

AVERAGE: 06/15/1800-->2400
CASE R

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 27-Jun-84
TIME : 03:10 PM
RUN ID NUMBER : EB-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 142.4
OIL/SLURRY INLET TEMP. (des.C) : 250.5
AVE. REACTOR TEMPERATURE (des.C) : 249.3
REACTOR OUTLET TEMP. (des.C) : 250.5
GUARD BED FEED PRESSURE (kPa) : 6475
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6307
GAS SUPERFICIAL VELOCITY (cm/sec) : 11.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.7
SLURRY CONCENTRATION (wt%) : 48.9
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 5005
RECYCLE/FRESH FEED RATIO : 4.31158
OIL/SLURRY CIRCULATION RATE (m3/hr) : 43.7
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (kmol/hr) : 136.00
PURGE GAS FLOW RATE <S0> (kmol/hr) : 6.66

STREAM #	1	55	10	15	25*	25*	68
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED	FEED REACTOR	FEED	FEED	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1	
COMPONENT							
H2	60.28	54.78	55.79	56.29	52.11	52.48	
CO	26.76	17.46	19.33	19.32	16.66	16.49	
CO2	3.26	5.29	4.92	4.90	5.12	5.07	
N2	6.63	20.54	18.11	17.87	19.46	19.75	
CH4	0.22	0.54	0.44	0.48	0.51	0.49	
H2O	0.01	0.00	0.04	0.00	0.30	0.40	
CH3OH	0.00	0.34	0.37	0.27	5.23	5.46	4.81
ME	0.00	0.00	0.00	0.00	0.00	0.00	94.85
C2H5OH							0.00
C3H7OH							0.06
C4H9OH							0.01
C5H11OH							0.00
ALKANES							0.00
ESTERS							0.00
ALDEHYDES							0.14
OTL							0.00
TOTAL :	97.16	98.96	99.00	99.12	99.39	100.15	100.00
DENS.g/cc	0.004	0.034	0.026	0.026	0.022	0.001	
AV.HOL.WT	12.39	14.43	14.11	13.99	15.32	15.32	0.796
m3/hr	672.4	2899.1	3488.3	3518.5	3213.2	3213.6	31.82
kmol/hr	30.00	129.34	155.63 (2)	156.98 (2)	143.35 (1)	143.37	7.30
l/hr:prod							293.94

* Compositions correspond to STREAM#32

(1) Decreased 4% to optimize REACTOR EFFLUENT COMPONENT BALANCE

(2) Adjusted to match across reactor mass balance

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	13.3	15.5
CARBON MONOXIDE CONVERSION	(Z) :	21.4	21.3
CARBON DIOXIDE CONVERSION	(Z) :	4.9	4.6

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

	<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>%</u>
CO (+CO ₂) SELECTIVITY TO METHANOL (Z) :	105.1	100.4
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :		0.1

* Methanol in flashed gas not measured
 Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>MEDH SOURCE</u>	<u>smol/hr-ks cat</u>	<u>ks/1000 Na3 fresh feed</u>	<u>ks/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	10.18	341.2	65.2
As Net MeOH produced, OVERALL balance	9.88	331.0	63.2

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	2.11
REACTOR FEED (H ₂ -CO ₂)/(CO+CO ₂) :	2.12
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	51.0
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	16.6
METHANOL COLLECTED AS % OF CALCULATED :	96.7
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.16

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

27-Jun-84 / 03:11 PM

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-0.43074	0.64004	0.16353
CO	6.60261	0.93269	0.42564
CO2	-29.45530	1.69595	1.74141
N2	-34.70940	1.77632	-0.28191
CH4	n.a.	2.84462	-0.39013
H2O		100.00000	19.11370
CH3OH		3.89389	1.32806

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	30.3244	22.5825	1.1627	0.0283	—	23.7735	21.6027
CO2	7.6906	6.8461	0.3525	0.0087	—	7.2073	6.2843
CH3OH	0.4230	0.4402	0.0227	0.0094	6.9224	7.3946	-1647.9700
OTHERS	0.7485	0.7038	0.0362	0.0008	0.0339	0.7748	-3.5087
TOTAL C	39.1866	30.5726	1.5741	0.0472	6.9563	39.1502	0.0928
HYDROGEN:							
H2	176.7140	141.6900	7.2954	0.1802	—	149.1660	15.5894
H2O	0.0000	0.0000	0.0000	0.0014	0.7021	0.7034	n.a.
OTHERS	4.6862	4.5760	0.2356	0.0409	27.7685	32.6210	-596.1140
TOTAL H	181.4010	146.2660	7.5310	0.2224	28.4706	182.4900	-0.6007
OXYGEN:							
TOTAL O	46.1287	36.7149	1.8904	0.0558	7.3091	45.9612	0.3632
NITROGEN:							
TOTAL N	28.0510	26.5704	1.3681	0.0339	—	27.9724	0.2604
TOTAL MASS FLOW (ks/hr)	2196.6300	1865.7300	96.0629	2.6302	232.2100	2196.6400	-0.0004

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	101.189	100.653
HYDROGEN	103.910	100.997
OXYGEN	101.252	100.749

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 27-Jun-84
TIME : 03:34 PM
RUN ID NUMBER : EB-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 142.8
OIL/SLURRY INLET TEMP. (des.C) : 250.8
AVE. REACTOR TEMPERATURE (des.C) : 249.6
REACTOR OUTLET TEMP. (des.C) : 250.8
GUARD BED FEED PRESSURE (kPa) : 6450
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6306
GAS SUPERFICIAL VELOCITY (cm/sec) : 11.6
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.7
EXPANDED BED HEIGHT (cm) : n.a.
SLURRY CONCENTRATION (wt%): 46.5
CATALYST OXIDE WT IN REACTOR (kg oxide) :
GAS HOLD-UP :
SPACE VELOCITY (1/kg-hr) : 5447
RECYCLE/FRESH FEED RATIO : 4.38262
OIL/SLURRY CIRCULATION RATE (m3/hr) : 43.6
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (kmol/hr) : 134.97
PURGE GAS FLOW RATE <S0> (kmol/hr) : 7.03

STREAM #	1	55	10	15	25*	25*	68	
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	V/L SEP	V/L SEP	MECH PRODUCT	
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	60.30	55.02	56.06	56.94	52.91	52.77	---	---
CO	27.02	18.25	20.10	20.19	17.18	17.43	---	---
CO2	3.36	5.36	5.02	5.03	5.11	5.19	---	---
N2	6.89	20.15	18.02	17.69	18.78	19.56	---	---
CH4	0.19	0.48	0.39	0.42	0.45	0.43	---	---
H2O	0.01	0.00	0.04	0.00	0.29	0.38	4.80	2.72
CH3OH	0.00	0.35	0.42	0.26	4.94	5.25	94.86	95.56
BNE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH	---	---	---	---	---	---	0.06	0.05
C3OH'S	---	---	---	---	---	---	0.01	0.02
C4OH'S	---	---	---	---	---	---	0.00	0.01
C5OH'S	---	---	---	---	---	---	0.00	0.00
ALKANES	---	---	---	---	---	---	0.00	0.00
ESTERS	---	---	---	---	---	---	0.14	0.27
ALDEHYDES	---	---	---	---	---	---	0.00	0.00
OIL	---	---	---	---	---	---	0.12	1.33
TOTAL :	97.76	99.61	100.06	100.53	99.66	101.00	100.00	100.00
DENS, g/cc	0.004	0.036	0.026	0.026	0.022	0.001	---	0.790
AV. MOL. WT	12.50	14.47	14.22	14.05	15.15	15.37	31.81	---
M3/hr	654.4	2867.8	3429.3	3469.8	3218.5	3171.2	---	---
kmol/hr	29.19	127.94	153.00 (2)	154.80 (2)	143.59 (1)	141.48	6.90	---
L/hr, prod	---	---	---	---	---	---	---	277.79

* Compositions correspond to STREAM#32
(1) Decreased 2.66Z to match back end mass flow rate
(2) Decreased 3.72Z

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

27-Jun-84 / 03:35 PM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :		
CARBON MONOXIDE CONVERSION	(Z) :	13.0	13.8
CARBON DIOXIDE CONVERSION	(Z) :	19.8	21.0
		4.4	5.9

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

		<u>ACROSS REACTOR GC Average</u>	<u>OVERALL %</u>
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :		
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :	99.9	96.3
			0.1

* Methanol in flashed gas not measured
Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>smol/hr-ks cat</u>	<u>ks/1000 Na3 fresh feed</u>	<u>ks/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	10.57		
As Net MeOH produced, OVERALL balance	10.32	329.7 321.7	62.2 60.7

REACTOR FEED (CH ₂ /(CO+1.5CO ₂)) :	2.05
REACTOR FEED (CH ₂ -CO ₂)/(CO+CO ₂) :	2.06
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	53.8
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	11.0
METHANOL COLLECTED AS % OF CALCULATED :	97.2
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	6.73

27-Jun-84 / 03:35 PM

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.66884	-0.16659	2.14535
CO	6.53400	-0.03582	0.05664
CO2	-29.59670	0.61033	1.17980
N2	-36.41140	1.45272	-0.93397
CH4	n.a.	4.33375	-0.65661
H2O	—	100.00000	19.55100
CH3OH	—	10.18070	0.91216

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	31.2483	23.3492	1.2832	0.0263	—	24.6587	21.0878
CO2	7.7940	6.8615	0.3771	0.0078	—	7.2464	7.0261
CH3OH	0.4014	0.4469	0.0246	0.0079	6.5447	7.0241	-1649.7400
OTHERS	0.5424	0.6150	0.0338	0.0006	0.0314	0.6809	-5.9847
TOTAL C	40.0861	31.2726	1.7186	0.0428	6.5761	39.6101	1.1876
HYDROGEN:							
H2	176.2920	140.7950	7.7373	0.1595	—	148.6920	15.6563
H2O	0.0000	0.0000	0.0000	0.0011	0.6627	0.6638	n.a.
OTHERS	4.1754	4.2476	0.2334	0.0343	26.2519	30.7673	-636.8750
TOTAL H	180.4680	145.0420	7.9708	0.1950	26.9146	180.1230	0.1912
OXYGEN:							
TOTAL O	47.2377	37.5191	2.0619	0.0505	6.9009	46.5324	1.4931
NITROGEN:							
TOTAL N	27.3835	25.7759	1.4165	0.0296	—	27.2219	0.5900
TOTAL MASS FLOW (kg/hr)	2174.8300	1851.3300	101.7390	2.3236	219.4490	2174.8400	-0.0007

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.897	99.135
HYDROGEN	103.333	101.798
OXYGEN	101.009	99.158

AVERAGE: 06/16/1100-->1500
CASE D

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 27-Jun-84
TIME : 04:24 PM
RUN ID NUMBER : ER-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 141.9
OIL/SLURRY INLET TEMP. (deg.C) : 251.7
AVE. REACTOR TEMPERATURE (deg.C) : 250.6
REACTOR OUTLET TEMP. (deg.C) : 251.7
GUARD BED FEED PRESSURE (kPa) : 6522
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6306
GAS SUPERFICIAL VELOCITY (cm/sec) : 11.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.9
EXPANDED BED HEIGHT (cm) : n.a.
SLURRY CONCENTRATION (wt%) : 46.5
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 5489
RECYCLE/FRESH FEED RATIO : 4.39846
OIL/SLURRY CIRCULATION RATE (m3/hr) : 54.8
PRIM. SEPARATOR GAS FLOWRATE <S0> + <S5> (kmo1/hr) : 133.75
PURGE GAS FLOW RATE <S0> (kmo1/hr) : 6.31

STREAM #	1	55	10	15	25*	25*	68
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	V/L SEP	V/L SEP	METH PRODUCT
ON-LINE GC#	1	2	1	2	2	1	
COMPONENT							
H2	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>
CO	59.42	53.11	54.44	54.97	50.61	50.53	<WT>
CO2	27.83	17.43	19.65	19.75	16.91	16.83	
N2	3.49	5.78	5.37	5.39	5.56	5.54	
CH4	6.79	22.23	19.85	19.46	20.70	21.26	
H2O	0.20	0.57	0.47	0.49	0.54	0.51	
CH3OH	0.02	0.00	0.04	0.00	0.33	0.42	4.80
DME	0.00	0.39	0.41	0.30	5.17	5.45	94.86
C2H5OH	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3OH'S							0.06
C4OH'S							0.01
C5OH'S							0.00
ALKAHENES							0.00
ESTERS							0.00
ALDEHYDES							0.14
OIL							0.00
TOTAL :	97.75	99.51	100.24	100.36	99.82	100.54	100.00
DENS, g/cc	0.004	0.037	0.027	0.028	0.023	0.001	0.790
AV. MOL. WT	12.76	15.01	14.71	14.59	15.83	15.95	31.81
m3/hr	649.4	2856.5	3428.6	3457.7	3184.9	3162.7	7.52
kmo1/hr	28.97	127.44	152.96 (3)	154.26 (2)	142.09 (1)	141.10	302.63
l/hr, prod							

* Compositions correspond to STREAM#32
(1) Decreased 2.39% to match back end mass balance
(2) Decreased 3.52%

27-Jun-84 / 04:25 PM

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
HYDROGEN CONVERSION (Z) :	14.4	15.2
CARBON MONOXIDE CONVERSION (Z) :	21.0	21.1
CARBON DIOXIDE CONVERSION (Z) :	4.9	4.9

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL *
CO (+CO ₂) SELECTIVITY TO METHANOL (Z) :	103.1	96.2
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :		0.1

* Methanol in flashed gas not measured
 Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

MEOH SOURCE	mol/hr-kg cat	kg/1000 Nm ³ fresh feed	kg/1000 Nm ³ reactor feed
As calculated ACROSS REACTOR	11.08	344.4	64.7
As Net MeOH produced, OVERALL balance	11.36	353.0	66.3

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	1.98
REACTOR FEED ((H ₂ -CO ₂)/(CO+CO ₂)) :	1.97
APPROACH TO METHANOL EQUILIBRIUM (deg.C) :	48.2
APPROACH TO WATER-GAS EQUILIBRIUM (deg.C) :	18.3
METHANOL COLLECTED AS % OF CALCULATED :	102.2
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	6.98

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

27-Jun-84 / 04:25 PM

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.59219	0.12307	1.08451
CO	4.50967	-0.57677	2.83613
CO2	-33.83930	0.76599	2.06100
N2	-34.54010	0.84586	-1.22946
CH4	n.a.	3.29977	0.60280
H2O		100.00000	23.61030
CH3OH		7.28937	-4.20638

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	30.4580	22.2186	1.1003	0.0299	—	23.3488	23.3410
CO2	8.3071	7.3611	0.3645	0.0098	—	7.7354	6.8817
CH3OH	0.4593	0.4954	0.0245	0.0097	7.1300	7.6597	-1567.6890
OTHERS	0.7562	0.7251	0.0359	0.0009	0.0343	0.7962	-5.2816
TOTAL C	39.9806	30.8003	1.5253	0.0502	7.1643	39.5401	1.1019
HYDROGEN:							
H2	169.5900	135.3700	6.7036	0.1792	—	142.2530	16.1195
H2O	0.0000	0.0000	0.0000	0.0015	0.7219	0.7234	n.a.
OTHERS	4.8622	4.8821	0.2418	0.0423	28.5998	33.7660	-594.4640
TOTAL H	174.4520	140.2520	6.9454	0.2230	29.3218	176.7420	-1.3129
OXYGEN:							
TOTAL O	47.5315	37.4362	1.8539	0.0599	7.5181	46.8681	1.3956
NITROGEN:							
TOTAL N	30.0415	28.3292	1.4029	0.0377	—	29.7698	0.9042
TOTAL MASS FLOW (ks/hr)	2249.8500	1913.2100	94.7440	2.8274	239.0760	2249.8600	-0.0005

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.903	100.162
HYDROGEN	103.110	101.591
OXYGEN	101.015	100.251

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

AVERAGE: 06/16/1600—>06/17/0:
CASE E

DATE : 27-Jun-84
TIME : 04:50 PM
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 142.4
OIL/SLURRY INLET TEMP. (des.C) : 251.2
AVE. REACTOR TEMPERATURE (des.C) : 250.1
REACTOR OUTLET TEMP. (des.C) : 251.2
GUARD BED FEED PRESSURE (kPa) : 6579
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6307
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.3
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 6.1
SLURRY CONCENTRATION (wt%) : 46.0
CATALYST OXIDE WT IN REACTOR (kg oxide) :
GAS HOLD-UP :
SPACE VELOCITY (1/ks-hr) : 7090
RECYCLE/FRESH FEED RATIO : 5.45827
OIL/SLURRY CIRCULATION RATE (m3/hr) :
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 157.73
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 4.61

STREAM #	1	55	10	15	25*	25*	68	
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	V/L SEP	V/L SEP	MEOH PRODUCT	
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	60.16	54.22	54.86	55.40	51.71	51.33	—	—
CO	27.01	16.79	18.43	18.50	16.04	15.77	—	—
CO2	3.26	5.10	4.85	4.90	4.99	4.89	—	—
N2	6.44	22.26	20.58	20.33	21.84	22.05	—	—
CH4	0.15	0.55	0.45	0.49	0.53	0.49	—	—
H2O	0.01	0.00	0.04	0.00	0.30	0.41	5.87	3.34
CH3OH	0.00	0.37	0.41	0.27	4.61	4.79	93.81	94.84
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH	—	—	—	—	—	—	0.05	0.07
C3OH'S	—	—	—	—	—	—	0.01	0.02
C4OH'S	—	—	—	—	—	—	0.00	0.00
C5OH'S	—	—	—	—	—	—	0.00	0.00
ALKANES	—	—	—	—	—	—	0.00	0.00
ESTERS	—	—	—	—	—	—	0.13	0.25
ALDEHYDES	—	—	—	—	—	—	0.00	0.00
OIL	—	—	—	—	—	—	0.13	1.45
TOTAL :	97.03	99.30	99.61	99.89	100.01	99.72	100.00	100.00
DENS, g/cc	0.004	0.036	0.027	0.027	0.022	0.001	—	0.790
AV. MOL. WT	12.41	14.59	14.43	14.33	15.46	15.51	31.69	—
M3/hr	628.8	3432.3	3949.2	3977.6	3686.5	3675.0	—	—
ksmol/hr	28.05	153.13	176.19 (3)	177.46 (2)	164.47 (1)	163.96	7.54	—
l/hr, prod	—	—	—	—	—	—	—	302.65

* Compositions correspond to STREAM#32

(1) Decreased 4.52% to match back end mass flow rate

(2) Decreased 3.87%

(3) Decreased 3.86%

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

27-Jun-84 / 04:51 PM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	12.9	13.5
CARBON MONOXIDE CONVERSION	(Z) :	20.4	19.6
CARBON DIOXIDE CONVERSION	(Z) :	6.1	5.6

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

		<u>ACROSS REACTOR</u> <u>GC Average</u>	<u>OVERALL</u> <u>%</u>
CO (+CO ₂) SELECTIVITY TO METHANOL	(Z) :	101.1	106.6
CO (+CO ₂) SELECTIVITY TO ETHANOL	(Z) :		0.1

* Methanol in flashed gas not measured
 Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>METH SOURCE</u>	<u>smol/hr-kg cat</u>	<u>kg/1000 kg3 fresh feed</u>	<u>kg/1000 kg3 reactor feed</u>
As calculated ACROSS REACTOR	12.68	362.6	57.3
As Net MeOH produced, OVERALL balance	12.65	361.5	57.2

REACTOR FEED $\{O_2/(CO+1.5CO_2)\}$:	2.14
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	2.16
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	52.2
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	15.5
METHANOL COLLECTED AS % OF CALCULATED :	99.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.12

27-Jun-84 / 04:51 PM

LaPORTE LPMEETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 13 FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.34818	1.59050	-0.66567
CO	6.68145	1.40242	-0.50726
CO2	-29.12160	0.44296	1.75760
N2	-34.90130	-0.51592	2.13601
CH4	100.00000	2.53637	-0.79235
H2O	—	100.00000	10.96050
CH3OH	—	14.31950	-1.08178

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	32.8199	25.7083	0.7731	0.0259	—	26.5073	19.2341
CO2	8.6899	7.8137	0.2350	0.0080	—	8.0567	7.2860
CH3OH	0.4802	0.5604	0.0169	0.0079	7.0775	7.6627	-1495.7702
OTHERS	0.8654	0.8460	0.0254	0.0008	0.0305	0.9028	-4.3185
TOTAL C	42.8554	34.9284	1.0504	0.0426	7.1081	43.1295	-0.5396
HYDROGEN:							
H2	196.6320	166.0560	4.9939	0.1686	—	171.2180	12.9246
H2O	0.0000	0.0000	0.0000	0.0013	0.8852	0.8865	n.a.
OTHERS	5.3925	5.6258	0.1692	0.0347	28.3803	34.2100	-535.5780
TOTAL H	202.0140	171.6810	5.1631	0.2046	29.2655	206.3150	-2.1286
OXYGEN:							
TOTAL O	50.6798	41.8961	1.2600	0.0505	7.5449	50.7515	-0.1414
NITROGEN:							
TOTAL N	36.0815	34.0904	1.0252	0.0362	—	35.1518	2.5766
TOTAL MASS FLOW (ks/hr)	2542.6900	2233.8900	67.1816	2.5473	239.0870	2542.7000	-0.0007

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.014	100.385
HYDROGEN	102.398	101.411
OXYGEN	100.130	100.343

LAPORTE LPNETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

AVERAGE: 06/17/0300—>1500
CASE F

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DATE : 27-Jun-84
TIME : 05:07 PM
RUN ID NUMBER : EB-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 143.3
OIL/SLURRY INLET TEMP. (des.C) : 251.7
AVE. REACTOR TEMPERATURE (des.C) : 250.4
REACTOR OUTLET TEMP. (des.C) : 251.7
GUARD BED FEED PRESSURE (kPa) : 6559
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6305
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.9
EXPANDED BED HEIGHT (cm) : n.a.
SLURRY CONCENTRATION (wt%) : 44.0
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 7246
RECYCLE/FRESH FEED RATIO : 5.39402
OIL/SLURRY CIRCULATION RATE (m3/hr) : 50.0
PROD.SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 158.85
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 4.41
  
```

STREAM #	1	55	10	15	25*	25*	68	
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	V/L SEP	V/L SEP	NEOH PRODUCT	
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	60.28	54.03	55.30	55.71	51.88	51.74		
CO	27.73	17.60	19.56	19.24	16.78	16.64		
CO2	3.34	5.37	5.11	5.04	5.17	5.12		
N2	5.22	21.28	18.79	18.79	20.28	20.17		
CH4	0.19	0.64	0.54	0.56	0.62	0.58		
H2O	0.02	0.00	0.04	0.00	0.33	0.41	6.92	3.95
CH3OH	0.00	0.40	0.41	0.31	4.93	4.95	92.76	94.15
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH							0.04	0.06
C3OH'S							0.01	0.02
C4OH'S							0.00	0.00
C5OH'S							0.00	0.00
A.KA.TENES							0.00	0.00
ESTERS							0.12	0.24
ALDEHYDES							0.00	0.00
OIL							0.14	1.59
TOTAL :	96.77	99.32	99.74	99.64	99.99	99.62	100.00	100.00
DENS,g/cc	0.004	0.036	0.027	0.027	0.022	0.001		0.790
AV.MOL.WT	12.34	14.67	14.36	14.23	15.44	15.42	31.57	
Mm3/hr	641.8	3461.7	4027.8	4065.0	3746.3	3751.0		
ksmol/hr	28.63	154.44	179.70 (3)	181.36 (2)	167.14 (1)	167.35	7.83	
l/hr*prod								312.79

* Compositions correspond to STREAM#32
(1) Decreased 4.27% to match back end mass flow rate
(2) Decreased 3.22%

LaPORTE LPMEETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

27-Jun-84 / 05:08 PM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	12.9	14.2
CARBON MONOXIDE CONVERSION	(Z) :	20.7	19.6
CARBON DIOXIDE CONVERSION	(Z) :	6.5	5.5

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

		<u>ACROSS REACTOR GC Average</u>	<u>OVERALL %</u>
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	100.1	95.6
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.0

* Methanol in flashed gas not measured
Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>METH SOURCE</u>	<u>mmol/hr-kg cat</u>	<u>kg/1000 Nm3 fresh feed</u>	<u>kg/1000 Nm3 reactor feed</u>
As calculated ACROSS REACTOR	13.58	380.4	60.1
As Net MeOH produced, OVERALL balance	12.97	363.4	57.4

REACTOR FEED $\{H_2/(CO+1.5CO_2)\}$:	2.08
REACTOR FEED $\{H_2-CO_2/(CO+CO_2)\}$:	2.09
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	51.4
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	21.5
METHANOL COLLECTED AS % OF CALCULATED :	95.3
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.62

LaPORTE LPHETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

27-Jun-84 / 05:08 PM

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.00260	-0.32665	0.91484
CO	7.72858	0.68334	0.17974
CO2	-29.21690	1.16799	1.17226
N2	-26.42530	0.84783	0.17516
CH4	n.a.	2.41700	1.13172
H2O	—	100.00000	3.03005
CH3OH	—	10.22530	3.96610

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM # STREAM NAME	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	34.8863	27.1876	0.7767	0.0294	————	27.9937	19.7573
CO2	9.1385	8.2915	0.2369	0.0091	————	8.5374	6.5773
CH3OH	0.5554	0.6187	0.0177	0.0088	7.2604	7.9055	-1323.4100
OTHERS	1.0186	0.9890	0.0283	0.0010	0.0277	1.0461	-2.6952
TOTAL C	45.5988	37.0868	1.0595	0.0483	7.2882	45.4827	0.2546
HYDROGEN:							
H2	202.0540	166.8780	4.7672	0.1831	————	171.8280	14.9593
H2O	0.0000	0.0000	0.0000	0.0015	1.0836	1.0851	n.a.
OTHERS	6.2960	6.4308	0.1837	0.0391	29.1046	35.7583	-467.9550
TOTAL H	208.3500	173.3090	4.9510	0.2237	30.1882	208.6710	-0.1543
OXYGEN:							
TOTAL O	53.7187	44.3892	1.2681	0.0571	7.8255	53.5398	0.3325
NITROGEN:							
TOTAL N	34.0731	32.8695	0.9390	0.0357	————	33.8442	0.6719
TOTAL MASS FLOW (ks/hr)	2580.8300	2266.3000	64.7419	2.7284	247.1040	2580.8700	-0.0016

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.291	100.759
HYDROGEN	102.862	101.551
OXYGEN	99.435	100.734

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
ENTRAINED NODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

AVERAGE: 06/18/0100—>1200
CASE 6

```

DATE : 27-Jun-84
TIME : 05:24 PM
RUN ID NUMBER : EP-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 144.1
OIL/SLURRY INLET TEMP. (deg.C) : 252.1
AVE. REACTOR TEMPERATURE (deg.C) : 250.8
REACTOR OUTLET TEMP. (deg.C) : 252.1
GUARD BED FEED PRESSURE (kPa) : 6504
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6306
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.5
EXPANDED BED HEIGHT (cm) : n.a.
SLURRY CONCENTRATION (wt%): 42.0
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 7974
RECYCLE/FRESH FEED RATIO : 5.5981
OIL/SLURRY CIRCULATION RATE (m3/hr) : 41.1
PROD.SEPARATOR GAS FLOWRATE <S0> + <SS> (kmol/hr) : 162.41
PURGE GAS FLOW RATE <S0> (kmol/hr) : 4.95
  
```

STREAM #	1	SS	10	15	25*	25*	68	
STREAM NAME	FRESH FEED	RECYCLE	GAS GUARD-BED	FEED REACTOR FEED	V/L SEP	V/L SEP	MEOH PRODUCT	
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	60.43	56.26	56.92	57.42	54.33	53.65	—	—
CO	27.01	17.21	19.04	18.85	16.48	16.49	—	—
CO2	3.39	4.94	4.74	4.73	4.77	4.77	—	—
N2	5.70	19.89	18.15	17.70	19.07	19.34	—	—
CH4	0.20	0.54	0.44	0.48	0.51	0.47	—	—
H2O	0.02	0.00	0.04	0.00	0.31	0.39	6.81	3.89
CH3OH	0.00	0.37	0.38	0.32	4.44	4.63	92.87	94.25
IME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH	—	—	—	—	—	—	0.04	0.06
C3OH'S	—	—	—	—	—	—	0.01	0.02
C4OH'S	—	—	—	—	—	—	0.00	0.00
C5OH'S	—	—	—	—	—	—	0.00	0.00
ALKAHENES	—	—	—	—	—	—	0.00	0.00
ESTERS	—	—	—	—	—	—	0.13	0.25
ALDEHYDES	—	—	—	—	—	—	0.00	0.00
OIL	—	—	—	—	—	—	0.14	1.54
TOTAL :	96.75	99.20	99.70	99.51	99.92	99.74	100.00	100.00
DENS: g/cc	0.004	0.035	0.026	0.026	0.021	0.001	—	0.790
AV.MOL.WT	12.31	14.02	13.89	13.73	14.73	14.88	31.57	—
m3/hr	630.5	3529.4	4058.7	4106.6	3827.8	3787.8	—	—
kmol/hr	28.13	157.46	181.07 (2)	183.21	170.78 (1)	168.99	7.49	—
l/hr:prod	—	—	—	—	—	—	—	299.53

* Compositions correspond to STREAM#32

(1) Decreased 3.89% to match back end mass flow rate

(2) Decreased 3.74%

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

27-Jun-84 / 05:24 PM

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		-----	-----
HYDROGEN CONVERSION	(Z) :	12.0	11.8
CARBON MONOXIDE CONVERSION	(Z) :	19.1	18.5
CARBON DIOXIDE CONVERSION	(Z) :	6.2	6.0

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
		-----	-----
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	100.5	97.1
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.0

* Methanol in flashed gas not measured
Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	kmol/hr-kg cat	kg/1000 kg3 fresh feed	kg/1000 kg3 reactor feed
	-----	-----	-----
As calculated ACROSS REACTOR	13.72	359.1	55.1
As Net MeOH produced, OVERALL balance	13.55	354.7	54.5

REACTOR FEED $\{O_2/(CO+1.5CO_2)\}$:	2.21
REACTOR FEED $\{(H_2-CO_2)/(CO+CO_2)\}$:	2.23
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	56.1
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	18.0
METHANOL COLLECTED AS % OF CALCULATED :	98.5
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	7.07

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

27-Jun-84 / 05:25 PM

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-0.86671	0.36253	1.43090
CO	12.81860	0.42029	0.59186
CO2	-28.66100	0.64252	1.56636
N2	-35.60390	1.50771	0.71445
CH4	n.a.	2.67306	0.56687
H2O		100.00000	4.51528
CH3OH		-1.47395	0.23121

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

	INPUTS		OUTPUTS				(IN-OUT)/IN
STREAM #	15	55	50	62	68	TOTAL	
STREAM NAME	REACTOR FEED	RECYCLE	PURGE GAS	FLASH GAS	MeOH PRODUCT		Z
CARBON:							
CO	34.5423	27.0918	0.8508	0.0261	————	27.9687	19.0303
CO2	8.6720	7.7739	0.2441	0.0076	————	8.0256	7.4539
CH3OH	0.5921	0.5835	0.0183	0.0073	6.9598	7.5689	-1178.2500
OTHERS	0.8772	0.8440	0.0265	0.0007	0.0282	0.8995	-2.5428
TOTAL C	44.6836	36.2933	1.1398	0.0418	6.9879	44.4628	0.4942
HYDROGEN:							
H2	210.3910	177.1640	5.5638	0.1700	————	182.8980	13.0675
H2O	0.0000	0.0000	0.0000	0.0012	1.0209	1.0222	n.a.
OTHERS	5.8772	5.7103	0.1793	0.0323	27.9027	33.8246	-475.5200
TOTAL H	216.2680	182.8750	5.7431	0.2036	28.9237	217.7450	-0.6828
OXYGEN:							
TOTAL O	52.4785	43.2232	1.3574	0.0492	7.4939	52.1237	0.6761
NITROGEN:							
TOTAL N	32.4308	31.3230	0.9837	0.0306	————	32.3373	0.2882
TOTAL MASS FLOW (ks/hr)	2515.0900	2206.8100	69.3043	2.3580	236.6220	2515.1000	-0.0004

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.019	100.152
HYDROGEN	102.338	101.945
OXYGEN	100.128	100.162

AVERAGE: 06/18/1900—>2400
CASE H

LA PORTE LPMEETHANOL PROCESS AVERAGE REPORT
ENTRAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY

DATE : 28-Jun-84
TIME : 10:13 AM
RUN ID NUMBER : ED-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 138.0
OIL/SLURRY INLET TEMP. (deg.C) : 237.0
AVE. REACTOR TEMPERATURE (deg.C) : 235.6
REACTOR OUTLET TEMP. (deg.C) : 237.0
GUARD BED FEED PRESSURE (kPa) : 6495
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6307
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.0
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.3
SLURRY CONCENTRATION (wt%): 41.0
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/hr) : 8020
RECYCLE/FRESH FEED RATIO : 5.9842
OIL/SLURRY CIRCULATION RATE (m3/hr) : 39.3
PROD. SEPARATOR GAS FLOWRATE <S0> + <SS> (kmol/hr) : 161.02
PURGE GAS FLOW RATE <S0> (kmol/hr) : 5.43

STREAM #	1	SS	10	15	25*	25*	68	
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	U/L SEP	U/L SEP	MEDM	PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	60.16	55.53	56.25	56.82	54.38	53.16		
CO	26.38	18.19	19.77	19.64	17.48	17.41		
CO2	3.68	5.30	5.08	5.12	5.06	5.07		
N2	6.16	19.42	17.83	17.70	18.42	18.90		
CH4	0.19	0.46	0.38	0.44	0.43	0.40		
H2O	0.03	0.00	0.04	0.00	0.33	0.41	6.94	3.97
CH3OH	0.00	0.38	0.40	0.32	4.10	4.22	92.76	94.27
BME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH							0.03	0.04
C3OH'S							0.01	0.01
C4OH'S							0.00	0.00
C5OH'S							0.00	0.00
ALKANES							0.00	0.00
ESTERS							0.13	0.25
ALDEHYDES							0.00	0.00
OIL							0.13	1.46
TOTAL :	96.60	99.29	99.75	100.04	100.20	99.58	100.00	100.00
DEGS/s/cc	0.004	0.035	0.027	0.027	0.022	0.001		0.799
NO. MOL. WT	12.40	14.29	14.13	14.03	14.79	15.03	31.53	
Mm3/hr	582.8	3497.5	3988.6	4018.1	3810.7	3750.9		
kmol/hr	26.00	155.59	177.95	179.26 (1)	170.01 (2)	167.34	6.03	
1/hr/prod								240.69

* Compositions correspond to STREAM#32

(1) Flow rate decreased 3.37% to optimize front end (REACTOR FEED) component balance.

(2) Flow rate decreased 1.64% to match REACTOR FEED mass flow rate.

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

28-Jun-84 / 10:13 AM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	11.1	9.2
CARBON MONOXIDE CONVERSION	(Z) :	17.2	15.6
CARBON DIOXIDE CONVERSION	(Z) :	6.1	6.3

*** See next page for conversions as calc. by overall bal.

SELECTIVITIES :

		<u>ACROSS REACTOR GC Average</u>	<u>OVERALL %</u>
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	100.5	86.8
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.0

* Methanol in flashed gas not measured
Ethanol only measured in product flow

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>smol/hr-ks cat</u>	<u>ks/1000 Na3 fresh feed</u>	<u>ks/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	12.75	350.1	50.8
As Net MeOH produced, OVERALL balance	11.21	308.7	44.8

REACTOR FEED (H2/(CO+1.5CO2)) :	2.08
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	2.09
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	54.8
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	24.0
METHANOL COLLECTED AS % OF CALCULATED :	87.9
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	6.37