

28-Jun-84 / 10:14 AM

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

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
	< diff. >	< diff. >	< diff. >
H2	-0.30231	0.18805	3.18965
CO	13.84110	-0.13160	1.34065
CO2	-28.95440	0.29914	0.64592
N2	-35.30690	0.28336	0.02147
CH4	n.a.	-2.25791	-0.19785
H2O		100.00000	24.96100
CH3OH		0.54414	10.91760

OVERALL ELEMENTAL BALANCE (Kg-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	35.2139	28.3078	0.9871	0.0274	————	29.3224	16.7367
CO2	9.1810	8.2521	0.2878	0.0980	————	8.5479	6.8922
CH3OH	0.5815	0.5847	0.0254	0.0067	5.5937	6.2054	-957.0955
OTHERS	0.7827	0.7151	0.0249	0.0006	0.0206	0.7613	2.7285
TOTAL C	45.7591	37.8597	1.3202	0.0427	5.6143	44.8369	2.0152
HYDROGEN:							
H2	203.6970	172.7970	6.0256	0.1676	————	178.9900	12.1293
H2O	0.0000	0.0000	0.0000	0.0013	0.8376	0.8389	n.a.
OTHERS	5.4567	5.1991	0.1813	0.0292	22.4205	27.8301	-410.0199
TOTAL H	209.1540	177.9960	6.2069	0.1981	23.2581	207.6590	0.7147
OXYGEN:							
TOTAL O	54.1574	45.3967	1.5830	0.0507	6.0303	53.0608	2.0249
NITROGEN:							
TOTAL N	31.7291	30.2184	1.0538	0.0298	————	31.3020	1.3461
TOTAL MASS FLOW (kg/hr)	2514.8800	2222.9900	77.5184	2.3689	190.1420	2493.0200	0.8652

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.447	100.591
HYDROGEN	102.126	103.668
OXYGEN	99.653	100.545

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

AVERAGE: 06/19/0400—>0003
CASE I

DATE : 28-Jun-84
TIME : 11:17 AM
RUN ID NUMBER : EB-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 148.4
OIL/SLURRY INLET TEMP. (des.C) : 265.4
AVE. REACTOR TEMPERATURE (des.C) : 264.3
REACTOR OUTLET TEMP. (des.C) : 265.4
GUARD BED FEED PRESSURE (kPa) : 6487
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6307
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.8
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.2
SLURRY CONCENTRATION (wt%): 41.0
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 8075
RECYCLE/FRESH FEED RATIO : 5.66511
OIL/SLURRY CIRCULATION RATE (m3/hr) : 38.7
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (kmoles/hr) : 160.23
PURGE GAS FLOW RATE <S0> (kmoles/hr) : 5.87

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							
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%> <WT%>
H2	60.24	54.72	55.58	56.13	52.99	52.33	—
CO	26.53	17.77	19.49	19.30	17.16	17.07	—
CO2	3.51	5.31	5.09	5.07	5.16	5.12	—
N2	6.03	20.74	18.59	18.65	19.71	19.44	—
CH4	0.18	0.59	0.53	0.52	0.58	0.56	—
H2O	0.03	0.00	0.04	0.00	0.36	0.42	7.16
CH3OH	0.00	0.39	0.40	0.35	4.42	4.38	92.57
DME	0.00	0.00	0.02	0.00	0.00	0.01	94.28
C2H5OH	—	—	—	—	—	—	0.00
C3OH'S	—	—	—	—	—	—	0.02
C4OH'S	—	—	—	—	—	—	0.03
C5OH'S	—	—	—	—	—	—	0.00
ALKANES	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	0.00
ALDEHYDES	—	—	—	—	—	—	0.12
OIL	—	—	—	—	—	—	0.00
TOTAL :	96.52	99.52	99.73	100.02	100.39	99.33	0.12
							100.00
DENS,g/cc	0.004	0.036	0.026	0.026	0.021	0.001	1.36
AV.MOL.WT	12.34	14.52	14.29	14.19	15.18	15.21	0.00
M3/hr	610.8	3460.0	3998.8	4029.2	3764.7	3757.7	0.00
kmoles/hr	27.25	154.36	178.40 (2)	179.76 (1)	167.96 (3)	167.64	0.23
l/hr,prod	—	—	—	—	—	—	0.00
							1.36
							264.02

* Compositions correspond to STREAM#32

- (1) Flow rate decreased 3.19% to optimize front end (REACTOR FEED) component balance.
(2) Flow rate decreased 3.19% to match STRM # 15 mass flow rate.
(3) Flow rate decreased 3.88% to match STRM # 15 mass flow rate.

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

28-Jun-84 / 11:12 AM

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
HYDROGEN CONVERSION	(Z) :	11.5	11.8
CARBON MONOXIDE CONVERSION	(Z) :	17.7	16.9
CARBON DIOXIDE CONVERSION	(Z) :	5.4	5.0

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

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	103.6	89.5
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.0

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

METHANOL PRODUCTIVITIES & YIELDS

MEDN SOURCE	smol/hr-ks cat	ks/1000 Nm3 fresh feed	ks/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	13.44	352.5	53.4
As Net MeOH produced, OVERALL balance	12.34	323.2	49.0

REACTOR FEED (H2/(CO+1.SCO2)) :	2.09
REACTOR FEED (H2-CO2)/(CO+CO2)) :	2.09
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	43.4
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	13.2
METHANOL COLLECTED AS % OF CALCULATED :	91.3
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	6.72

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

28-Jun-84 / 11:18 AM

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
	<X diff.>	<X diff.>	<X diff.>
H2	-1.03239	-0.01187	1.40316
CO	14.65990	-0.11139	1.13392
CO2	-29.11280	0.28367	1.73460
N2	-32.48200	0.42838	-0.47037
CH4	n.a.	2.27571	3.36670
H2O		100.00000	21.17290
CH3OH		-3.26003	8.85124

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	34.6997	27.4328	1.0434	0.0246	————	28.5009	17.8640
CO2	9.1207	8.1916	0.3116	0.0074	————	8.5105	6.6899
CH3OH	0.6219	0.6023	0.0229	0.0063	6.1365	6.7681	-988.2030
OTHERS	0.9344	0.9079	0.0345	0.0008	0.0191	0.9624	-3.0002
TOTAL C	45.3767	37.1347	1.4124	0.0392	6.1556	44.7419	1.3989
HYDROGEN:							
H2	201.7910	168.9380	6.4256	0.1511	————	175.5140	13.0220
H2O	0.0000	0.0000	0.0000	0.0012	0.9494	0.9506	n.a.
OTHERS	6.2252	6.0410	0.2298	0.0285	24.5871	30.8865	-396.1500
TOTAL H	208.0170	174.9790	6.6553	0.1808	25.5365	207.3510	0.3199
OXYGEN:							
TOTAL O	53.5630	44.4183	1.6895	0.0464	6.6287	52.7828	1.4566
NITROGEN:							
TOTAL N	33.5205	32.0204	1.2179	0.0281	————	33.2664	0.7581
TOTAL MASS FLOW (ks/hr)	2550.0800	2240.7000	85.2253	2.1959	208.5710	2536.7000	0.5247

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.859	101.131
HYDROGEN	102.325	102.311
OXYGEN	100.219	101.147

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

AVERAGE : 06/20/0500—>1040
CASE J

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DATE : 28-Jun-84
TIME : 11:53 AM
RUN ID NUMBER : ER-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 144.7
OIL/SLURRY INLET TEMP. (des.C) : 252.4
AVE. REACTOR TEMPERATURE (des.C) : 251.1
REACTOR OUTLET TEMP. (des.C) : 252.4
GUARD BED FEED PRESSURE (kPa) : 6529
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6302
GAS SUPERFICIAL VELOCITY (cm/sec) : 13.6
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.7
SLURRY CONCENTRATION (wt%) : 32.0
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/ks-hr) : 12562
RECYCLE/FRESH FEED RATIO : 5.62955
OIL/SLURRY CIRCULATION RATE (m3/hr) : 52.5
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 163.44
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 6.32
  
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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								
H2	61.03	56.20	56.90	57.51	53.99	53.31		
CO	26.18	16.97	18.73	18.71	16.37	16.44		
CO2	3.57	5.09	4.89	4.94	4.99	4.94		
N2	5.69	20.40	18.11	18.09	19.62	19.04		
CH4	0.19	0.59	0.49	0.51	0.57	0.56		
H2O	0.01	0.00	0.03	0.00	0.39	0.46	6.32	3.60
CH3OH	0.00	0.37	0.39	0.29	4.38	4.60	93.37	94.60
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
ALKANES							0.00	0.00
ESTERS							0.13	0.24
ALDEHYDES							0.00	0.00
OIL							0.13	1.48
TOTAL :	96.68	99.63	99.54	100.06	100.32	99.34	100.00	100.00
DENS,g/cc	0.004	0.035	0.026	0.026	0.022	0.001		0.790
AV.MOL.WT	12.17	14.11	13.89	13.81	14.89	14.93	31.63	
M3/hr	625.6	3521.7	4083.5	4107.9	3810.6	3799.1		
ksmol/hr	27.91	157.12	182.18 (3)	183.27 (2)	170.01 (1)	169.49	7.29	
l/hr,prod								291.97

* Compositions correspond to STREAM#32

(1) Flow rate decreased by 4.94% to optimize H2/CO/N2 back end (REACTOR EFFLUENT) component balance.

(2) Flow rate decreased by 3.79% to match back end mass flow rate.

(3) Flow rate decreased by 3.73% to match back end mass flow rate.

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

28-Jun-84 / 11:54 AM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	12.8	12.9
CARBON MONOXIDE CONVERSION	(Z) :	18.3	18.8
CARBON DIOXIDE CONVERSION	(Z) :	6.0	6.2

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

SELECTIVITIES :

		<u>ACROSS REACTOR GC Average</u>	<u>OVERALL %</u>
CO (+CO ₂) SELECTIVITY TO METHANOL	(Z) :	101.5	96.7
CO (+CO ₂) SELECTIVITY TO ETHANOL	(Z) :		0.0

* 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	21.42	358.8	54.6
As Net MeOH produced, OVERALL balance	20.90	350.0	53.3

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	2.2 ^a
REACTOR FEED ((H ₂ -CO ₂)/(CO+CO ₂)) :	2.22
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	56.0
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	28.3
METHANOL COLLECTED AS % OF CALCULATED :	97.2
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.01

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

28-Jun-84 / 11:54 AM

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	-2.11752	-0.06290	-0.18235
CO	12.91390	-0.89857	0.23930
CO2	-26.70880	-0.57443	1.79895
N2	-32.96100	1.43632	-0.05697
CH4	n.a.	3.33173	0.96493
H2O		100.00000	30.93030
CH3OH		8.14571	0.34943

OVERALL ELEMENTAL BALANCE (Ks-stoms/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	34.2815	26.6685	1.0735	0.0275	————	27.7696	18.9955
CO2	9.0507	8.0024	0.3221	0.0083	————	8.3328	7.9316
CH3OH	0.5392	0.5870	0.0236	0.0077	6.8096	7.4279	-1277.6669
OTHERS	0.9423	0.9216	0.0371	0.0009	0.0266	0.9863	-4.6629
TOTAL C	44.8137	36.1796	1.4564	0.0444	6.8362	44.5166	0.6621
HYDROGEN:							
H2	210.8060	176.6090	7.1093	0.1783	————	183.8960	12.7659
H2O	0.0000	0.0000	0.0000	0.0015	0.9218	0.9234	n.a.
OTHERS	5.9260	6.0344	0.2429	0.0345	27.2987	33.6106	-467.1670
TOTAL H	216.7320	182.6430	7.3522	0.2143	28.2206	218.4309	-0.7837
OXYGEN:							
TOTAL O	52.9221	43.2604	1.7414	0.0525	7.2928	52.3471	1.0864
NITROGEN:							
TOTAL N	33.1526	32.0481	1.2901	0.0318	————	33.3700	-0.6569
TOTAL MASS FLOW (ks/hr)	2530.7400	2216.7200	89.2330	2.4967	230.6540	2539.1100	-0.3307

REACTOR GAS BALANCE (OUT/IN) :

	GC01	GC02
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.786	99.846
HYDROGEN	101.594	100.858
OXYGEN	100.919	100.014

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

AVERAGE: 06/20/1400—>2000
CASE K

DATE : 28-Jun-84
TIME : 12:22 PM
RUN ID NUMBER : ER-X954
FEED GAS TYPE: BALANCED GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 146.2
OIL/SLURRY INLET TEMP. (des.C) : 261.8
AVE. REACTOR TEMPERATURE (des.C) : 260.4
REACTOR OUTLET TEMP. (des.C) : 261.8
GUARD BED FEED PRESSURE (kPa) : 6567
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6304
GAS SUPERFICIAL VELOCITY (cm/sec) : 14.0
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.7
SLURRY CONCENTRATION (wt%) : 32.5
CATALYST OXIDE WT IN REACTOR (kg oxide) : -
GAS HOLD-UP : -
SPACE VELOCITY (1/kg-hr) : 11252
RECYCLE/FRESH FEED RATIO : 5.67711
OIL/SLURRY CIRCULATION RATE (m3/hr) : 52.4
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 163.53
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 4.40

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	MEDM PRODUCT	
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	60.45	53.83	54.35	55.76	51.77	50.88	—	—
CO	27.69	17.63	19.59	19.35	16.83	17.09	—	—
CO2	3.72	5.66	5.43	5.46	5.51	5.45	—	—
N2	5.74	21.81	19.36	19.63	20.89	20.64	—	—
CH4	0.19	0.59	0.47	0.51	0.56	0.51	—	—
H2O	0.01	0.00	0.04	0.00	0.34	0.45	6.32	3.66
CH3OH	0.00	0.39	0.43	0.34	4.45	4.73	93.37	94.60
DME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2H5OH	—	—	—	—	—	—	0.04	0.00
C3OH'S	—	—	—	—	—	—	0.01	0.00
C4OH'S	—	—	—	—	—	—	0.00	0.00
C5OH'S	—	—	—	—	—	—	0.00	0.00
ALKANES	—	—	—	—	—	—	0.00	0.00
ESTERS	—	—	—	—	—	—	0.13	0.24
ALDEHYDES	—	—	—	—	—	—	0.00	0.00
OIL	—	—	—	—	—	—	0.13	1.48
TOTAL :	97.81	99.90	99.68	100.99	190.35	99.74	100.00	100.00
DENS,g/cc	0.004	0.037	0.027	0.027	0.022	0.001	—	0.790
AV.MOL.WT	12.55	14.86	14.67	14.47	15.56	15.71	31.63	—
M3/hr	628.3	3566.8	4062.8	4118.0	3829.6	3792.6	—	—
ksmol/hr	28.03	159.13	181.26 (3)	183.72 (2)	170.85 (1)	169.20	7.31	—
1/hr:prod	—	—	—	—	—	—	—	292.72

* Compositions correspond to STREAM#32

(1)Flow rate decreased 5.37% to optimize H2/CO/N2 back end (REACTOR EFFLUENT) component balance.

(2)Flow rate decreased 4.48% to match reactor effluent mass flow rate.

(3)Flow rate decreased 4.56% to match reactor effluent mass flow rate.

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

28-Jun-84 / 12:18 PM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	12.6	13.7
CARBON MONOXIDE CONVERSION	(Z) :	18.6	19.1
CARBON DIOXIDE CONVERSION	(Z) :	6.4	5.1

*** 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 (+CO2) SELECTIVITY TO METHANOL (Z) :	97.7	93.4
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 Mo3 fresh feed</u>	<u>kg/1000 Mo3 reactor feed</u>
As calculated ACROSS REACTOR	19.40	362.1	55.2
As Net MeOH produced, OVERALL balance	18.69	349.1	53.3

REACTOR FEED (H2/(CO+1.5CO2)) :	2.03
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	2.03
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	36.7
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	7.4
METHANOL COLLECTED AS % OF CALCULATED :	96.2
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	7.10

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

28-Jun-84 / 12:18 PM

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 13 FRESH FEED GAS	[(1455)-15] REACTOR FEED	[25 - (50+51+62+68)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-2.95836	0.15721	0.36831
CO	9.47740	0.71373	-0.33462
CO2	-32.02170	1.25112	1.60322
N2	-35.89630	0.67973	-0.03173
CH4	n.a.	4.87400	-0.58107
H2O	-----	100.00000	20.34320
CH3OH	-----	0.90671	1.61710

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	35.5582	28.0511	0.7765	0.0316	-----	28.8592	18.8395
CO2	9.9216	9.0046	0.2493	0.0101	-----	9.2640	6.6280
CH3OH	0.6194	0.6251	0.0173	0.0087	6.8270	7.4781	-1107.2639
OTHERS	0.9490	0.9338	0.0258	0.0009	0.0267	0.9873	-5.0290
TOTAL C	47.0392	38.6146	1.0689	0.0514	6.8537	46.5886	0.9579
HYDROGEN:							
H2	204.8680	171.3040	4.7420	0.1881	-----	176.2340	13.9767
H2O	0.0000	0.0000	0.0000	0.0017	0.9242	0.9259	n.a.
OTHERS	6.2378	6.2356	0.1726	0.0387	27.3686	33.8155	-442.1100
TOTAL H	211.1050	177.5390	4.9146	0.2285	28.2928	210.9750	0.0616
OXYGEN:							
TOTAL O	56.0207	46.6854	1.2923	0.0613	7.3115	55.3506	1.1962
NITROGEN:							
TOTAL N	36.0634	34.7030	0.9606	0.0382	-----	35.6987	1.0113
TOTAL MASS FLOW (ks/hr)	2658.1800	2364.2000	65.4456	2.9048	231.2450	2663.8000	-0.2113

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.993	99.350
HYDROGEN	102.661	100.553
OXYGEN	100.118	99.560

LAPORTE LDMETHANOL PROCESS AVERAGE REPORT
ENTAINED MODE
PROCESS VARIABLES & ANALYTICAL SUMMARY
=====

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DATE :                               26-Jun-84
TIME :                               12:44 PM
RUN ID NUMBER :                       EE-Y054
FEED GAS TYPE:                        BALANCED GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 141.1
OIL/SLURRY INLET TEMP. (deg.C) :      252.1
AVE. REACTOR TEMPERATURE (deg.C) :    251.2
REACTOR OUTLET TEMP. (deg.C) :         252.1
GUARD BED FEED PRESSURE (kPa) :        6314
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 6304
GAS SUPERFICIAL VELOCITY (cm/sec) :    7.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.2
SLURRY CONCENTRATION (wt%) :           32.5
CATALYST OXIDE WT IN REACTOR (kg) :    -
GAS MOLE-FR :                         -
SPACE VELOCITY (1/hr) :                6325
RECYCLE/FRESH FEED RATIO :             3.75/1
OIL/SLURRY CIRCULATION RATE (m3/hr) :  39.1
PROD. SEPARATOR GAS FLOWRATE (50 + 455) (kmol/hr) : 85.30
PURGE GAS FLOW RATE (50) (kmol/hr) :   3.95
  
```

STREAM #	1	55	10	15	25*	25*	6E
STREAM NAME	FRESH FEED	RECYCLE GAS	GUARD-BED FEED	REACTOR FEED	U/L SEP	U/L SEP	RED- PRODUCT
ON-LINE GC#	1	2	1	2	2	1	
COMPONENT	=====	=====	=====	=====	=====	=====	=====
H2	41.32	54.28	56.17	57.01	56.54	51.67	-----
CO	28.14	14.97	19.73	19.67	15.91	15.94	-----
CO2	2.72	5.62	4.92	4.94	5.41	5.09	-----
N2	5.32	21.50	17.82	17.88	20.26	19.45	-----
CH4	0.22	0.63	0.49	0.56	0.59	0.55	-----
H2O	0.01	0.00	0.03	0.00	0.31	0.42	6.22
C2H6	0.00	0.25	0.39	0.26	6.32	6.60	93.39
INE	0.00	0.00	0.00	0.00	0.00	0.00	0.66
C2H5OH	-----	-----	-----	-----	-----	-----	0.04
C2H5O	-----	-----	-----	-----	-----	-----	0.01
C2H5S	-----	-----	-----	-----	-----	-----	0.00
C2H5E	-----	-----	-----	-----	-----	-----	0.00
ALCOHOLNES	-----	-----	-----	-----	-----	-----	0.00
ESTERS	-----	-----	-----	-----	-----	-----	0.00
ALCOHOLNES	-----	-----	-----	-----	-----	-----	0.00
OIL	-----	-----	-----	-----	-----	-----	0.00
TOTAL :	97.75	99.35	99.54	106.32	99.34	99.82	100.00
DENSITY/cc	0.904	0.835	0.825	0.826	0.822	0.801	-----
AV. MOL.WT	12.12	14.65	14.09	13.97	15.81	15.53	21.62
kg/hr	486.2	1877.0	2205.4	2315.1	2045.8	2022.2	-----
kmol/hr	21.60	91.51	102.41 (2)	165.29 (2)	91.27 (1)	92.89	5.01
1/hrfeed	-----	-----	-----	-----	-----	-----	201.40

* Compositions correspond to STREAM#22

(1) Increased 0.44% to optimize H2/CO/N2 back end (REACTOR EFFLUENT) component balance.

(2) Increased 3.86% to match reactor effluent gas flow rate.

(3) Increased 3.25% to match reactor effluent gas flow rate.

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY
=====

28-Jun-84 / 12:44 PM

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	16.6	21.7
CARBON MONOXIDE CONVERSION	(Z) :	26.7	28.6
CARBON DIOXIDE CONVERSION	(Z) :	6.1	3.3

*** 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) :	96.9	77.9
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>smol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	15.45	372.7	78.3
As Net MeOH produced, OVERALL balance	12.81	309.1	64.9

REACTOR FEED (H2/(CO+1.5CO2)) :	2.10
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	2.12
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	41.6
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	11.0
METHANOL COLLECTED AS % OF CALCULATED :	82.7
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	5.66

LaPORTE LPMETHANOL PROCESS HOURLY REPORT
MATERIAL BALANCE SUMMARY

28-Jun-84 / 12:44 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	0.26019	-2.32354	-0.61602
CO	10.40260	-1.89959	0.02409
CO2	-33.30930	1.30068	2.67331
N2	-28.99010	1.13148	0.59254
CH4	n.a.	-3.20427	-0.07009
H2O	-----	100.00000	-12.75560
CH3OH	-----	5.69104	13.61750

OVERALL ELEMENTAL BALANCE (Ks-stoes/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	20.3193	13.8346	0.6591	0.0205	-----	14.5142	28.5694
CO2	5.1024	4.5794	0.2182	0.0065	-----	4.8041	5.8485
CH3OH	0.2675	0.2836	0.0135	0.0086	4.6764	4.9821	-1762.4402
OTHERS	0.5815	0.5151	0.0245	0.0007	0.0164	0.5568	4.2412
TOTAL C	26.2709	19.2127	0.9154	0.0363	4.6928	24.8573	5.3839
HYDROGEN:							
H2	117.7640	88.4795	4.2156	0.1329	-----	92.8280	21.1745
H2O	0.0000	0.0000	0.0000	0.0011	0.6328	0.6339	n.a.
OTHERS	3.3960	3.1951	0.1522	0.0372	18.7434	22.1279	-551.5942
TOTAL H	121.1600	91.6747	4.3678	0.1712	19.3762	115.5960	4.5974
OXYGEN:							
TOTAL O	30.7919	23.2770	1.1090	0.0427	5.0060	29.4348	4.4074
NITROGEN:							
TOTAL N	18.4671	17.5215	0.8348	0.0250	-----	18.3813	0.4647
TOTAL MASS FLOW							
(Ks/hr)	1442.8600	1194.1700	56.8960	1.9970	158.3360	1411.4000	2.1805

REACTOR GAS BALANCE (OUT/IN) :

	6C#1	6C#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.420	98.060
HYDROGEN	104.174	97.435
OXYGEN	100.519	98.852

APPENDIX F
RUN E-3 DETAILED DATA ACQUISITION SHEETS

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

DATE : 07-Aug-85
TIME : 10:09 AM
TIME INTERVAL: FROM: 0400 04-Aug TO: 0800 04-Aug
NUMBER OF AVERAGED HOURS : 4
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 146.7
OIL/SLURRY INLET TEMP. (deg.C) : 244.3
AVE. REACTOR TEMPERATURE (deg.C) : 249.5
REACTOR OUTLET TEMP. (deg.C) : 247.8
REACTOR GAS INLET PRESSURE (kPa) : 5498
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5282
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.9
SLURRY CONCENTRATION (wt%) : 29.5
SPACE VELOCITY (1/ks-hr) : 9801
RECYCLE/FRESH FEED RATIO : 3.30
OIL/SLURRY CIRCULATION RATE (m3/hr) : 44.8
PROD.SEPARATOR GAS FLOWRATE <S0> + <SS> (ksmol/hr) : 84.30
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 4.11

STREAM #	1	SS	10	15	25X	25X	62	58
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDN PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	61.83	26.24	33.49	33.76	24.04	23.95	5.73	
CO	34.87	54.22	50.26	50.24	50.04	50.14	23.50	
CO2	1.82	14.94	12.26	12.08	14.32	14.06	60.76	
N2	0.09	2.64	2.11	2.09	2.43	2.45	0.37	
CH4	0.09	1.06	0.88	0.85	1.03	0.98	0.92	
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.75
CH3OH	0.00	0.44	0.39	0.35	7.64	7.53	7.43	95.18
BME	0.00	0.02	0.02	0.02	0.02	0.03	0.21	0.90
C2H5OH								1.00
C3OH'C								0.32
C4OH'S								0.31
C5OH'S								0.15
ALKANES								0.00
ESTERS								1.00
ALDEHYDES								0.00
OIL								1.30
TOTAL :	98.71	99.56	99.40	99.39	99.52	99.14	99.13	100.00
DENS/g/cc	0.004	0.051	0.033	0.033	0.030	0.030	0.004	0.790
AV.MOL.WT	12.01	23.45	21.14	21.04	24.22	24.19	36.53	32.63
3/hr	548.8	1808.7	2366.0	2371.9	2060.2	2062.7	5.7	
ksmol/hr	24.49	80.69	105.55	105.82	91.91	92.02	0.30	7.04
1/hrprod								290.70

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0400 04-May-85 - 0800 04-May-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	37.7	38.2
CARBON MONOXIDE CONVERSION	(Z) :	13.0	13.5
CARBON DIOXIDE CONVERSION	(Z) :	-0.0	-3.0
RATIO H ₂ CONSUMED/CO CONSUMED	:	1.92	1.90

*** 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) :	96.2	96.8
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :		0.7

* 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 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	27.23	384.7	89.0
As Net MeOH produced, OVERALL balance	28.36	400.8	92.7

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	0.49
REACTOR FEED ((H ₂ -CO ₂)/(CO+CO ₂)) :	0.35
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	19.6
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	103.6
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	6.59

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0400 04-May-85 - 0800 04-May-85

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	-3.75088	1.61183	-0.77616
CO	-1.36482	-1.68284	0.03350
CO2	-185.97400	-2.28475	3.76138
N2	-207.89300	-2.65238	-3.72439
CH4	n.a.	-2.29510	-14.21580
H2O	_____	n.a.	n.a.
CH3OH	_____	-3.78124	-2.73347

OVERALL ELEMENTAL BALANCE (Ks-stoes/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	53.1658	43.7479	2.2260	0.0701	_____	46.0440	13.3955
CO2	12.7855	12.0550	0.6134	0.1805	_____	12.8489	-0.4959
CH3OH	0.3660	0.3526	0.0179	0.0221	6.8241	7.2168	-1872.0290
OTHERS	0.9156	0.8735	0.0444	0.0033	0.2745	1.1958	-30.6005
TOTAL C	67.2329	57.0290	2.9018	0.2760	7.0986	67.3055	-0.1079
HYDROGEN:							
H2	71.4592	42.3499	2.1549	0.0340	_____	44.5388	37.6724
H2O	0.0000	0.0000	0.0000	0.0007	0.1911	0.1918	n.a.
OTHERS	5.1611	4.9415	0.2514	0.1029	27.9962	33.2921	-545.0540
TOTAL H	76.6203	47.2914	2.4063	0.1377	28.1873	78.0228	-1.8303
OXYGEN:							
TOTAL O	79.1203	68.2291	3.4717	0.4542	7.0673	79.2223	-0.1290
NITROGEN:							
TOTAL N	4.4269	4.2669	0.2171	0.0022	_____	4.4862	-1.3385
TOTAL MASS FLOW (ks/hr)	2226.4100	1892.5400	96.2978	10.8537	226.7520	2226.4500	-0.0016

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.392	99.866
HYDROGEN	99.180	99.419
OXYGEN	99.520	100.309
NITROGEN	101.304	100.706

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

DATE : 07-Aug-35
TIME : 10:40 AM
TIME INTERVAL: FROM: 1700 04-May
TO: 0200 05-May
9
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 147.1
OIL/SLURRY INLET TEMP. (des.C) : 244.1
AVE. REACTOR TEMPERATURE (des.C) : 249.7
REACTOR OUTLET TEMP. (des.C) : 247.8
REACTOR GAS INLET PRESSURE (kPa) : 5516
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5285
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.7
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 4.9
SLURRY CONCENTRATION (wt%): 28.9
SPACE VELOCITY (1/ks-hr) : 9827
RECYCLE/FRESH FEED RATIO : 3.11
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.1
PROD.SEPARATOR GAS FLOWRATE <S0> + <SS> (ksmol/hr) : 35.72
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 4.11

STREAM #	1	SS	10	15	25x	25x	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDM PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	61.35	27.88	35.30	35.15	25.71	25.42	5.73	—
CO	35.51	53.57	49.56	49.47	49.32	49.25	23.60	—
CO2	1.68	14.64	11.80	11.82	13.71	13.82	60.76	—
N2	0.09	1.72	1.37	1.37	1.57	1.59	0.37	—
CH4	0.09	1.46	1.15	1.15	1.35	1.33	0.92	—
H2O	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.75
CH3OH	0.00	0.44	0.40	0.35	7.97	8.05	7.43	95.18
DME	0.00	0.02	0.02	0.01	0.02	0.02	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	1.00
C3OH'S	—	—	—	—	—	—	—	0.32
C4OH'S	—	—	—	—	—	—	—	0.31
C5OH'S	—	—	—	—	—	—	—	0.15
ALKAHENES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	1.00
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.30
TOTAL :	98.72	99.73	99.60	99.32	99.66	99.49	99.13	100.00
DENS: g/cc	0.004	0.050	0.032	0.033	0.029	0.030	0.004	0.790
AV. MOL. WT	12.12	22.94	20.58	20.59	23.67	23.76	36.53	32.63
M3/hr	587.3	1829.4	2409.3	2407.7	2094.7	2086.5	6.0	—
ksmol/hr	26.20	81.62	107.49	107.42	93.45	93.09	0.27	7.32
1/hr:prod	—	—	—	—	—	—	—	302.45

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

1700 04-May-85 - 0200 05-May-85

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
HYDROGEN CONVERSION	(Z) :	37.6	36.4
CARBON MONOXIDE CONVERSION	(Z) :	13.9	13.3
CARBON DIOXIDE CONVERSION	(Z) :	-1.4	-1.0
RATIO H ₂ CONSUMED/CO CONSUMED	:	1.92	1.95

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

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
CO (+CO ₂) SELECTIVITY TO METHANOL	(Z) :	99.7	98.8
CO (+CO ₂) SELECTIVITY TO ETHANOL	(Z) :		0.7

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

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	smol/hr-ks cat	ks/1000 Na3 fresh feed	ks/1000 Na3 reactor feed
As calculated ACROSS REACTOR	28.86	385.7	94.1
As Net MeOH produced, OVERALL balance	29.13	389.4	95.0

REACTOR FEED (H ₂ /(CO+1.5CO ₂)) :	0.52
REACTOR FEED ((H ₂ -CO ₂)/(CO+CO ₂)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	21.3
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	100.4
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	7.07

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

1700 04-May-85 - 0200 05-May-85

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1+55)-15] REACTOR FEED	[25 - (50+51+52+58)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-3.66859	2.77264	0.46232
CO	-1.56295	-0.22642	0.37938
CO2	-192.94600	-2.44289	2.05581
H2	-103.94200	-2.69561	-4.79920
CH4	n.a.	-1.48790	-11.96910
H2O	—	n.a.	n.a.
CH3OH	—	-5.15127	-0.60458

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	58 MeOH PRODUCT	TOTAL	Z
CARBON:							
CO	53.1408	43.7169	2.1992	0.0631	—	45.9792	13.4765
CO2	12.6927	11.9492	0.6011	0.1623	—	12.7126	-0.1573
CH3OH	0.3772	0.3587	0.0180	0.0198	7.1000	7.4966	-1887.3400
OTHERS	1.2485	1.2086	0.0608	0.0030	0.2856	1.5580	-24.7925
TOTAL C	67.4592	57.2335	2.8792	0.2482	7.3856	67.7465	-0.4260
HYDROGEN:							
H2	75.5039	45.5042	2.2671	0.0306	—	47.2240	36.6603
H2O	0.0000	0.0000	0.0000	0.0007	0.1938	0.1995	n.a.
OTHERS	6.5325	6.3019	0.3170	0.0926	29.1279	35.8394	-448.6340
TOTAL H	82.0364	51.8061	2.6062	0.1238	29.3268	85.8628	-2.2264
OXYGEN:							
TOTAL O	78.9181	67.9903	3.4203	0.4084	7.3530	79.1721	-0.3219
NITROGEN:							
TOTAL N	2.9379	2.8142	0.1416	0.0020	—	2.9578	-0.6775
TOTAL MASS FLOW (Ks/hr)	2212.0400	1872.1700	94.1817	9.7601	235.9180	2212.0300	0.0005

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.747	100.267
HYDROGEN	99.704	101.173
OXYGEN	99.994	100.3...
NITROGEN	100.557	100.099