

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0200 04-Jun-85 - 2400 04-Jun-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	-1.79007	2.45074	-0.00399
CO	-0.57083	0.67814	0.05387
CO2	-93.45550	-0.57243	1.64797
N2	-95.67400	-0.32608	-7.82948
CH4	n.a.	-0.21018	-23.45690
H2O	—	n.a.	-134.17800
CH3OH	—	1.25879	2.16445

OVERALL ELEMENTAL BALANCE (Kd-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	53.0749	44.4591	2.8558	0.0560	—	47.3709	10.7471
CO2	12.4837	11.5596	0.7425	0.1441	—	12.4463	0.3001
CH3OH	0.4528	0.4586	0.0295	0.0176	5.6209	6.1265	-1253.0500
OTHERS	0.5952	0.5645	0.0363	0.0027	0.1495	0.7529	-26.4985
TOTAL C	66.6067	57.0418	3.6641	0.2204	5.7704	66.6967	-0.1351
HYDROGEN:							
H2	75.2193	49.3261	3.1685	0.0272	—	52.5217	30.1752
H2O	0.0000	0.0000	0.0000	0.0006	0.2242	0.2248	n.a.
OTHERS	4.2299	4.1232	0.2649	0.0822	22.8686	27.3388	-546.3170
TOTAL H	79.4493	53.4493	3.4333	0.1100	23.0927	80.0853	-0.8006
OXYGEN:							
TOTAL O	78.5141	68.0524	4.3714	0.3627	5.8122	78.5986	-0.1076
NITROGEN:							
TOTAL N	1.3664	1.2951	0.0832	0.0018	—	1.3801	-1.0033
TOTAL MASS FLOW (kg/hr)	2157.7700	1845.0000	118.5140	8.6664	185.5810	2157.7700	0.0003

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.022	100.135
HYDROGEN	99.952	100.767
OXYGEN	100.041	100.209
NITROGEN	100.724	101.151

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

DATE :	22-Jun-85
TIME :	05:26 PM
TIME INTERVAL:	FROM: 0200 05-Jun
	TO: 2300 05-Jun
NUMBER OF AVERAGED HOURS :	21
RUN ID NUMBER :	EU-X754
FEED GAS TYPE:	CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) :	145.6
OIL/SLURRY INLET TEMP. (deg.C) :	245.1
Ave. REACTOR TEMPERATURE (deg.C) :	249.9
REACTOR OUTLET TEMP. (deg.C) :	247.6
REACTOR GAS INLET PRESSURE (kPa) :	5466
PRIMARY SEPARATOR GAS PRESSURE (kPa) :	5272
GAS SUPERFICIAL VELOCITY (cm/sec) :	9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	5.0
SLURRY CONCENTRATION (wt%) :	24.8
SPACE VELOCITY (1/ks-hr) :	10639
RECYCLE/FRESH FEED RATIO :	3.41
OIL/SLURRY CIRCULATION RATE (m3/hr) :	45.7
PROD.SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) :	87.65
PURGE GAS FLOW RATE <S0> (ksmol/hr) :	5.29

STREAM #	1	55	10	15	25X	25X	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEON PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.25	29.70	35.59	35.59	27.85	27.75	5.73	—
CO	37.22	54.32	50.80	50.83	50.93	50.87	23.60	—
CO2	3.55	14.01	11.87	11.88	13.33	13.33	60.76	—
N2	0.14	0.77	0.63	0.63	0.69	0.72	0.37	—
CH4	0.12	0.65	0.55	0.54	0.61	0.62	0.92	—
H2O	0.00	0.00	0.00	0.00	0.05	0.01	0.12	1.09
C25OH	0.00	0.55	0.48	0.43	6.64	6.64	7.43	95.72
ME	0.00	0.02	0.01	0.02	0.00	0.01	0.21	0.00
C25OH	—	—	—	—	—	—	—	0.67
C3OH'S	—	—	—	—	—	—	—	0.31
C4OH'S	—	—	—	—	—	—	—	0.17
C5OH'S	—	—	—	—	—	—	—	0.13
ALKANES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.60
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.31
TOTAL :	98.29	100.02	99.92	99.91	100.11	99.94	99.13	100.00
DEMS/1/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AP.MOL.WT	13.43	22.48	20.61	20.61	23.10	23.12	36.53	32.42
M3/hr	541.1	1846.0	2351.6	2351.2	2097.7	2095.6	5.1	—
ksmol/hr	24.14	82.36	104.91	104.90	93.59	93.49	0.23	5.73
1/bvprod	—	—	—	—	—	—	—	235.01

* Compositions correspond to STREAM#32

LAPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0200 05-Jun-85 - 2300 05-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(%) :	30.5	30.2
CARBON MONOXIDE CONVERSION	(%) :	10.8	10.6
CARBON DIOXIDE CONVERSION	(%) :	-0.1	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	1.99

*** 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	(%) :	100.9	98.5
CO (+CO2) SELECTIVITY TO ETHANOL	(%) :		0.5

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

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>smol/hr-kg cat</u>	<u>kg/1000 Me3 fresh feed</u>	<u>kg/1000 Me3 reactor feed</u>
As calculated ACROSS REACTOR	25.93	339.3	78.1
As Net MeOH produced, OVERALL balance	25.31	331.2	76.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	29.9
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.s.
METHANOL COLLECTED AS % OF CALCULATED :	96.8
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	5.73

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0200 05-Jun-85 - 2300 05-Jun-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	-1.50439	2.49684	0.08194
CO	-0.69040	0.74421	0.10341
CO2	-93.50020	-0.54326	1.61889
N2	-109.97700	1.57016	-12.27890
CH4	n.a.	-0.06039	-25.16520
H2O		100.00000	-138.02000
CH3OH		1.03357	2.59191

OVERALL ELEMENTAL BALANCE (Ks-atoms/hr) :

STREAM # STREAM NAME	INPUTS		OUTPUTS				(IN-OUT)/IN Z
	15 REACTOR FEED	55 RECYCLE	50 PURGE GAS	62 FLASH GAS	68 MeOH PRODUCT	TOTAL	
CARBON:							
CO	53.3182	44.7334	2.8760	0.0533	—	47.6628	10.6070
CO2	12.4593	11.5338	0.7415	0.1372	—	12.4126	0.3750
CH3OH	0.4520	0.4567	0.0294	0.0168	5.5478	6.0507	-1238.6800
OTHERS	0.5844	0.5525	0.0355	0.0025	0.1522	0.7427	-27.1037
TOTAL C	66.8139	57.2764	3.6825	0.2099	5.7000	66.8688	-0.0822
HYDROGEN:							
H2	74.6539	48.9205	3.1452	0.0259	—	52.0916	30.2226
H2O	0.0000	0.0000	0.0000	0.0006	0.2247	0.2253	n.a.
OTHERS	4.1799	4.0658	0.2614	0.0783	22.5832	26.9987	-545.6710
TOTAL H	78.8339	52.9862	3.4066	0.1047	22.8080	79.3055	-0.5983
OXYGEN:							
TOTAL O	78.7061	68.2723	4.3894	0.3453	5.7398	78.7468	-0.0516
NITROGEN:							
TOTAL N	1.3126	1.2642	0.0813	0.0017	—	1.3472	-2.6386
TOTAL MASS FLOW (Ks/hr)	2161.8200	1851.2500	119.0220	8.2521	183.2890	2161.8100	0.0003

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.969	100.143
HYDROGEN	100.047	100.682
OXYGEN	99.996	100.224
NITROGEN	101.712	98.536

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

DATE : 22-Jun-85
 TIME : 05:33 PM
 TIME INTERVAL: FROM: 0000 06-Jun TO: 2400 06-Jun
 22
 NUMBER OF AVERAGED HOURS :
 RUN ID NUMBER : EU-X754
 FEED GAS TYPE: CO-RICH GAS
 REACTOR FEED GAS INLET TEMP. (des.C) : 146.2
 OIL/SLURRY INLET TEMP. (des.C) : 245.2
 AVE. REACTOR TEMPERATURE (des.C) : 250.0
 REACTOR OUTLET TEMP. (des.C) : 247.8
 REACTOR GAS INLET PRESSURE (kPa) : 5466
 PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5272
 GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
 LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
 SLURRY CONCENTRATION (wt%): 24.8
 SPACE VELOCITY (L/kg-hr) : 10641
 RECYCLE/FRESH FEED RATIO : 3.43
 OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.5
 PROD-SEPARATOR GAS FLOWRATE <S0> + <S5> (kmo1/hr) : 87.53
 PURGE GAS FLOW RATE <S0> (kmo1/hr) : 5.26

STREAM #	1	S5	10	15	25*	25*	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<HOL>	<HOL>	<HOL>	<HOL>	<HOL>	<HOL>	<HOL>	<HTZ>
H2	57.28	29.74	35.63	35.70	27.95	27.83	5.73	—
CO	37.06	54.11	50.61	50.67	50.73	50.71	23.69	—
CO2	3.58	14.08	11.95	11.96	13.42	13.42	60.76	—
H2	0.13	0.74	0.61	0.61	0.69	0.69	0.37	—
CH4	0.10	0.65	0.53	0.54	0.61	0.61	0.92	—
H2O	0.00	0.00	0.00	0.00	0.05	0.00	0.12	1.09
CH3OH	0.00	0.55	0.48	0.43	6.62	6.62	7.43	95.72
BNE	0.00	0.02	0.02	0.01	0.01	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.68
C3OH'S	—	—	—	—	—	—	—	0.25
C4OH'S	—	—	—	—	—	—	—	0.18
C5OH'S	—	—	—	—	—	—	—	0.13
ALKANES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.59
ALDEHYDES	—	—	—	—	—	—	—	0.00
OTI	—	—	—	—	—	—	—	1.33
TOTAL :	98.15	99.89	99.84	99.91	100.08	99.90	99.13	100.00
DENS _{ref} /cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.HOL.WT	13.41	22.47	20.61	20.59	23.09	23.12	36.53	32.42
M ₃ /hr	537.7	1844.2	2350.0	2351.6	2097.6	2095.0	5.0	—
kmo1/hr	23.99	82.28	104.84	104.92	93.58	93.47	0.22	5.79
L/hr _{prod}	—	—	—	—	—	—	—	237.37

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 06-Jun-85 - 2400 06-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	30.4	30.2
CARBON MONOXIDE CONVERSION	(Z) :	10.7	10.7
CARBON DIOXIDE CONVERSION	(Z) :	-0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.99

*** 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) :	101.0	98.0
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.5

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

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>kmol/hr-kg cat</u>	<u>kg/1000 Nm3 fresh feed</u>	<u>kg/1000 Nm3 reactor feed</u>
As calculated ACROSS REACTOR	25.87	340.7	77.9
As Net MeOH produced, OVERALL balance	25.56	336.7	77.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED (H2-CO2)/(CO+CO2) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	30.0
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	0.3.
METHANOL COLLECTED AS % OF CALCULATED :	98.0
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	5.72

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 06-Jun-85 - 2400 06-Jun-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	-0.78086	1.98159	0.41489
CO	-0.50443	0.47072	0.23022
CO2	-93.63630	-0.82345	1.87706
N2	-84.15760	-0.50940	-8.06966
CH4	n.a.	-0.69377	-23.95060
H2O	—	n.a.	-121.97900
CH3OH	—	1.00948	1.48884

OVERALL ELEMENTAL BALANCE (Kg-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	53.1563	44.5173	2.8447	0.0530	—	47.4150	10.8008
CO2	12.5429	11.5827	0.7402	0.1364	—	12.4593	0.6672
CH3OH	0.4506	0.4552	0.0291	0.0167	5.6039	6.1049	-1254.8200
OTHERS	0.5793	0.5527	0.0353	0.0025	0.1520	0.7425	-28.1742
TOTAL C	66.7292	57.1078	3.6493	0.2086	5.7559	66.7217	0.0113
HYDROGEN:							
H2	74.9005	48.9351	3.1270	0.0257	—	52.0878	30.4573
H2O	0.0000	0.0000	0.0000	0.0006	0.2270	0.2276	n.a.
OTHERS	4.1509	4.0649	0.2598	0.0778	22.8073	27.2098	-555.5220
TOTAL H	79.0514	53.0000	3.3868	0.1041	23.0343	79.5251	-0.5993
OXYGEN:							
TOTAL O	78.7084	68.1546	4.3552	0.3433	5.7966	78.6497	0.0746
NITROGEN:							
TOTAL N	1.2846	1.2179	0.0778	0.0017	—	1.2974	-0.9919
TOTAL MASS FLOW (kg/hr)	2160.5600	1849.0800	118.1590	8.2024	185.0990	2160.5400	0.0007

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.061	100.101
HYDROGEN	100.103	100.584
OXYGEN	100.067	100.177
NITROGEN	100.462	100.966

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

DATE : 22-Jun-85
TIME : 05:40 PM
TIME INTERVAL: FROM: 0000 07-Jun
TO: 2400 07-Jun
24
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 146.3
OIL/SLURRY INLET TEMP. (des.C) : 245.1
AVE. REACTOR TEMPERATURE (des.C) : 250.0
REACTOR OUTLET TEMP. (des.C) : 247.9
REACTOR GAS INLET PRESSURE (kPa) : 5464
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5271
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
SLURRY CONCENTRATION (wt%) : 24.7
SPACE VELOCITY (1/ks-hr) : 10680
RECYCLE/FRESH FEED RATIO : 3.46
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.3
PROD.SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 87.56
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 5.25

STREAM #	1	55	10	15	25x	25x	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	METH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
H2	57.22	29.79	35.58	35.62	27.90	27.80	5.73	—
CO	37.00	54.04	50.56	50.61	50.66	50.65	23.66	—
CO2	3.54	14.11	11.98	11.99	13.44	13.45	60.76	—
N2	0.15	0.89	0.74	0.74	0.83	0.83	0.37	—
CH4	0.09	0.58	0.48	0.48	0.54	0.55	0.92	—
H2O	0.00	0.00	0.00	0.00	0.05	0.00	0.12	1.10
CH3OH	0.00	0.56	0.48	0.43	6.59	6.60	7.43	95.75
BME	0.00	0.02	0.01	0.02	0.01	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.66
C3OH'S	—	—	—	—	—	—	—	0.27
C4OH'S	—	—	—	—	—	—	—	0.17
C5OH'S	—	—	—	—	—	—	—	0.12
ALKAHENES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.59
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.34
TOTAL :	98.00	99.97	99.83	99.88	100.02	99.89	99.13	100.00
DENS#/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.40	22.48	20.63	20.63	23.11	23.13	36.53	32.41
M3/hr	533.3	1845.0	2349.0	2349.5	2097.1	2094.9	5.3	—
ksmol/hr	23.79	82.31	104.80	104.82	93.56	93.46	0.24	5.78
l/hr:prod	—	—	—	—	—	—	—	237.21

* Compositions correspond to STREAM#32

LaPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 07-Jun-85 - 2400 07-Jun-85

CONVERSIONS ACROSS REACTOR :

		GC#1	GC#2
		<u> </u>	<u> </u>
HYDROGEN CONVERSION	(Z) :	30.3	30.1
CARBON MONOXIDE CONVERSION	(Z) :	10.7	10.7
CARBON DIOXIDE CONVERSION	(Z) :	-0.1	-0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.99

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

SELECTIVITIES :

		ACROSS REACTOR GC Average	OVERALL %
		<u> </u>	<u> </u>
CO (+CO2) SELECTIVITY TO METHANOL	(Z) :	100.9	99.0
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :	<u> </u>	0.5

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

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	kmol/hr-kt cat	kg/1000 Nm3 fresh feed	kg/1000 Nm3 reactor feed
As calculated ACROSS REACTOR	25.88	342.2	77.7
As Net MeOH produced, OVERALL balance	25.68	339.4	77.0

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	30.0
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	98.4
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	5.69

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 07-Jun-85 - 2400 07-Jun-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	-0.67568	2.09546	0.02561
CO	-0.36381	0.43120	0.16419
CO2	-93.13910	-0.94474	1.77899
N2	-131.55400	-0.81149	-7.13503
CH4	n.a.	-0.46966	-28.48040
H2O	-----	n.a.	-128.72100
CH3OH	-----	2.10239	1.00349

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	53.0486	44.4764	2.8382	0.0557	-----	47.3703	10.7040
CO2	12.5709	11.6115	0.7410	0.1433	-----	12.4958	0.5972
CH3OH	0.4473	0.4569	0.0292	0.0175	5.6019	6.1055	-1264.9200
OTHERS	0.5182	0.4914	0.0314	0.0027	0.1469	0.6723	-29.7451
TOTAL C	66.5850	57.0363	3.6397	0.2192	5.7488	66.6439	-0.0886
HYDROGEN:							
H2	74.6627	49.0326	3.1289	0.0270	-----	52.1885	30.1009
H2O	0.0000	0.0000	0.0000	0.0006	0.2293	0.2299	n.a.
OTHERS	3.8974	3.9235	0.2440	0.0817	22.7855	26.9347	-591.1010
TOTAL H	78.5601	52.8561	3.3729	0.1093	23.0147	79.3531	-1.0094
OXYGEN:							
TOTAL O	78.6553	68.1715	4.3502	0.3606	5.7942	78.6764	-0.0269
NITROGEN:							
TOTAL N	1.5498	1.4663	0.0936	0.0017	-----	1.5617	-0.7628
TOTAL MASS FLOW (ks/hr)	2161.9800	1850.3200	118.0750	8.6167	184.9550	2161.9700	0.0004

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.049	100.081
HYDROGEN	100.123	100.599
OXYGEN	100.048	100.150
NITROGEN	99.986	100.653

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

DATE : 22-Jun-85
TIME : 05:48 PM
TIME INTERVAL : FROM: 0000 08-Jun TO: 1300 08-Jun
NUMBER OF AVERAGED HOURS : 13
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 146.5
OIL/SLURRY INLET TEMP. (des.C) : 245.1
AVE. REACTOR TEMPERATURE (des.C) : 250.0
REACTOR OUTLET TEMP. (des.C) : 247.8
REACTOR GAS INLET PRESSURE (kPa) : 5466
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5271
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
SLURRY CONCENTRATION (wt%): 24.6
SPACE VELOCITY (1/ks-hr) : 10703
RECYCLE/FRESH FEED RATIO : 3.47
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.4
PROD-SEPARATOR GAS FLOWRATE <S0> + <SS> (kmol/hr) : 87.79
PURGE GAS FLOW RATE <S0> (kmol/hr) : 5.42

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	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	57.45	29.85	35.67	35.59	27.99	27.90	5.73	—
CO	36.90	54.04	50.59	50.60	50.70	50.68	23.60	—
CO2	3.47	14.07	11.93	11.94	13.42	13.37	60.76	—
H2	0.13	0.80	0.67	0.67	0.76	0.76	0.37	—
CH4	0.08	0.60	0.50	0.49	0.56	0.57	0.92	—
H2O	0.00	0.00	0.00	0.00	0.06	0.01	0.12	1.11
CH3OH	0.00	0.57	0.49	0.44	6.59	6.58	7.43	95.78
DME	0.00	0.02	0.02	0.01	0.01	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.65
CSOH'S	—	—	—	—	—	—	—	0.27
CAOH'S	—	—	—	—	—	—	—	0.16
CSOH'S	—	—	—	—	—	—	—	0.12
ALKANES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.59
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.32
TOTAL :	98.04	99.95	99.86	99.74	100.09	99.89	99.13	100.00
DENS, g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV. MOL. WT	13.34	22.46	20.60	20.61	23.08	23.09	36.53	32.40
M3/hr	532.7	1846.3	2356.0	2354.6	2102.7	2101.7	5.4	—
kmol/hr	23.77	82.37	105.11	105.05	93.81	93.77	0.24	5.79
l/hr prod	—	—	—	—	—	—	—	237.21

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 08-Jun-85 - 1300 08-Jun-85

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
HYDROGEN CONVERSION (Z) :	30.2	29.8
CARBON MONOXIDE CONVERSION (Z) :	10.6	10.5
CARBON DIOXIDE CONVERSION (Z) :	-0.0	-0.4
RATIO H ₂ CONSUMED/CO CONSUMED :	2.01	1.99

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

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL ±
CO (+CO ₂) SELECTIVITY TO METHANOL (Z) :	101.7	99.3
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :		0.5

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

METHANOL PRODUCTIVITIES & YIELDS

MEDH SOURCE	smol/hr-ks cat	ks/1000 Na ₃ fresh feed	ks/1000 Na ₃ reactor feed
As calculated ACROSS REACTOR	25.86	342.2	77.4
As Net MeOH produced, OVERALL balance	25.69	340.0	76.9

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) :	30.2
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	98.5
CALCULATED METHANOL PRODUCTION RATE (Ksmol/hr) :	5.69

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 08-Jun-85 - 1300 08-Jun-85

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	-1.23956	2.22206	0.15794
CO	-0.32643	0.24289	0.24264
CO2	-92.76000	-1.00822	1.89407
N2	-108.33300	-2.15496	-6.84255
CH4	n.a.	-0.34235	-27.32990
H2O	-----	n.a.	-115.70300
CH3OH	-----	2.06580	0.98407

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	53.1564	44.5145	2.9278	0.0570	-----	47.4993	10.6423
CO2	12.5378	11.5871	0.7621	0.1466	-----	12.4958	0.3354
CH3OH	0.4602	0.4699	0.0309	0.0179	5.6037	6.1224	-1230.4200
OTHERS	0.5300	0.5110	0.0336	0.0027	0.1451	0.6925	-30.6574
TOTAL C	66.6844	57.0825	3.7544	0.2242	5.7488	66.8100	-0.1884
HYDROGEN:							
H2	74.7759	49.1679	3.2339	0.0276	-----	52.4295	29.8845
H2O	0.0000	0.0000	0.0500	0.0006	0.2310	0.2316	n.a.
OTHERS	3.9902	3.9585	0.2604	0.0836	22.7877	27.0901	-578.9190
TOTAL H	78.7660	53.1264	3.4942	0.1118	23.0187	79.7512	-1.2507
OXYGEN:							
TOTAL O	78.7069	68.1760	4.4841	0.3689	5.7964	78.8253	-0.1504
NITROGEN:							
TOTAL N	1.4131	1.3231	0.0870	0.0018	-----	1.4119	0.0842
TOTAL MASS FLOW (ks/hr)	2165.1400	1849.6700	121.6570	8.8155	184.9940	2165.1400	0.0000

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.023	100.259
HYDROGEN	99.988	100.933
OXYGEN	100.028	100.348
NITROGEN	101.247	100.944

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

DATE : 22-Jun-85
TIME : 05:55 PM
TIME INTERVAL : FROM: 0000 09-Jun TO: 2400 09-Jun
NUMBER OF AVERAGED HOURS : 24
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (deg.C) : 146.0
OIL/SLURRY INLET TEMP. (deg.C) : 245.0
AVE. REACTOR TEMPERATURE (deg.C) : 250.0
REACTOR OUTLET TEMP. (deg.C) : 247.8
REACTOR GAS INLET PRESSURE (kPa) : 5462
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5271
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
SLURRY CONCENTRATION (wt%): 24.6
SPACE VELOCITY (1/ks-hr) : 10687
RECYCLE/FRESH FEED RATIO : 3.48
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.4
PROD.SEPARATOR GAS FLOWRATE <SO> + <SS> (kmol/hr) : 87.75
PURGE GAS FLOW RATE <SO> (kmol/hr) : 5.59

STREAM #	1	SS	10	15	25*	25*	62	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	MEDH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.33	29.84	35.64	35.58	27.86	27.87	5.73	—
CO	36.94	54.26	50.79	50.78	50.77	50.88	23.60	—
CO2	3.46	13.93	11.86	11.83	13.23	13.28	60.76	—
N2	0.12	0.72	0.62	0.62	0.69	0.69	0.37	—
CH4	0.09	0.59	0.50	0.49	0.55	0.56	0.92	—
H2O	0.00	0.00	0.00	0.00	0.06	0.01	0.12	1.10
CH3OH	0.00	0.57	0.49	0.43	6.54	6.58	7.43	95.82
DME	0.00	0.02	0.01	0.02	0.01	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.65
C3OH'S	—	—	—	—	—	—	—	0.29
CAOH'S	—	—	—	—	—	—	—	0.17
CSOH'S	—	—	—	—	—	—	—	0.12
ALKANES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.60
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.25
TOTAL :	97.94	99.92	99.91	99.75	99.71	99.89	99.13	100.00
DENS, g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.35	22.43	20.60	20.60	23.06	23.09	36.53	32.39
m3/hr	529.4	1841.7	2350.2	2351.0	2099.5	2097.5	5.2	—
kmol/hr	23.62	82.16	104.85	104.89	93.67	93.58	0.23	5.73
l/hr,prod	—	—	—	—	—	—	—	234.85

* Compositions correspond to STREAM#32

LaPORTE LPHETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 09-Jun-85 - 2400 09-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	30.2	30.1
CARBON MONOXIDE CONVERSION	(Z) :	10.6	10.7
CARBON DIOXIDE CONVERSION	(Z) :	0.1	0.1
RATIO H ₂ CONSUMED/CO CONSUMED	:	2.00	1.97

*** 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) :	99.5	99.3
CO (+CO ₂) SELECTIVITY TO ETHANOL (Z) :		0.5

* 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	25.72	342.5	77.1
As Net MeOH produced, OVERALL balance	25.45	338.9	76.3

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) :	30.4
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	98.1
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	5.66

LaPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 09-Jun-85 - 2400 09-Jun-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	-0.61335	1.92218	-0.38499
CO	-0.46888	0.07962	-0.12538
CO2	-91.63320	-1.16760	1.37585
H2	-83.51190	-3.89606	-6.05798
CH4	n.a.	-1.48846	-26.85930
H2O	---	n.a.	-104.26500
CH3OH	---	2.14095	0.97250

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	53.2600	44.5780	3.0313	0.0545	---	47.6638	10.5073
CO2	12.4055	11.4455	0.7783	0.1403	---	12.3640	0.3345
CH3OH	0.4545	0.4645	0.0316	0.0172	5.5501	6.0633	-1234.0200
OTHERS	0.5331	0.5011	0.0341	0.0026	0.1476	0.6854	-28.5683
TOTAL C	66.6531	56.9890	3.8752	0.2145	5.6977	66.7765	-0.1851
HYDROGEN:							
H2	74.6447	49.0308	3.3341	0.0264	---	52.3913	29.8124
H2O	0.0000	0.0000	0.0000	0.0006	0.2263	0.2269	n.a.
OTHERS	3.9869	3.8932	0.2647	0.0800	22.5796	26.8175	-572.6490
TOTAL H	78.6315	52.9240	3.5988	0.1070	22.8059	79.4357	-1.0227
OXYGEN:							
TOTAL O	78.5438	67.9490	4.6205	0.3530	5.7409	78.6633	-0.1522
NITROGEN:							
TOTAL N	1.2981	1.1905	0.0810	0.0017	---	1.2732	1.9169
TOTAL MASS FLOW (ks/hr)	2160.3300	1843.2700	125.3410	8.4344	183.2780	2160.3200	0.0003

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.001	99.895
HYDROGEN	100.065	100.349
OXYGEN	99.993	99.980
NITROGEN	99.900	100.273

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

DATE : 22-Jun-85
TIME : 06:02 PM
TIME INTERVAL : FROM: 0000 10-Jun TO: 2400 10-Jun 24
NUMBER OF AVERAGED HOURS :
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 145.8
OIL/SLURRY INLET TEMP. (des.C) : 244.9
AVE. REACTOR TEMPERATURE (des.C) : 249.9
REACTOR OUTLET TEMP. (des.C) : 247.6
REACTOR GAS INLET PRESSURE (kPa) : 5461
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5271
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
SLURRY CONCENTRATION (wt%): 24.8
SPACE VELOCITY (1/ks-hr) : 10639
RECYCLE/FRESH FEED RATIO : 3.47
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.3
PROD.SEPARATOR GAS FLOWRATE <S0> + <SS> (ksmol/hr) : 87.82
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 5.68

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	METH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<MOL>	<WT>
H2	57.46	30.11	36.01	35.85	28.21	28.11	5.73	
CO	36.89	54.09	50.62	50.62	50.70	50.67	23.60	
CO2	3.47	13.91	11.81	11.81	13.25	13.20	60.76	
H2	0.15	0.85	0.71	0.72	0.80	0.79	0.37	
CH4	0.09	0.58	0.48	0.48	0.54	0.54	0.92	
H2O	0.00	0.00	0.00	0.00	0.06	0.01	0.12	1.11
CH3OH	0.00	0.55	0.47	0.42	6.59	6.57	7.43	95.82
BME	0.00	0.02	0.01	0.01	0.00	0.01	0.21	0.00
C2H5OH								0.64
C3OH'S								0.31
C4OH'S								0.16
C5OH'S								0.12
ALKANES								0.00
ESTERS								0.59
ALDEHYDES								0.00
OIL								1.25
TOTAL :	98.06	100.10	100.11	99.91	100.15	99.91	99.13	100.00
DENS.g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.34	22.37	20.51	20.54	23.00	23.01	36.53	32.39
m3/hr	530.8	1841.1	2352.8	2351.2	2099.4	2098.3	5.0	
ksmol/hr	23.68	82.14	104.97	104.90	93.66	93.61	0.22	5.68
1/hrprod								232.80

* Compositions correspond to STREAM#32

LA PORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 10-Jun-85 - 2400 10-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	30.4	29.7
CARBON MONOXIDE CONVERSION	(Z) :	10.7	10.6
CARBON DIOXIDE CONVERSION	(Z) :	0.3	-0.2
RATIO H2 CONSUMED/CO CONSUMED	:	2.01	1.99

*** 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	(X) :	100.5	99.1
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :	—	0.5

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

METHANOL PRODUCTIVITIES & YIELDS

<u>MEDH SOURCE</u>	<u>gmol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	25.73	343.3	77.5
As Net MeOH produced, OVERALL balance	25.11	335.0	75.6

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED (H2-CO2)/(CO+CO2) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	30.7
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	96.7
CALCULATED METHANOL PRODUCTION RATE (Kgmol/hr) :	5.69

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 10-Jun-85 - 2400 10-Jun-85

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	CPURE GASES - 13 FRESH FEED GAS	[(1455)-153] REACTOR FEED	C25 - (50+51+62+68)1 REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.10465	1.91417	-0.10089
CO	-0.53781	0.13252	-0.03060
CO2	-92.54740	-1.17372	1.60108
N2	-131.91200	-3.04269	-6.82101
CH4	n.a.	-1.07959	-27.65970
H2O	—	n.a.	-116.89000
CH3OH	—	1.43557	2.74005

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	
CARBON:							
CO	53.0963	44.4302	3.0703	0.0522	—	47.5527	10.4407
CO2	12.3906	11.4239	0.7894	0.1345	—	12.3478	0.3448
CH3OH	0.4450	0.4514	0.0312	0.0164	5.5018	6.0009	-1248.6100
OTHERS	0.5155	0.4907	0.0339	0.0025	0.1454	0.6726	-30.4686
TOTAL C	66.4473	56.7963	3.9248	0.2057	5.6472	66.5740	-0.1906
HYDROGEN:							
H2	75.2051	49.4597	3.4178	0.0254	—	52.9029	29.6552
H2O	0.0000	0.0000	0.0050	0.0005	0.2265	0.2270	n.a.
OTHERS	3.8679	3.7980	0.2625	0.0767	22.3808	26.5179	-585.5960
TOTAL H	79.0730	53.2577	3.6803	0.1026	22.6073	79.6478	-0.7269
OXYGEN:							
TOTAL O	78.3354	67.7441	4.6813	0.3384	5.6913	78.4552	-0.1529
NITROGEN:							
TOTAL N	1.5088	1.3939	0.0963	0.0016	—	1.4919	1.1205
TOTAL MASS FLOW (ks/hr)	2154.2800	1837.5500	126.9800	8.0864	181.6780	2154.2900	-0.0003

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.881	100.183
HYDROGEN	99.591	100.756
OXYGEN	99.868	100.262
NITROGEN	100.262	98.947

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

DATE : 22-Jun-85
 TIME : 06:10 PM
 TIME INTERVAL : FROM: 0000 11-Jun TO: 2400 11-Jun
 24
 NUMBER OF AVERAGED HOURS :
 RUN ID NUMBER : EU-X754
 FEED GAS TYPE: CO-RICH GAS
 REACTOR FEED GAS INLET TEMP. (des.C) : 145.7
 OIL/SLURRY INLET TEMP. (des.C) : 244.9
 AVE. REACTOR TEMPERATURE (des.C) : 249.9
 REACTOR OUTLET TEMP. (des.C) : 247.7
 REACTOR GAS INLET PRESSURE (kPa) : 5461
 PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5272
 GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
 LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
 SLURRY CONCENTRATION (wt%): 24.8
 SPACE VELOCITY (1/ks-hr) : 10688
 RECYCLE/FRESH FEED RATIO : 3.50
 OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.3
 PROD.SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 87.91
 PURGE GAS FLOW RATE <S0> (ksmol/hr) : 5.70

STREAM #	1	55	10	15	25*	25*	2	68
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEOH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<MOLZ>	<WTZ>
H2	57.24	29.86	35.63	35.60	28.63	27.89	5.73	—
CO	36.94	54.06	50.58	50.61	50.65	50.68	23.60	—
CO2	3.50	13.92	11.85	11.84	13.25	13.24	60.76	—
N2	0.16	0.94	0.78	0.79	0.88	0.89	0.37	—
CH4	0.10	0.61	0.51	0.51	0.58	0.58	0.92	—
H2O	0.00	0.00	0.00	0.00	0.06	0.00	0.12	1.13
CH3OH	0.00	0.54	0.48	0.43	6.49	6.51	7.43	95.79
DME	0.00	0.02	0.02	0.01	0.00	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.62
C3OH'S	—	—	—	—	—	—	—	0.28
CAOH'S	—	—	—	—	—	—	—	0.19
CSOH'S	—	—	—	—	—	—	—	0.11
ALKANES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.57
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.31
TOTAL :	97.95	99.95	99.85	99.79	99.93	99.80	99.13	100.00
DENS.g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.28	22.43	20.59	20.59	23.03	23.07	36.53	32.39
m3/hr	527.0	1842.7	2350.9	2351.4	2182.9	2099.5	5.0	—
ksmol/hr	23.51	82.21	104.88	104.90	93.82	93.67	0.22	5.66
l/hr,prod	—	—	—	—	—	—	—	231.85

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 11-Jun-85 - 2400 11-Jun-85

CONVERSIONS ACROSS REACTOR :

	GC#1	GC#2
HYDROGEN CONVERSION (Z) :	30.1	29.6
CARBON MONOXIDE CONVERSION (Z) :	10.5	10.5
CARBON DIOXIDE CONVERSION (Z) :	0.2	-0.1
RATIO H2 CONSUMED/CO CONSUMED :	2.02	1.98

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

SELECTIVITIES :

	ACROSS REACTOR GC Average	OVERALL ±
CO (+CO2) SELECTIVITY TO METHANOL (Z) :	100.6	99.7
CO (+CO2) SELECTIVITY TO ETHANOL (Z) :		0.4

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

METHANOL PRODUCTIVITIES & YIELDS

METH SOURCE	mmol/hr-kg cat	kg/1000 Na3 fresh feed	kg/1000 Na3 reactor feed
As calculated ACROSS REACTOR	25.53	241.5	76.5
As Net MeOH produced, OVERALL balance	25.12	336.0	75.3

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	30.7
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	97.5
CALCULATED METHANOL PRODUCTION RATE (Kmmol/hr) :	5.62

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 11-Jun-85 - 2400 11-Jun-85

COMPONENT BALANCE (IN-OUT)/IN :

STREAMS # STREAMS LOCATION COMPONENT :	[PURE GASES - 1] FRESH FEED GAS	[(1455)-15] REACTOR FEED	[25 - (50+51+62+69)] REACTOR EFFLUENT
	<Z diff.>	<Z diff.>	<Z diff.>
H2	-1.09396	1.74680	0.11490
CO	-0.49021	0.06064	-0.01703
CO2	-92.25020	-1.22642	1.51668
N2	-137.77800	-2.26837	-6.81776
CH4	n.a.	-1.64444	-23.78020
H2O		100.00000	-95.61000
CH3OH		-0.64068	1.88460

OVERALL ELEMENTAL BALANCE (Kg-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	53.0961	44.4422	3.0839	0.0529	—	47.5789	10.3998
CO2	12.4161	11.4427	0.7940	0.1361	—	12.3728	0.3484
CH3OH	0.4487	0.4457	0.0309	0.0166	5.4776	5.9709	-1230.7800
OTHERS	0.5471	0.5134	0.0356	0.0025	0.1410	0.6926	-26.5979
TOTAL C	66.5079	56.8440	3.9445	0.2082	5.6186	66.6152	-0.1614
HYDROGEN:							
H2	74.6819	49.0938	3.4067	0.0257	—	52.5261	29.6668
H2O	0.0000	0.0000	0.0000	0.0006	0.2304	0.2309	n.a.
OTHERS	4.0141	3.8639	0.2581	0.0776	22.2727	26.4824	-559.7330
TOTAL H	78.6960	52.9577	3.6748	0.1039	22.5031	79.2394	-0.6906
OXYGEN:							
TOTAL O	78.3924	67.7869	4.7038	0.3426	5.6667	78.5000	-0.1371
NITROGEN:							
TOTAL N	1.6603	1.5480	0.1074	0.0017	—	1.6571	0.1894
TOTAL MASS FLOW (kg/hr)	2160.4600	1843.5200	127.9240	8.1859	180.8360	2160.4600	-0.0001

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.986	100.088
HYDROGEN	99.834	100.691
OXYGEN	99.965	100.165
NITROGEN	101.239	99.311

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

DATE :	22-Jun-85
TIME :	06:17 PM
TIME INTERVAL:	FROM: 0000 12-Jun
	TO: 2400 12-Jun
	23
NUMBER OF AVERAGED HOURS :	EU-X754
RUN ID NUMBER :	CO-RICH GAS
FEED GAS TYPE:	
REACTOR FEED GAS INLET TEMP. (deg.C) :	145.3
OIL/SLURRY INLET TEMP. (deg.C) :	245.0
Ave. REACTOR TEMPERATURE (deg.C) :	250.0
REACTOR OUTLET TEMP. (deg.C) :	247.8
REACTOR GAS INLET PRESSURE (kPa) :	5460
PRIMARY SEPARATOR GAS PRESSURE (kPa) :	5271
GAS SUPERFICIAL VELOCITY (cm/sec) :	9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) :	5.0
SLURRY CONCENTRATION (wt%):	24.7
SPACE VELOCITY (1/ks-hr) :	10675
RECYCLE/FRESH FEED RATIO :	3.51
OIL/SLURRY CIRCULATION RATE (m3/hr) :	45.4
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) :	88.05
PURGE GAS FLOW RATE <S0> (ksmol/hr) :	5.82

STREAM #	1	55	10	15	25*	25*	62	68
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								
H2	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
CO	57.02	29.73	35.40	35.41	27.86	27.76	5.73	
CO2	37.01	54.12	50.74	50.74	50.77	50.83	23.60	
N2	3.52	13.73	11.75	11.72	13.07	13.14	60.76	
CH4	0.19	1.07	0.89	0.89	1.00	1.00	0.37	
H2O	0.10	6.61	0.51	0.50	0.56	0.57	0.92	
CH3OH	0.00	0.00	0.00	0.00	0.05	0.00	0.12	1.13
DME	0.00	0.51	0.44	0.40	6.37	6.43	7.43	95.79
C2H5OH	0.00	0.02	0.01	0.02	0.00	0.01	0.21	0.00
C3OH'S								0.62
CAOH'S								0.26
CSOH'S								0.18
ALKATENES								0.12
ESTERS								0.00
ALDEHYDES								0.58
OIL								0.00
TOTAL :	97.83	99.77	99.76	99.68	99.70	99.75	99.13	100.00
DENS,g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.43	22.42	20.63	20.62	23.03	23.08	36.53	32.40
Mm3/hr	524.7	1843.3	2346.1	2348.6	2102.3	2098.1	4.9	
ksmol/hr	23.41	82.24	104.67	104.78	93.79	93.60	0.22	5.57
l/hr:prod								228.22

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 12-Jun-85 - 2400 12-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	29.9	29.6
CARBON MONOXIDE CONVERSION	(Z) :	10.4	10.4
CARBON DIOXIDE CONVERSION	(Z) :	0.0	0.1
RATIO H2 CONSUMED/CO CONSUMED	:	2.00	1.98

*** 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	98.8
CO (+CO2) SELECTIVITY TO ETHANOL	(Z) :		0.4

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

METHANOL PRODUCTIVITIES & YIELDS

<u>MEOH SOURCE</u>	<u>mol/hr-kg cat</u>	<u>kg/1000 Na3 fresh feed</u>	<u>kg/1000 Na3 reactor feed</u>
As calculated ACROSS REACTOR	25.26	339.4	75.8
As Net MeOH produced, OVERALL balance	24.71	332.1	74.2

REACTOR FEED (H2/(CO+1.5CO2)) :	0.52
REACTOR FEED ((H2-CO2)/(CO+CO2)) :	0.38
APPROACH TO METHANOL EQUILIBRIUM (des.C) :	31.0
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	97.0
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	5.56

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 12-Jun-85 - 2400 12-Jun-85

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	-0.29104	1.81794	-0.21137
CO	-0.42058	-0.00534	-0.06062
CO2	-92.13470	-1.30699	1.36210
N2	-220.79600	-1.29725	-5.97310
CH4	n.a.	-1.04257	-27.38250
H2O	---	n.a.	-124.02100
CH3OH	---	-0.09815	2.07972

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	53.1677	44.5019	3.1471	0.0515	---	47.7005	10.2830
CO2	12.2761	11.2931	0.7986	0.1326	---	12.2242	0.4228
CH3OH	0.4166	0.4161	0.0294	0.0162	5.3915	5.8533	-1305.1700
OTHERS	0.5428	0.5138	0.0363	0.0025	0.1366	0.6892	-26.9562
TOTAL C	66.4033	56.7249	4.0115	0.2027	5.5281	66.4672	-0.0963
HYDROGEN:							
H2	74.2101	48.8914	3.4576	0.0250	---	52.3740	29.4248
H2O	0.0000	0.0000	0.0000	0.0005	0.2258	0.2264	n.a.
OTHERS	3.8713	3.7519	0.2653	0.0756	21.9165	26.0094	-571.8580
TOTAL H	78.0814	52.6434	3.7229	0.1011	22.1424	78.6077	-0.6767
OXYGEN:							
TOTAL O	78.1534	67.5202	4.7750	0.3335	5.5768	78.2055	-0.0666
NITROGEN:							
TOTAL N	1.8690	1.7584	0.1244	0.0016	---	1.8844	-0.8206
TOTAL MASS FLOW (ks/hr)	2159.9900	1843.6900	130.3340	7.9704	177.9460	2159.9800	0.0002

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	100.033	99.954
HYDROGEN	100.126	100.393
OXYGEN	100.014	100.027
NITROGEN	99.782	100.257

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

DATE : 22-Jun-85
TIME : 06:25 PM
TIME INTERVAL: FROM: 0000 13-Jun
TO: 1200 13-Jun
NUMBER OF AVERAGED HOURS : 12
RUN ID NUMBER : EU-X754
FEED GAS TYPE: CO-RICH GAS
REACTOR FEED GAS INLET TEMP. (des.C) : 143.7
OIL/SLURRY INLET TEMP. (des.C) : 244.8
AVE. REACTOR TEMPERATURE (des.C) : 250.0
REACTOR OUTLET TEMP. (des.C) : 247.8
REACTOR GAS INLET PRESSURE (kPa) : 5459
PRIMARY SEPARATOR GAS PRESSURE (kPa) : 5271
GAS SUPERFICIAL VELOCITY (cm/sec) : 9.5
LIQUID SUPERFICIAL VELOCITY (cm/sec) : 5.0
SLURRY CONCENTRATION (wt%): 24.7
SPACE VELOCITY (1/ks-hr) : 10764
RECYCLE/FRESH FEED RATIO : 3.50
OIL/SLURRY CIRCULATION RATE (m3/hr) : 45.5
PROD. SEPARATOR GAS FLOWRATE <S0> + <S5> (ksmol/hr) : 88.08
PURGE GAS FLOW RATE <S0> (ksmol/hr) : 5.73

STREAM #	1	55	10	15	25*	25*	62	58
STREAM NAME	FRESH FEED	RECYCLE GAS	REACTOR FEED	REACTOR FEED	V/L SEP	V/L SEP	FLASH GAS	NEBH PRODUCT
ON-LINE GC#	1	2	1	2	2	1		
COMPONENT								
	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<MOL%>	<WT%>
H2	57.56	29.94	35.71	35.67	28.05	28.03	5.73	—
CO	36.82	54.30	50.82	50.81	50.92	50.89	23.60	—
CO2	3.55	13.79	11.79	11.78	13.18	13.18	60.76	—
H2	0.15	0.90	0.74	0.74	0.83	0.84	0.37	—
CH4	0.10	0.62	0.52	0.52	0.58	0.59	0.92	—
H2O	0.00	0.00	0.00	0.00	0.04	0.00	0.12	1.12
CH3OH	0.00	0.42	0.38	0.32	6.34	6.37	7.43	95.71
DME	0.00	0.02	0.01	0.01	0.00	0.01	0.21	0.00
C2H5OH	—	—	—	—	—	—	—	0.65
C3OH'S	—	—	—	—	—	—	—	0.26
C4OH'S	—	—	—	—	—	—	—	0.19
C5OH'S	—	—	—	—	—	—	—	0.13
ALKAHENES	—	—	—	—	—	—	—	0.00
ESTERS	—	—	—	—	—	—	—	0.61
ALDEHYDES	—	—	—	—	—	—	—	0.00
OIL	—	—	—	—	—	—	—	1.34
TOTAL :	98.18	99.98	99.98	99.85	99.95	99.91	99.13	100.00
DENS,g/cc	0.005	0.046	0.032	0.032	0.029	0.029	0.004	0.790
AV.MOL.WT	13.34	22.38	20.57	20.56	23.01	23.02	36.53	32.41
Mm3/hr	527.3	1845.9	2357.8	2357.3	2107.2	2106.1	5.4	—
ksmol/hr	23.53	82.35	105.19	105.17	94.01	93.96	0.24	5.71
l/hr:prod	—	—	—	—	—	—	—	234.37

* Compositions correspond to STREAM#32

LaPORTE LPMETHANOL PROCESS AVERAGE REPORT
CONVERSION-SELECTIVITY-PRODUCTIVITY

0000 13-Jun-85 - 1200 13-Jun-85

CONVERSIONS ACROSS REACTOR :

		<u>GC#1</u>	<u>GC#2</u>
HYDROGEN CONVERSION	(Z) :	29.9	29.7
CARBON MONOXIDE CONVERSION	(Z) :	10.6	10.4
CARBON DIOXIDE CONVERSION	(Z) :	0.2	-0.0
RATIO H2 CONSUMED/CO CONSUMED	:	1.99	2.00

*** 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 (HCO ₂) SELECTIVITY TO METHANOL	(Z) :	100.0	98.4
CO (HCO ₂) SELECTIVITY TO ETHANOL	(Z) :		0.5

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

METHANOL PRODUCTIVITIES & YIELDS

<u>MEDN SOURCE</u>	<u>mol/hr-kg cat</u>	<u>kg/1000 kg₃ fresh feed</u>	<u>kg/1000 kg₃ reactor feed</u>
As calculated ACROSS REACTOR	25.60	340.6	76.2
As Net MeOH produced, OVERALL balance	25.46	338.8	75.8

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) :	31.5
APPROACH TO WATER-GAS EQUILIBRIUM (des.C) :	n.a.
METHANOL COLLECTED AS % OF CALCULATED :	98.7
CALCULATED METHANOL PRODUCTION RATE (Kmol/hr) :	5.61

LaPORTE LPHETHANOL PROCESS AVERAGE REPORT
MATERIAL BALANCE SUMMARY

0000 13-Jun-85 - 1200 13-Jun-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	-0.90636	1.77788	-0.02775
CO	-0.61397	-0.10107	0.09876
CO2	-91.46070	-1.61502	1.97188
N2	-250.87700	-0.42945	-9.57115
CH4	n.a.	-2.18425	-26.19330
H2O	—	n.a.	-175.76300
CH3OH	—	1.81722	0.65617

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	53.4314	44.7150	3.1089	0.0567	—	47.8806	10.3885
CO2	12.3849	11.3534	0.7894	0.1461	—	12.2889	0.7754
CH3OH	0.3399	0.3461	0.0241	0.0179	5.5327	5.9207	-1642.1300
OTHERS	0.5604	0.5262	0.0366	0.0027	0.1466	0.7121	-27.0627
TOTAL C	66.7166	56.9408	3.9589	0.2234	5.6793	66.8024	-0.1295
HYDROGEN:							
H2	75.0279	49.3046	3.4280	0.0275	—	52.7602	29.6792
H2O	0.0000	0.0000	0.0000	0.0006	0.2310	0.2316	n.a.
OTHERS	3.6292	3.5212	0.2448	0.0833	22.5062	26.3555	-626.2030
TOTAL H	78.6571	52.8258	3.6728	0.1114	22.7372	79.3473	-0.8775
OXYGEN:							
TOTAL O	78.5551	67.7839	4.7128	0.3675	5.7259	78.5901	-0.0446
NITROGEN:							
TOTAL N	1.5624	1.4831	0.1031	0.0018	—	1.5880	-1.6408
TOTAL MASS FLOW (ks/hr)	2162.7000	1843.0200	128.1410	8.7824	182.7470	2162.6900	0.0001

REACTOR GAS BALANCE (OUT/IN) :

	GC#1	GC#2
MASS BALANCE, (Z) :	100.000	100.000
ELEMENTAL BALANCE, (Z) :		
CARBON	99.905	100.058
HYDROGEN	99.921	100.261
OXYGEN	99.884	100.124
NITROGEN	100.724	99.288