8	80.1	80.0
		psig	775.6	793.4	814.0	754.6	754.6	754.6	735.0	1.2	682.9	34.8	82.2	1.0
		H2	10.63	57.05	100.00	60.63	0.00	60.63	46.63	57.04	57.05	12.69	0.00	0.00
		CO	77.13	19.85	0.00	24.73	0.00	24.73	15.96	19.85	19.85	9.25	0.00	0.00
		N2	3.01	7.99	0.00	4.79	0.00	4.79	6.53	7.99	7.99	2.82	0.00	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	9.23	15.11	0.00	9.85	0.00	9.85	13.08	15.10	15.11	61.48	0.00	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	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	0.02
		EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23
		MeOH	0.00	0.00	0.00	0.00	0.00	0.00	18.85	0.00	0.00	13.72	0.00	96.91
		H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.02	0.00	0.03	0.00	2.50
		Etoh	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.22
		1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.04
		Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
		1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
		2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
		2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
		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	0.00
		1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		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	0.00
		others	0.00	0.00	0.00	0.00	100.00	0.00	0.10	0.00	0.00	0.00	100.00	0.02
		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	26.725	15.599	2.020	13.829	65.684	13.829	18.629	15.599	15.599	35.098	65.684	31.836
		Flow SCFH	15485	42309	23445	81240	0	81240	59602	48428	6010	116	0	11453
		lb mole/hr	40.05	109.43	60.64	210.11	0.00	210.11	154.15	125.25	15.54	0.30	0.00	29.62
		lb/hr	1070.4	1707.0	122.5	2905.7	0.0	2905.7	2871.7	1953.9	242.5	10.5	0.0	943.1

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

Performance Results

CO Conversion to H2 (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (3 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor inlet)

C
H
O
N
Total Mass

Liquid
Product
Analysis
(wt%)

	Sample# 11:00 A	Sample# 11:00 B	Sample# 19:30 A	Sample# 19:30 B	Sample# 6:00 A	Sample# 6:00 B
Methanol	96.382	97.26	97.384	97.598	96.844	96.941
Ethanol	0.317	0.372	0.29	0.288	0.324	0.295
1-Propanol	0.093	0.095	0.082	0.074	0.079	0.08
iso-Propanol	0	0.037	0	0	0	0
1-Butanol	0.077	0.083	0.113	0.098	0.088	0.066
2-Butanol	0.037	0.037	0	0.032	0.032	0.032
iso-Butanol	0.017	0.019	0	0.015	0.018	0.018
2-Methyl-1-Butanol	0	0	0	0	0	0
1-Pentanol	0.03	0.031	0.025	0.024	0.025	0.015
2-Methyl-1-Pentanol	0	0	0	0	0	0
1-Hexanol	0	0	0	0	0	0
2-Methyl-1-Isobutyrate	0	0	0	0	0	0
Methyl Acetate	0.046	0.129	0.04	0.049	0.066	0.044
Ethyl Acetate	0	0	0	0	0	0
Methyl Formate	0.399	0.402	0.419	0.422	0.429	0.431
DME	0	0	0	0	0	0
CO2	0	0	0	0	0	0
Water	1.453	1.473	1.473	1.471	1.433	1.436
Oil	0.2	0.2	0.2	0.2	0.2	0.2
Total	99.051	100.138	100.026	100.271	99.538	99.558

RUN NO: AF-R13.2B (Rev. 1) TITLE: LPMEOH over Baseline catalyst with KINGSPORT SYNGAS : SV=4000

	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
T	290.8	139.1	101.9	276.6	100.0	257.4	462.6	88.5	93.3	86.9	79.4	80.0
P	775.8	856.7	821.1	754.8	754.8	754.8	735.0	1.2	666.0	34.8	82.1	1.0
Comp	10.56	56.96	100.00	60.62	0.00	60.62	46.77	56.95	56.96	12.63	0.00	0.00
(mole%)	77.05	19.64	0.00	24.65	0.00	24.65	15.94	19.64	19.64	9.13	0.00	0.00
H2	3.07	8.21	0.00	4.90	0.00	4.90	6.66	8.21	8.21	2.88	0.00	0.00
CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N2	9.32	15.19	0.00	9.84	0.00	9.84	13.03	15.19	15.19	61.43	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	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	0.00
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	16.62	0.00	0.00	13.89	0.00	96.82
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.02	0.00	0.03	0.00	2.58
EtoH	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.04
1-ProH	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
iso-ProH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
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	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.10	0.00	0.00	0.00	100.00	0.02
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	26.755	15.637	2.020	13.830	65.852	13.830	18.571	15.637	15.637	35.113	65.852	31.831
lb/lb mole												
Flow	15464	42504	23520	81488	0	81488	59949	48220	5698	117	0	11611
SCFH												
lb mole/hr	40.00	109.93	60.83	210.76	0.00	210.76	155.05	124.71	14.74	0.30	0.00	30.03
lb/hr	1070.1	1718.9	122.9	2914.7	0.0	2914.7	2879.5	1950.1	230.4	10.6	0.0	955.9

RUN NO: AF-R13.3A (Rev. 1)

TITLE: LPMEOH over Baseline Catalyst with KINGSPORT SYNGAS : SV=10,000

Balance Period:

Start Date	6/9/95	19:00	Time From Start of Run (hr)	Start	127.00
End Date	6/10/95	13:00		End	145.00

Reaction Conditions

Temperature (°F)	481.45	Catalyst Weight (lb oxide)	1179
Pressure (psig)	720.74	Slurry Conc. based on NDG (wt %)	48.5
Space Velocity (sL/kg-hr)	9150	Slurry Level (%)	94
Vg (inlet)	1.13	Gas Holdup based on NDG (vol %)	55.7

Performance Results

CO Conversion to H ₂ (%)	-2.4	Atomic/Mass Balance (% of reactor inlet)	C	100.88
CO Conversion to MeOH (%)	37.8		H	97.42
Theoretical Conversion % (3 CSTR)			O	101.44
Alcohol Production (Ton/day)	17.9		N	102.06
		Total Mass		101.02

Liquid Product Analysis (wt%)

	Sample#	Sample#	Sample#	Sample#	Sample#
	5:15 A	5:15 B			
Methanol	95.809	95.686			
Ethanol	0.174	0.174			
1-Propanol	0.039	0.039			
Iso-Propanol	0	0			
1-Butanol	0.054	0.052			
2-Butanol	0.02	0.019			
Iso-Butanol	0	0			
2-Methyl-1-Butanol	0	0			
1-Pentanol	0	0.014			
2-Methyl-1-Pentanol	0	0			
1-Hexanol	0	0			
2-Methyl-1-isobutyrate	0	0			
Methyl Acetate	0.039	0.046			
Ethyl Acetate	0	0			
Methyl Formate	0.287	0.303			
DME	0	0			
CO ₂	0	0			
Water	1.71	1.684			
Oil	0.2	0.2			
Total	98.332	98.217			

RUN NO: AF-R13.3A (Rev. 1) TITLE: LPMEOH over Baseline Catalyst with KINGSPORT SYNGAS : SV=10,000

	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
T F	287.7	149.6	101.6	332.1	100.0	315.8	469.0	87.6	98.8	86.7	78.9	80.0
P psig	832.1	850.5	819.7	775.2	775.2	775.2	720.7	1.3	620.8	35.1	81.9	1.0
Comp H2	30.33	57.16	100.00	59.28	0.00	59.28	48.62	57.15	57.16	17.10	0.00	0.00
(mole%) CO	63.14	22.27	0.00	25.55	0.00	25.55	19.60	22.27	22.27	13.70	0.00	0.00
N2	1.63	9.51	0.00	6.79	0.00	6.79	8.59	9.51	9.51	4.43	0.00	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	4.90	11.06	0.00	8.38	0.00	8.38	10.15	11.06	11.06	51.48	0.00	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	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	0.02
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
MeOH	0.00	0.00	0.00	0.00	0.00	0.00	12.22	0.00	0.00	13.25	0.00	96.58
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.02	0.00	0.04	0.00	3.04
Etoh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.12
1-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
Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.05	0.00	0.00	0.00	100.00	0.02
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	20.909	14.925	2.020	13.944	71.328	13.944	17.436	14.925	14.925	32.332	71.328	31.712
Flow SCFH	30798	124550	30757	186105	0	186105	147149	130073	4448	123	0	19650
lb mole/hr	79.65	322.13	79.55	481.33	0.00	481.33	380.58	336.41	11.50	0.32	0.00	50.82
lb/hr	1665.5	4807.8	160.7	6711.7	0.0	6711.7	6635.7	5021.1	171.7	10.3	0.0	1611.7

RUN NO: AF-R13.3B (Rev.1)

TITLE: LPMEOH over Baseline Catalyst with KINGSPORT SYNGAS : SV=10,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

13:00
0:00

145.00
156.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. by NDG (wt %)
Slurry Level (%)
Gas Holdup by NDG (vol %)

1179
48.9
94
55.8

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (3 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N
Total Mass

100.87
100.65
101.36
100.72
101.08

Sample# Sample# Sample# Sample# Sample#
18:15 A 18:15 B

Methanol	96.174	97.094
Ethanol	0.161	0.173
1-Propanol	0.04	0.052
iso-Propanol	0	0
1-Butanol	0.076	0.032
2-Butanol	0	0.019
iso-Butanol	0	0
2-Methyl-1-Butanol	0	0
1-Pentanol	0	0.01
2-Methyl-1-Pentanol	0	0
1-Hexanol	0	0
2-Methyl-1-Isobutyrate	0	0
Methyl Acetate	0.033	0
Ethyl Acetate	0	0
Methyl Formate	0.307	0.536
DME	0	0
CO ₂	0	0
Water	1.761	1.581
Oil	0.2	0.2
Total	98.752	99.697

Liquid Product Analysis (wt%)

RUN NO: AF-R13.3B (Rev.1) TITLE: LPMEOH over Baseline Catalyst with KINGSPORT SYNGAS : SV=10,000

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	288.0 831.2	150.7 847.8	104.2 804.7	331.2 774.2	100.0 774.2	315.2 774.2	469.6 720.1	90.3 1.1	99.8 621.7	88.9 34.6	82.1 81.8	80.0 1.0
Comp	H2	30.87	58.70	100.00	61.12	0.00	61.12	50.51	58.69	58.70	16.97	0.00	0.00
(mole%)	CO	62.63	22.00	0.00	24.89	0.00	24.89	18.70	22.00	22.00	13.05	0.00	0.00
	N2	1.44	8.25	0.00	5.75	0.00	5.75	7.32	8.25	8.25	3.70	0.00	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	5.05	11.05	0.00	8.24	0.00	8.24	9.88	11.05	11.05	49.99	0.00	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	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	0.01
	EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22
	MeOH	0.00	0.00	0.00	0.00	0.00	0.00	12.64	0.00	0.00	16.25	0.00	96.61
	H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.02	0.00	0.04	0.00	2.97
	EtoH	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.12
	1-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
	Iso-ProH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	0.00
	1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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	0.00
	others	0.00	0.00	0.00	0.00	100.00	0.00	0.06	0.00	0.00	0.00	100.00	0.02
	TOTAL	100.00 20.796	100.00 14.522	100.00 2.020	100.00 13.443	100.00 69.594	100.00 13.443	100.00 16.907	100.00 14.522	100.00 14.522	100.00 32.249	100.00 69.594	100.00 31.733
Mole Wt	lb/lb mole												
Flow	SCFH	31134	123326	30813	185273	0	185273	145567	128204	4854	123	0	18842
	lb mole/hr	80.52	318.97	79.69	479.18	0.00	479.18	376.49	331.58	12.56	0.32	0.00	48.73
	lb/hr	1674.5	4631.9	161.0	6441.6	0.0	6441.6	6365.3	4815.4	182.3	10.3	0.0	1546.4

RUN NO: AF-R14.1A (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

7.00
25.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

1158
45.4
94
49.6

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (1 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N

99.51
98.17
99.74
98.33

Total Mass

99.59

Liquid Product Analysis (wt%)

Methanol
Ethanol
1-Propanol
iso-Propanol
1-Butanol
2-Butanol
iso-Butanol
2-Methyl-1-Butanol
1-Pentanol
2-Methyl-1-Pentanol
1-Hexanol
2-Methyl-1-Isobutyrate
Methyl Acetate
Ethyl Acetate
Methyl Formate
DME
CO₂
Water
Oil
Total

Sample#	Sample#	Sample#	Sample#	Sample#
20:00 A	04:05 A	11:00 A		
95.677	95.881	96.103		
1.048	0.967	0.923		
0.303	0.273	0.276		
0.022	0.013	0.017		
0.175	0.175	0.161		
0.061	0.061	0		
0.066	0.049	0.069		
0	0	0		
0.085	0.078	0.079		
0	0	0		
0.038	0.037	0.038		
0	0	0		
0.29	0.257	0.251		
0	0	0		
1.082	1.074	1.048		
0	0	0		
0	0	0		
0.349	0.391	0.398		
0.2	0.2	0.2		
99.396	99.456	99.563		

RUN NO: AF-R14.1A (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

	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
T F	303.4	132.4	93.0	318.9	100.0	302.0	470.0	78.5	87.4	77.9	74.6	80.0
P psig	850.0	871.6	777.1	803.7	803.7	803.7	752.4	2.4	668.6	33.5	82.2	1.0
Comp H2	7.95	23.94	100.00	35.07	0.00	35.07	21.33	23.94	23.94	35.02	0.00	0.00
(mole%) CO	84.17	57.62	0.00	51.31	0.00	51.31	51.32	57.62	57.62	51.42	0.00	0.00
N2	0.51	1.52	0.00	1.10	0.00	1.10	1.34	1.52	1.52	1.11	0.00	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	7.36	16.92	0.00	12.52	0.00	12.52	15.40	16.92	16.92	12.44	0.00	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	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	0.12
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58
MeOH	0.00	0.00	0.00	0.00	0.00	0.00	10.27	0.00	0.00	0.00	0.00	97.58
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.01	0.00	0.69
1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.69
iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.15
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.03
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.01
others	0.00	0.00	0.00	0.00	100.00	0.00	0.18	0.00	0.00	0.00	100.00	0.00
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	27.121	24.494	2.020	20.897	60.168	20.897	25.415	24.494	24.494	20.899	60.168	32.380
Flow SCFH	20860	97868	24800	143527	0	143527	117938	105766	7859	216	0	12865
lb mole/hr	53.95	253.12	64.14	371.21	0.00	371.21	305.03	273.55	20.33	0.56	0.00	33.27
lb/hr	1463.2	6199.9	129.6	7757.4	0.0	7757.4	7752.3	6700.2	497.9	11.7	0.0	1077.4

RUN NO: AFR14.1B (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

6/14/95 12:00
6/15/95 12:00

25.00
49.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

1158
45.3
94
49.9

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (1 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N

98.81
100.22
99.04
98.49

Total Mass

98.99

Sample# Sample# Sample# Sample# Sample# Sample#

19:30 A 03:10 A 10:15 A

Methanol
Ethanol
1-Propanol
iso-Propanol
1-Butanol
2-Butanol
iso-Butanol
2-Methyl-1-Butanol
1-Pentanol
2-Methyl-1-Pentanol
1-Hexanol
2-Methyl-1-Isobutyrate
Methyl Acetate
Ethyl Acetate
Methyl Formate
DME
CO₂
Water
Oil
Total

96.213 95.583 95.296
0.914 0.882 0.912
0.26 0.253 0.264
0.024 0.016 0.013
0.171 0.171 0.154
0.052 0.031 0.052
0.055 0.055 0.053
0 0 0
0.076 0.072 0.085
0 0 0
0.037 0.034 0.038
0 0 0
0.235 0.221 0.21
0 0 0
1.014 1.009 0.906
0 0 0
0 0 0
0.413 0.404 0.437
0.2 0.2 0.2
99.664 98.931 98.62

RUN NO: AF-R14.1B (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

	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
T F	307.0	135.9	98.6	335.7	100.0	318.8	469.2	82.5	90.3	81.1	75.4	80.0
P psig	853.7	875.3	776.9	806.4	806.4	806.4	753.5	1.8	671.1	42.3	82.6	1.0
Comp H2	7.99	23.68	100.00	35.58	0.00	35.58	22.40	23.68	23.68	35.63	0.00	0.00
(mole%) CO	83.83	57.40	0.00	50.59	0.00	50.59	50.49	57.40	57.40	50.64	0.00	0.00
N2	0.55	1.56	0.00	1.13	0.00	1.13	1.37	1.56	1.56	1.13	0.00	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	7.63	17.35	0.00	12.70	0.00	12.70	15.54	17.35	17.35	12.58	0.00	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	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	0.10
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53
MeOH	0.00	0.00	0.00	0.00	0.00	0.00	9.94	0.00	0.00	0.00	0.00	97.64
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.01	0.00	0.76
EtoH	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.64
1-ProH	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.14
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	0.00	0.00	0.00	0.00	0.00	0.02
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
2-Methyl 1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.16	0.00	0.00	0.00	100.00	0.02
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	27.154	24.631	2.020	20.794	60.423	20.794	25.130	24.631	24.631	20.763	60.423	32.335
Flow SCFH	20799	98157	24799	143754	0	143754	118814	105504	7885	76	0	12958
lb mole/hr	53.79	253.87	64.14	371.80	0.00	371.80	307.30	272.87	20.39	0.20	0.00	33.51
lb/hr	1460.7	6253.0	129.6	7731.0	0.0	7731.0	7722.3	6721.0	502.3	4.1	0.0	1083.7

RUN NO: AF-R14.2A (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=4,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

6/15/95	19:00	56.00
6/17/95	1:00	86.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

482.64	Catalyst Weight (lb oxide)	1158
734.97	Slurry Conc. based on NDG (wt %)	39.4
4042	Slurry Level (%)	94
0.48	Gas Holdup based on NDG (vol %)	37.5

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (2 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor inlet)

-2	C	99.00
49.4	H	98.06
48.9	O	100.27
10.0	N	99.40
	Total Mass	99.62

Liquid Product Analysis (wt%)

	Sample# 2:30 A	Sample# 10:30 A	Sample# 21:20A	Sample#	Sample#
Methanol	96.643	97.373	96.617		
Ethanol	0.356	0.376	0.344		
1-Propanol	0.096	0.097	0.091		
iso-Propanol	0	0	0		
1-Butanol	0.071	0.071	0.102		
2-Butanol	0.037	0.037	0.038		
iso-Butanol	0.023	0.021	0.02		
2-Methyl-1-Butanol	0	0	0		
1-Pentanol	0.029	0.026	0.023		
2-Methyl-1-Pentanol	0	0	0		
1-Hexanol	0	0	0		
2-Methyl-1-Isobutyrate	0	0	0		
Methyl Acetate	0.058	0.096	0.053		
Ethyl Acetate	0	0	0		
Methyl Formate	0.535	0.516	0.456		
DME	0	0	0		
CO ₂	0	0	0		
Water	1.167	1.207	1.283		
Oil	0.2	0.2	0.2		
Total	99.215	100.02	99.227		

RUN NO: AF-R14.2A (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=4,000

	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
T	294.1	122.4	99.2	277.7	100.0	259.2	463.3	84.3	89.2	82.9	77.3	80.0
P	776.6	780.0	771.4	756.4	756.4	756.4	735.0	1.4	666.9	35.9	82.4	1.0
Comp	10.80	56.85	100.00	60.83	0.00	60.83	46.86	56.85	56.85	60.84	0.00	0.00
(mole%)	77.00	20.55	0.00	25.27	0.00	25.27	16.54	20.55	20.55	25.30	0.00	0.00
CO	2.76	7.31	0.00	4.25	0.00	4.25	5.80	7.31	7.31	4.25	0.00	0.00
N2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	9.44	15.29	0.00	9.65	0.00	9.65	12.92	15.28	15.29	9.58	0.00	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	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	0.00
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	17.04	0.00	0.00	0.00	0.00	0.27
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.01	0.00	0.02	0.00	97.14
EtOH	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	2.17
1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.01
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.12	0.00	0.00	0.00	100.00	0.02
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	26.713	15.680	2.020	13.744	64.659	13.744	18.566	15.680	15.680	13.727	64.659	31.910
lb/lb mole												
Flow	16026	40972	23754	80752	0	80752	59153	47243	6220	4	0	11695
SCFH	41.45	105.97	61.44	208.85	0.00	208.85	152.99	122.19	16.09	0.01	0.00	30.25
lb mole/hr												
lb/hr	1107.2	1661.5	124.1	2870.4	0.0	2870.4	2840.4	1915.9	252.2	0.2	0.0	965.2

RUN NO: AF-R14.2B (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=4,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (2 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N
Total Mass

Liquid Product Analysis (wt%)

	Sample# 4:00 A	Sample# 10:00 A	Sample# 18:00A	Sample# 2:00A	Sample#
Methanol	95.56	96.037	95.732	95.95	
Ethanol	0.337	0.339	0.325	0.372	
1-Propanol	0.095	0.095	0.09	0.094	
iso-Propanol	0	0	0	0	
1-Butanol	0.067	0.052	0.108	0.071	
2-Butanol	0.033	0.036	0.036	0.032	
iso-Butanol	0.02	0.022	0.018	0.02	
2-Methyl-1-Butanol	0	0	0	0	
1-Pentanol	0.026	0.028	0.026	0.027	
2-Methyl-1-Pentanol	0	0	0	0	
1-Hexanol	0	0	0	0	
2-Methyl-1-Isobutyrate	0	0	0	0	
Methyl Acetate	0.052	0.057	0.055	0.102	
Ethyl Acetate	0	0	0	0	
Methyl Formate	0.432	0.435	0.436	0.443	
DME	0	0	0	0	
CO ₂	0	0	0	0	
Water	1.273	1.291	1.289	1.268	
Oil	0.2	0.2	0.2	0.2	
Total	98.095	98.592	98.315	98.579	

RUN NO: AF-R14.2B (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=4,000

	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
T F	295.5	123.3	99.1	278.3	100.0	259.4	463.2	85.0	90.0	83.1	77.1	80.0
P psig	776.4	780.1	774.3	756.3	756.3	756.3	735.0	1.4	686.8	35.6	82.7	1.0
Comp H2	10.62	57.24	100.00	60.93	0.00	60.93	47.31	57.23	57.24	60.96	0.00	0.00
(mole%) CO	77.14	20.25	0.00	25.23	0.00	25.23	16.66	20.25	20.25	25.21	0.00	0.00
N2	2.89	7.50	0.00	4.37	0.00	4.37	5.93	7.50	7.50	4.36	0.00	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	9.35	15.01	0.00	9.47	0.00	9.47	12.63	15.01	15.01	9.44	0.00	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	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	0.00
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	16.65	0.00	0.00	0.00	0.00	0.00
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.01	0.00	0.03	0.00	0.00
Etoh	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.11	0.00	0.00	0.00	100.00	0.02
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	26.746	15.537	2.020	13.691	65.152	13.691	18.385	15.537	15.537	13.676	65.152	31.879
Flow SCFH	16032	40529	23882	80443	0	80443	59248	47174	6613	18	0	11575
lb mole/hr	41.46	104.82	61.77	208.05	0.00	208.05	153.24	122.01	17.10	0.05	0.00	29.94
lb/hr	1109.0	1628.6	124.8	2848.4	0.0	2848.5	2817.3	1895.6	285.7	0.6	0.0	954.4

RUN NO: AF-R14.3 (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=7,000

Balance Period:

Start Date	6/18/95	18:00	127.00
End Date	6/19/95	16:00	149.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

481.90	Catalyst Weight (lb oxide)	1158
520.69	Slurry Conc. based on NDG (wt %)	45.6
7092	Slurry Level (%)	94
1.18	Gas Holdup based on NDG (vol %)	50.4

Performance Results

CO Conversion to H2 (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (2 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor inlet)

-5.5	C	99.75
33.0	H	99.51
32.5	O	100.11
11.1	N	99.72

Total Mass

99.91

Liquid Product Analysis (wt%)

	Sample# 21:00 A	Sample# 3:00 A	Sample# 10:00A	Sample# 15:00A	Sample#
Methanol	96.214	96.405	96.85	96.863	
Ethanol	0.282	0.185	0.258	0.22	
1-Propanol	0.055	0.046	0.052	0.05	
iso-Propanol	0	0	0	0	
1-Butanol	0.04	0.044	0.052	0.033	
2-Butanol	0.029	0.02	0.024	0	
Iso-Butanol	0.015	0	0.013	0	
2-Methyl-1-Butanol	0	0	0	0	
1-Pentanol	0.019	0.01	0	0.017	
2-Methyl-1-Pentanol	0	0	0	0	
1-Hexanol	0	0	0	0	
2-Methyl-1-Isobutyrate	0	0	0	0	
Methyl Acetate	0.054	0	0.097	0.026	
Ethyl Acetate	0	0	0	0	
Methyl Formate	0.175	0.19	0.2	0.359	
DME	0	0	0	0	
CO2	0	0	0	0	
Water	2.449	2.969	2.719	2.512	
Oil	0.2	0.2	0.2	0.2	
Total	99.532	100.069	100.465	100.28	

RUN NO: AF-R14.3 (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Kingsport Syngas : SV=7,000

	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
T F	262.0	158.0	99.9	341.8	100.0	324.9	474.9	85.4	94.7	84.3	76.0	80.0
P psig	610.1	631.3	814.2	571.5	571.5	571.5	520.7	1.3	432.3	34.4	82.8	1.0
Comp H2	12.85	58.28	100.00	60.21	0.00	60.21	51.03	58.26	58.28	15.69	0.00	0.00
(mole%) CO	80.53	22.01	0.00	23.96	0.00	23.96	19.56	22.01	22.01	11.22	0.00	0.00
N2	0.48	7.07	0.00	5.49	0.00	5.49	6.69	7.07	7.07	2.76	0.00	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	6.13	12.64	0.00	10.34	0.00	10.34	11.43	12.63	12.64	43.27	0.00	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	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	0.02
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MeFm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
MeOH	0.00	0.00	0.00	0.00	0.00	0.00	9.63	0.00	0.00	27.02	0.00	94.97
H2O	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.03	0.00	0.06	0.00	4.65
EtOH	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.16
1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
iso-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IBOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.04	0.00	0.00	0.00	100.00	0.02
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	25.650	14.885	2.020	14.015	69.384	14.015	16.823	14.886	14.885	31.939	69.384	31.481
Flow SCFH	12598	110159	18933	141690	0	141690	116379	110385	92	20	0	10919
lb mole/hr	32.58	284.91	48.97	366.46	0.00	366.46	301.00	285.49	0.24	0.05	0.00	28.24
lb/hr	835.8	4240.9	98.9	5136.1	0.0	5136.1	5063.7	4249.8	3.5	1.6	0.0	889.1

RUN NO: AF-R14.4 (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=4,000

Balance Period:

Start Date
End Date

6/19/95 23:00
6/21/95 7:00

156.00
188.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

482.68
750.92
4062
0.47

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

1158
42.2
94
42.9

Performance Results

CO Conversion to H₂ (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (2 CSTR)
Alcohol Production (Ton/day)

-0.4
17.5
17.7
7.2

Atomic/Mass Balance (% of reactor inlet)

C
H
O
N

101.36
95.70
101.94
100.34

Total Mass

101.50

Liquid Product Analysis (wt%)

	Sample# 1:00 A	Sample# 6:15 A	Sample# 14:30A	Sample# 21:30A	Sample# 5:00A	Sample#
Methanol	92.04	91.867	93.226	92.147	92.826	
Ethanol	1.585	1.564	1.495	1.521	1.544	
1-Propanol	0.489	0.492	0.458	0.478	0.477	
iso-Propanol	0.02	0.022	0.027	0.04	0.03	
1-Butanol	0.24	0.268	0.227	0.25	0.284	
2-Butanol	0.092	0.09	0.088	0.086	0.08	
iso-Butanol	0.108	0.109	0.102	0.103	0.12	
2-Methyl-1-Butanol	0	0	0	0	0	
1-Pentanol	0.138	0.141	0.131	0.137	0.139	
2-Methyl-1-Pentanol	0	0	0	0	0	
1-Hexanol	0.073	0.074	0.074	0.065	0.071	
2-Methyl-1-Isobutylate	0	0	0	0	0	
Methyl Acetate	0.491	0.501	0.473	0.497	0.488	
Ethyl Acetate	0	0	0	0	0	
Methyl Formate	1.13	1.184	1.182	1.18	1.187	
DME	0	0	0	0	0	
CO ₂	0	0	0	0	0	
Water	0.331	0.312	0.333	0.311	0.314	
Oil	0.2	0.2	0.2	0.2	0.2	
Total	96.937	96.824	98.016	97.015	97.76	

RUN NO: AF-R14.4 (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=4,000

	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
T	286.7	128.0	91.4	325.6	100.0	305.6	466.3	86.0	89.3	82.9	78.6	80.0
P	803.0	860.6	814.9	775.8	775.8	775.8	750.9	1.5	723.9	34.4	82.1	1.0
Comp	59.85	23.83	100.00	35.07	0.00	35.07	20.00	23.83	23.83	4.15	0.00	0.00
(mole%)	37.79	56.96	0.00	50.85	0.00	50.85	50.88	56.96	56.96	21.64	0.00	0.00
CO	0.22	1.95	0.00	1.39	0.00	1.39	1.72	1.95	1.95	0.58	0.00	0.00
N2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	2.14	17.25	0.00	12.69	0.00	12.69	15.84	17.25	17.25	61.72	0.00	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	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	0.00
EtAc	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	0.00	0.00	11.01	0.00	0.00	11.91	0.00	96.82
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.01	0.00	0.60
EtOH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.12
1-Proh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27
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	0.00	0.00	0.00	0.00	0.00	0.05
1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
2-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
2-Methyl 1-Buoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Peoh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
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	0.00
1-hexanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
2-Methyl 1-Isobutyrate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
others	0.00	0.00	0.00	0.00	100.00	0.00	0.29	0.00	0.00	0.00	100.00	0.02
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	12.796	24.576	2.020	20.925	59.319	20.925	25.857	24.576	24.576	37.287	59.319	32.608

Flow	SCFH	52729	0	81151	0	81151	65591	57481	4290	70	0	7892
lb mole/hr		136.38	0.00	209.88	0.00	209.88	169.64	148.67	11.09	0.18	0.00	20.41
lb/hr		3351.5	0.0	4391.8	0.0	4391.8	4386.4	3653.6	272.7	6.7	0.0	665.6

RUN NO: AF-R14.5 (Rev. 1)

TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

Balance Period:

Start Date
End Date

Time From Start of Run (hr)

Start
End

191.00
213.00

Reaction Conditions

Temperature (°F)
Pressure (psig)
Space Velocity (sL/kg-hr)
Vg (inlet)

Slurry Data

Catalyst Weight (lb oxide)
Slurry Conc. based on NDG (wt %)
Slurry Level (%)
Gas Holdup based on NDG (vol %)

1158
46.5
94
50.8

Performance Results

CO Conversion to H2 (%)
CO Conversion to MeOH (%)
Theoretical Conversion % (2 CSTR)
Alcohol Production (Ton/day)

Atomic/Mass Balance (% of reactor Inlet)

C
H
O
N
Total Mass

100.19
98.56
100.47
99.67
100.30

Liquid Product Analysis (wt%)	Sample# 13:30 A	Sample# 18:00 A	Sample# 00:05A	Sample# 06:00A	Sample#	Sample#
Methanol	95.237	95.747	96.088	95.457		
Ethanol	0.983	0.842	0.859	0.861		
1-Propanol	0.29	0.242	0.247	0.241		
iso-Propanol	0.015	0.026	0.02	0.011		
1-Butanol	0.167	0.132	0.133	0.139		
2-Butanol	0.051	0.058	0.057	0.056		
iso-Butanol	0.052	0.046	0.047	0.045		
2-Methyl-1-Butanol	0	0	0	0		
1-Pentanol	0.083	0.051	0.074	0.074		
2-Methyl-1-Pentanol	0	0	0	0		
1-Hexanol	0	0.03	0.04	0.039		
2-Methyl-1-Isobutyrate	0	0	0	0		
Methyl Acetate	0.211	0.188	0.188	0.184		
Ethyl Acetate	0	0	0	0		
Methyl Formate	0.966	0.911	0.924	0.941		
DME	0	0	0	0		
CO2	0	0	0	0		
Water	0.395	0.485	0.462	0.45		
Oil	0.2	0.2	0.2	0.2		
Total	98.65	98.958	99.339	98.698		

RUN NO: AF-R14.5 (Rev. 1) TITLE: LPMEOH over Alternate Catalyst with Texaco Syngas : SV=7,000

T P	Comp (mole%)	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	
		311.2	850.9	140.9	873.0	102.9	814.7	334.9	803.6	100.0	803.6	318.0	803.6	470.0	751.5	91.5	0.9	94.9	668.6	87.9	34.7	83.0	81.5	80.0	1.0
	H2	8.07		24.92		100.00		35.40		0.00		35.40		22.31		24.92		24.92		5.03		0.00		0.00	
	CO	83.36		56.82		0.00		50.87		0.00		50.87		50.95		56.82		56.82		24.14		0.00		0.00	
	N2	0.53		1.38		0.00		1.02		0.00		1.02		1.23		1.38		1.38		0.43		0.00		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	8.05		16.88		0.00		12.72		0.00		12.72		15.38		16.88		16.88		62.44		0.00		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		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		0.00	
	EtAc	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
	MeFm	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.51	
	MeOH	0.00		0.00		0.00		0.00		0.00		0.00		9.75		0.00		0.00		7.95		0.00		97.65	
	H2O	0.00		0.00		0.00		0.00		0.00		0.00		0.18		0.01		0.00		0.01		0.00		0.81	
	Etoh	0.00		0.00		0.00		0.00		0.00		0.00		0.05		0.00		0.00		0.00		0.00		0.63	
	1-Proh	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.14	
	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		0.00		0.00		0.00		0.00		0.00		0.02	
	1-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-Buoh	0.00		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-Buoh	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
	1-Peoh	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.03	
	2-Methyl 1-Peoh	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
	1-hexanol	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.01	
	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		0.00	
	others	0.00		0.00		0.00		0.00		0.00		0.00		0.15		0.00		0.00		0.00		0.00		0.02	
	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	27.200		24.233		2.020		20.845		60.222		20.845		25.106		24.233		24.233		37.012		60.222		32.307	
	Flow	20349		99279		23493		143120		0		143121		118693		106100		6838		52		0		12424	
	lb mole/hr	52.63		256.77		60.76		370.16		0.00		370.16		306.95		274.41		17.69		0.13		0.00		32.13	
	lb/hr	1431.5		6222.4		122.7		7716.1		0.0		7716.1		7706.5		6649.8		428.6		4.9		0.0		1038.1	