B. DETAILED DATA FROM RUNS 46 AND 48

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 A From Hr. 1500 to Hr. 0900 Hrs. 0-19

FLOWS	SCFH	%
Oxygen	2791	
Nat. Gas	3411	
Total		
Fresh Feed	10254	
F. F. by C		
Avg. F. F.		
Wet Gas	2039	
Contraction		
Recycle	16058	
Bleed	808	
Total	16866	
Total Feed	27120	
Recycle/F.F.	1.64	
Inlet Vel.	0.82	
Steam Flow		

RUN CONDITIONS	
Generator Press.	430
O_2 Preheat, °F	422
Gas Preheat, °F	673
Reactor Press.	384
Steam Back Press.	673
Temperatures, °F	
Heater Outlet	417
Catalyst #1	626
#2	628
#3	639
#4	617
#5	
Average	628
Product Separator	53

DISTILLATIONS

ASTM	
Prod.	Naph
A.P.I.	56.3
I.B.P.	100
5%	
10%	134
20	162
30	188
40	216
50	240
60	266
70	296
80	330
90	366
95	394
E.P.	408
Rec.	98
Res.	1.5
Loss	0.5

Hempel Dist. °F	%	A.P.I.
to 400	64.3	56.3
400-550	16.6	36.9
550+	19.1	16.8

WATER Temp.	%
200	
203	
208	

X-Ray Diffraction on Catalyst

$Fe_{20}C_9$	30%
Fe_3O_4	60%
Fe	10%

CATALYST DATA	
In Reactor at Start of Period	1117
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	45
In Reactor at End of Period	1022
Reactor d-P, H_2O (End of Period)	
Pounds in Reactor	1034
Density, lbs./cu. ft.	129
Bed Height, Feet	12.15
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	10.0
V/hr/V	1400

CATALYST ANALYSIS

Particle Size

Screen Frac.	M	%	Sedimentation M	%
On 40	420+	14.9	80+	
100	419-150	59.1	80-40	
150	149-105	11.7	40-20	
200	104-74	8.7	20-10	
250	73-62	1.6	10-0	
325	61-44	0.6		
<325	43-0	3.4		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	153	% Fe	66.9
Settled	155	% C	3.6
Compacted	166	% Oil	0.9(ext)
Sp. Grav.	4.5	Specific Surface	
% K_2O	0.25		m^2/gm
% H_2	0.20	1.6	ml.NH_3/gm
K_2O/100 Fe	0.37	<$1m^2/g$	N_2 ads.

NATURAL GAS	%
CO_2	1.78
CH_4	84.51
C_2H_6	9.43
C_3H_8	3.41
C_4H_{10}	0.16
N_2	0.56
O_2	0.15
MW	18.953

PRODUCT INSPECTION

	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	56.6	47.6			
Sap. No.	53.9	47.9			
Hydrox. No.					
Bromine No.	84.4				
% Fe					
% Alc		6.0			
°API	49.4	9.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		7.364 0.014			14.756
CO_2		0.160	0.16		0.320
CH_4		7.606	7.61	30.424	
C_2H_6		0.849	1.70	5.094	
C_3H_8		0.307	0.92	2.456	
C_4H_{10}		0.014	0.06	0.140	
N_2		0.050			
Total			10.44	38.114	15.076

OUT	Mol %	m/hr	C	H	O
CO_2	3.310	0.896	0.9		1.79
CO	36.773	9.951	10.0		9.95
CH_4	0.027	0.007	0.0	0.03	
H_2	59.377	16.067		32.13	
N_2	0.513	0.139			
H_2O				6.31	3.16
Total		27.06	10.9	38.47	14.90
Balance			103.9	100.93	98.82

	FRESH FEED %	m/hr	#/hr	WET GAS %	Measured m/hr	Measured #/hr	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	%	EFFLUENT m/hr	%
CO	36.773	9.95	278.67	14.79	0.723	20.25	1.019	28.53	6.581	16.530	23.10	7.600	13.11
H2	59.377	16.06	32.38	27.63	1.350	2.72	1.902	3.83	12.296	28.360	39.63	14.198	24.49
CO2	3.310	0.90	39.43	33.14	1.620	71.30	2.283	100.46	14.748	15.644	21.86	17.031	29.38
N2	0.513	0.14	3.99	0.75	0.036	1.01	0.051	1.42	0.332	0.471	0.66	0.383	0.66
CH4	0.027	0.01	0.11	11.78	0.576	9.24	0.812	13.02	5.241	5.248	7.33	6.053	10.44
C2H4				2.63	0.129	3.62	0.182	5.10	1.171	1.171	1.64	1.353	2.33
C2H6				1.92	0.094	2.93	0.132	3.99	0.855	0.855	1.19	0.987	1.70
C3H6				3.41	0.170	7.15	0.240	10.07	1.551	1.551	2.17	1.791	3.09
C3H8				0.62	0.030	1.32	0.042	1.86	0.277	0.277	0.39	0.319	0.55
C4H8				1.96	0.095	5.33	0.134	7.51	0.870	0.870	1.22	1.004	1.73
C4H10				0.51	0.025	1.45	0.035	2.04	0.227	0.227	0.32	0.262	0.45
C5H10				0.59 0.11	0.029 0.005	2.03 0.36	0.041 0.007	2.86 0.51	0.264 0.047	0.264 0.047	0.37 0.07	0.305 0.054	0.53 0.09
C6H12				0.10	0.005	0.42	0.007	0.59	0.042	0.042	0.06	0.049	0.08
OIL												0.431	0.74
WATER												6.156	10.62
TOTAL		27.06	354.48		4.887	129.03	6.886	181.80	44.501	71.556		57.974	
H2+CO		26.01					2.921			44.890		21.798	
H2/CO		1.61					1.87			1.72		1.87	

NET CHANGE ON REACTION

	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-8.930	-8.930				-8.930				
H2	-14.162			-28.324						
CO2	1.387	1.387	15.53			2.774				
N2	-0.088									
CH4	0.805	0.805	9.01	3.220						
C2H4	0.182	0.364	4.08	0.728						57.8
C2H6	0.132	0.264	2.96	0.792						
C3H6	0.240	0.720	8.06	1.440			10.07 9.06	4.32 6.25	2.33 1.45	84.2
C3H8	0.042	0.126	1.41	0.336			1.86	4.24	0.44	
C4H8	0.134	0.536	6.00	1.072			7.51 7.13	5.00 6.10	1.50 1.17	79.3
C4H10	0.035	0.140	1.57	0.350			2.04	4.86	0.42	
C5H10	0.041 0.007	0.205 0.035	2.30 0.39	0.410 0.084			2.86 0.51	5.45	0.62	
C6H12	0.007	0.042	0.47	0.084			0.59	5.5	0.11	
OIL		4.306	48.22	8.612			60.40	6.51	29.28	
WATER				11.196		5.156 5.598				
TOTAL	-20.168						82.59		13.05	
H2+CO	-23.092									
H2/CO	1.59									

ULTIMATE YIELDS

	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	16.05	22.00	2.231	37.73			
C3+	68.42	85.84	8.707	147.24	14.70	1.491	210.5
C4+	58.95	73.91	7.497	126.77	11.93	1.210	171.0
Ult. Oil		82.59	8.377	141.66	13.05	1.324	187.1
CO2	15.53	61.03	6.190	104.67			
H20		110.91	11.250	190.24	13.20	1.340	189.3

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	129.03		181.80
Oil	62.51		62.51
Water	110.17		110.17
Total	301.71	84.16	354.48

H_2+CO= 9860 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	25.44	2.58	5.42	0.55
Rec Oil	62.51	6.34	9.60	0.97
WSC	6.61	0.67	0.79	0.08
	94.56	9.59	15.81	1.60
H_2O	103.56	10.50	12.42	1.26

EFFLUENT RATIOS	
H2/H20	2.306
C02/C0	2.240
(H2) (C02) / (H20) (C0)	5.17

CONTRACTION:	74.55
C0 Conversion:	89.76
H2 Conversion:	88.16
H_2+C0=	88.77

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 B From Hr. 1200 to Hr. 0700 Hrs. 19-38

FLOWS	SCFH	%
Oxygen	3799	
Nat. Gas	5312	
Total		
Fresh Feed	15937	
F. F. by C		
Avg. F. F.		
Wet Gas	5547	
Contraction		
Recycle	19054	
Bleed	968	
Total	20022	
Total Feed	35959	
Recycle/F.F.	1.26	
Inlet Vel.	1.08	
Steam Flow		

RUN CONDITIONS	
Generator Press.	413
O_2 Preheat, °F	400
Gas Preheat, °F	627
Reactor Press.	387
Steam Back Press.	713
Temperatures, °F	
Heater Outlet	265
Catalyst #1	630
#2	630
#3	648
#4	643
#5	
Average	639
Product Separator	64

DISTILLATIONS

ASTM		Hempel Dist.		
Prod.	Naph	°F	%	A.P.I.
A.P.I.	57.0	to 400	66.6	57.0
I.B.P.	102	400-550	16.6	37.9
5%		550+	16.8	
10%	140			
20	166			
30	192	WATER		
40	216	Temp.	%	
50	236	200		
60	262	203		
70	292	208		
80	322			
90	356			
95	386			
E.P.	402			
Rec.	97.5			
Res.	1.5			
Loss.	1.0			

CATALYST DATA	
In Reactor at Start of Period	1022
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	172
In Reactor at End of Period	850
Reactor d-P, H_2O	
Pounds in Reactor	1026
Density, lbs./cu. ft.	138
Bed Height, Feet	11.3
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	15.5
V/hr/V	2137

CATALYST ANALYSIS

Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	18.5	80+	
100	419-150	32.2	80-40	
150	149-105	10.0	40-20	
200	104-74	5.4	20-10	
250	73-62	0.6	10-0	
325	61-44	1.0		
<325	43-0	2.2		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	134		% Fe	
Settled	136		% C	
Compacted	146		% Oil	
Sp. Grav.	4.3		Specific Surface	
				m^2/gm
			4.8	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.72
CH_4	35.27
C_2H_6	8.57
C_3H_8	3.43
C_4H_{10}	0.21
N_2	0.67
O_2	0.13
MW	18.856

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45.3	42.6			
Sap. No.	50.4	43.3			
Hydrox. No.					
Bromine No.	60.8				
% Fe					
% Alc		8.0			
°API	50.1	10.2			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		0.018 10.023			20.082
CO_2		0.241	0.24		0.482
CH_4		11.951	11.95	47.804	
C_2H_6		1.201	2.40	7.206	
C_3H_8		0.481	1.44	3.848	
C_4H_{10}		0.029	0.12	0.290	
N_2		0.094			
Total			16.15	59.148	20.554

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.373	0.898	1.0		2.0
CO	37.377	15.717	15.7		15.7
CH_4	0.040	0.017	0.0	0.068	
H_2	58.837	24.740		49.480	
N_2	1.370	0.577			
H_2O				7.651	3.8
Total		42.049	16.7	57.199	21.5
Balance			103.6	96.7	104.7

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	37.38	15.72	440.23	19.380	2.836	79.44	3.101	86.87	10.238	25.355	27.354	13.339	17.37
H2	58.94	24.74	49.88	45.200	6.615	13.34	7.234	14.59	23.879	48.619	51.240	31.113	40.51
CO2	2.37	1.00	43.92	22.520	3.296	145.06	3.604	158.64	11.897	12.895	13.590	15.501	20.18
N2	1.37	0.58	16.16	0.447	0.065	1.82	0.071	1.99	0.236	0.813	0.857	0.307	0.40
CH4	0.04	0.02	0.27	5.386	0.788	12.64	0.862	13.82	2.845	2.862	3.016	3.707	4.83
C2H4				1.967	0.288	8.08	0.315	8.84	1.039	1.039	1.095	1.354	1.76
C2H6				0.723	0.106	3.19	0.116	3.49	0.382	0.382	0.403	0.498	0.65
C3H6				1.987	0.291	12.24	0.318	13.39	1.050	1.050	1.107	1.368	1.78
C3H8				0.077	0.011	0.49	0.012	0.54	0.042	0.042	0.044	0.054	0.07
C4H8				1.213	0.178	9.99	0.195	10.92	0.641	0.641	0.676	0.836	1.09
C4H10				0.437	0.064	3.72	0.070	4.07	0.231	0.231	0.243	0.301	0.39
C5H10				0.457	0.067	4.70	0.073	5.14	0.241 0.054	0.241 0.054	0.254 0.057	0.314 0.070	0.41 0.09
C6H12				0.103	0.015	1.08	0.016	1.18	0.054	0.054	0.057	0.070	0.09
OIL				0.103	0.015	1.26	0.016	1.38				0.571	0.74
WATER												7.404	9.64
TOTAL		42.05	550.46		14.635	297.05	16.005	324.85	52.830	94.879		76.807	
H2+CO		40.46					10.335			74.574		44.452	
H2/CO		1.57					2.33			1.87		2.33	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-12.62	-12.62	19.730			-12.616				
H2	-17.51			-35.012						
CO2	2.61	2.62	16.58			5.212				
N2	- 0.51									
CH4	0.85	0.85	5.38	3.380						
C2H4	0.32	0.63	4.01	1.260						71.70
C2H6	0.12	0.23	1.48	0.696						
C3H6	0.32	0.95	6.07	1.903			13.39 12.05	4.32 6.25	3.10 1.93	96.12
C3H8	0.01	0.04	0.23	0.096			0.54	4.24	0.13	
C4H8	0.20	0.78	4.96	1.560			10.92 9.83	5.00 6.10	2.18 1.61	72.85
C4H10	0.07	0.28	1.78	0.700			4.07	4.86	0.84	
C5H10	0.07 0.02	0.37 0.08	2.32 0.51	0.730 0.192			5.14 1.18	5.45	1.16	
C6H12	0.02	0.10	0.61	0.192			1.38	5.5	0.25	
OIL		5.71	36.34	11.424			80.12	6.49	12.35	
WATER				12.874		7.404 6.437				
TOTAL	26.05						113.77		18.14	
H2+CO	-30.12									
H2/CO	1.39									

ULTIMATE YIELDS

	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	10.87	25.88	1.688	28.54			
C3+	52.82	116.74	7.614	128.8	20.01	1.305	184.4
C4+	46.52	102.81	6.705	113.4	16.78	1.094	154.6
Ult. Oil		113.77	7.420	125.5	18.14	1.183	167.2
CO2	16.58	114.72	7.482	126.5			
H20		133.39	8.699	147.1			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	297.05		324.85
Oil	65.73		65.73
Water	159.88		159.88
Total	522.66	94.95	550.46

H_2+CO = 15333 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	36.62	2.39	7.66	0.50
Reco 011	65.73	4.29	10.13	0.66
NSC	12.79	0.83	1.53	0.10
	115.14	7.51	19.32	1.26
H_2O	147.09	9.59	17.64	1.15

EFFLUENT RATIOS	
H2/H20	4.202
C02/C0	1.162
(H2) (C02) / (H20) (C0)	4.883

CONTRACTION:	61.94
C0 Conversion:	80.27
H2 Conversion:	70.75
H_2+CO =	74.45

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 C From Hr. 0700 to Hr. 0600 Hrs. 38-62

FLOWS	SCFH	%
Oxygen	3835	
Nat. Gas	5382	
Total		
Fresh Feed	15996	
F. F. by C		
Avg. F. F.		
Wet Gas	6309	
Contraction		
Recycle	19451	
Bleed	1013	
Total	20464	
Total Feed	36360	
Recycle/F.F.	1.29	
Inlet Vel.	1.09	
Steam Flow		

RUN CONDITIONS	
Generator Press.	423
O_2 Preheat, °F	405
Gas Preheat, °F	625
Reactor Press.	387
Steam Back Press.	735
Temperatures, °F	
Heater Outlet	299
Catalyst #1	633
#2	633
#3	656
#4	671
#5	
Average	648
Product Separator	63

DISTILLATIONS	ASTM					Hempel Dist.		
Prod.	Naph					°F	%	A.P.I.
A.P.I.	58.2					to 400	65.6	58.2
I.B.P.	95					400-550	16.3	40.7
5%						550+	18.1	
10%	128							
20	160							
30	185					WATER		
40	208					Temp.	%	
50	233					200		
60	260					203		
70	286					208		
80	319							
90	350							
95	376							
E.P.	392							
Rec.	97.5							
Res.	1.5							
Loss	1.0							

CATALYST DATA	
In Reactor at Start of Period	850
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	56
In Reactor at End of Period	794
Reactor d-P, H_2O	
Pounds in Reactor	973
Density, lbs./cu. ft.	144
Bed Height, Feet	10.2
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	16.3
V/hr/V	2361

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	30.0	80+	
100	419-150	62.0	80-40	
150	149-105	4.6	40-20	
200	104-74	1.6	20-10	
250	73-62	0.2	10-0	
325	61-44	0.0		
<325	43-0	0.8		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	131		% Fe	
Settled	133		% C	4.70
Compacted	150		% Oil	
Sp. Grav.	4.3		Specific Surface	
				m^2/gm
% H_2	0.31		6.8	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	2.16
CH_4	85.31
C_2H_6	8.09
C_3H_8	3.06
C_4H_{10}	0.16
N_2	1.04
O_2	0.18
MW	18.831

PRODUCT INSPECTION						
		Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.		41.7	41.9			
Sap. No.		47.3	45.3			
Hydrox. No.						
Bromine No.		85.3				
% Fe						
% Alc		10.0				
°API		51.3	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		10.146			20.292
CO_2		0.307	0.31		0.614
CH_4		12.115	12.12	48.460	
C_2H_6		1.149	2.30	6.894	
C_3H_8		0.434	1.30	3.472	
C_4H_{10}		0.023	0.09	0.230	
N_2		0.148			
Total			16.11	59.056	20.906

OUT	Mol %	m/hr	C	H	O
CO_2		1.072	1.1		2.1
CO		15.450	15.5		15.5
CH_4		0.155	0.2	0.620	
H_2		25.141		50.282	
N_2		0.125			
H_2O				7.388	3.7
Total		41.943	16.7	58.289	21.3
Balance			103.5	98.7	101.6

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	36.836	15.450	432.75	13.73	3.12	87.34	3.467	97.12	10.115	25.565	26.65	13.592	17.09
H2	59.940	25.141	50.68	49.49	8.24	16.61	9.159	18.47	26.718	51.859	54.05	35.877	45.15
CO2	2.557	1.072	47.18	20.85	3.47	152.71	3.858	169.80	11.258	12.330	12.85	15.120	19.02
N2	0.297	0.125	3.50	0.76	0.13	3.56	0.141	3.96	0.412	0.537	0.56	0.553	0.70
CH4	0.370	0.155	2.49	4.60	0.77	12.29	0.852	13.66	2.485	2.640	2.75	3.337	4.20
C2H4				1.33	0.22	6.20	0.246	6.89	0.717	0.717	0.75	0.963	1.21
C2H6				0.53	0.09	2.68	0.099	2.98	0.288	0.288	0.30	0.387	0.49
C3H6				1.64	0.27	11.45	0.302	12.73	0.884	0.884	0.92	1.186	1.49
C3H8				0.51	0.09	3.75	0.095	4.17	0.277	0.277	0.29	0.372	0.47
C4H8				0.96	0.16	8.98	0.178	9.99	0.520	0.520	0.54	0.698	0.88
C4H10				0.20	0.03	1.92	0.037	2.13	0.106	0.106	0.11	0.143	0.18
C5H10				0.35	0.06	4.07	0.064	4.53	0.189	0.189	0.20	0.253	0.32
C6H12				0.06	0.01	0.76	0.010	0.84	0.031	0.031	0.03	0.041	0.05
OIL												0.538	0.68
WATER												6.411	8.07
TOTAL		41.943	536.60		16.65	312.32	18.508	347.28	53.994	95.937		79.457	
H2+CO		40.591					12.626			77.424		49.459	
H2/CO		1.63					2.64			2.03		2.64	

NET CHANGE ON REACTION	m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.983	-11.983	22.44			-11.983				
H2	-15.982			-31.964						
CO2	2.786	2.786	18.03			5.572				
N2	0.016									
CH4	0.697	0.697	4.51	2.768						
C2H4	0.246	0.492	3.18	0.984						69.91
C2H6	0.099	0.198	1.28	0.594						
C3H6	0.302	0.908	5.88	1.818			12.73 11.46	4.32 6.25	2.95 1.83	75.33
C3H8	0.095	0.285	1.85	0.760			4.17	4.24	0.98	
C4H8	0.178	0.712	4.61	1.424			9.99 8.99	5.00 6.10	2.00 1.47	32.43
C4H10	0.037	0.148	0.96	0.370			2.13	4.86	0.44	
C5H10	0.064	0.320	2.07	0.640			4.53	5.45	0.83	
C6H12	0.010	0.060	0.39	0.120			0.84	5.5	0.15	
OIL		5.376	34.80	10.752			75.40	6.445	11.70	
WATER				11.714		6.411 5.857				
TOTAL	23.435						103.35		16.42	
H2+CO	27.965									
H2/CO	1.33									

ULTIMATE YIELDS

	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	8.977	21.04	1.368	23.13			
C3+	50.549	108.52	7.054	119.3	19.05	1.238	174.9
C4+	42.821	92.89	6.038	102.1	15.12	0.983	138.9
Ult. Oil		103.35	6.718	113.6	16.42	1.067	150.8
C02	18.032	122.62	7.971	134.8			
H20		115.50	7.508	127.0			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	312.32		347.28
Oil	57.01		57.01
Water	132.31		132.31
Total	501.64	93.48	536.60

EFFLUENT RATIOS	
H2/H20	5.60
C02/C0	1.11
(H2) (C02) / (H20) (C0)	6.23

CONTRACTION: 55.87

C0 Conversion: 77.56

H2 Conversion: 63.57

$H_2 + CO = 68.90$

$H_2 + CO = 15384$ SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	34.39	2.235	7.35	0.478
R&C 01	157.01	3.706	8.845	0.575
WSC	13.23	0.860	1.586	0.103
	104.63	6.801	17.781	1.156

H_2O 119.08

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 D From Hr. 0800 to Hr. 0700 Hrs. 62-84

FLOWS	SCFH	%
Oxygen	3788	
Nat. Gas	5414	
Total		
Fresh Feed	15135	
F. F. by C		
Avg. F. F.		
Wet Gas	6363	
Contraction		
Recycle	17888	
Bleed	1006	
Total	18894	
Total Feed	35029	
Recycle/F.F.	1.17	
Inlet Vel.	1.05	
Steam Flow		

RUN CONDITIONS	
Generator Press.	419
O_2 Preheat, °F	408
Gas Preheat, °F	644
Reactor Press.	333
Steam Back Press.	710
Temperatures, °F	
Heater Outlet	259
Catalyst #1	636
#2	636
#3	665
#4	672
#5	
Average	652
Product Separator	60

DISTILLATIONS	ASTM					Hempel Dist.		
Prod.	Naph					°F	%	A.P.I.
A.P.I.	57.4					to 400	70.0	57.4
I.B.P.	98					400-550	17.6	39.0
5%						550+	12.4	
10%	137							
20	169							
30	194					WATER		
40	219					Temp.	%	
50	240					200		
60	265					203		
70	292					208		
80	323							
90	359							
95	386							
E.P.	398							
Rec.	97.5							
Res.	1.5							
Loss.	1.0							

CATALYST DATA	
In Reactor at Start of Period	794
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	49
In Reactor at End of Period	745
Reactor d-P, H_2O	
Pounds in Reactor	875
Density, lbs./cu. ft.	130
Bed Height, Feet	10.2
Space Vel. SCFH/lb. cat.	
Inventory Figures	18.4
From d-P Meters	
V/hr/V	2397

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	22.3	80+	
100	419-150	66.5	80-40	
150	149-105	7.6	40-20	
200	104-74	2.2	20-10	
250	73-62	0.2	10-0	
325	61-44	0.4		
<325	43-0	0.9		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	148		% Fe	
Settled	151		% C	
Compacted	152		% Oil	
Sp. Grav.	4.4		Specific Surface	
				m^2/gm
			8.4	ml.NH_3/gm

NATURAL GAS	%
CO_2	2.60
CH_4	94.93
C_2H_6	8.04
C_3H_8	3.14
C_4H_{10}	0.24
N_2	0.89
O_2	0.16
MW	19.011

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	45.3	46.9			
Sap. No.	40.6	40.0			
Hydrox. No.					
Bromine No.	84.9				
% Fe					
% Alc	10.0				
°API	50.6	10.5			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		10.010			20.02
CO_2		0.371	0.37		0.74
CH_4		12.133	12.13	48.532	
C_2H_6		1.148	2.30	6.368	
C_3H_8		0.443	1.34	3.584	
C_4H_{10}		0.034	0.14	0.340	
N_2		0.127			
Total			16.28	59.344	20.76

OUT	Mol %	m/hr	C	H	O
CO_2		1.103	1.1		2.2
CO		15.973	16.0		16.0
CH_4		0.109	0.1	0.436	
H_2		25.280		50.560	
N_2		0.108			
H_2O				6.756	3.4
Total		42.573	17.2	57.752	21.6
Balance			105.3	97.3	103.8

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %	NET CHANGE ON REACTION Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	37.520	15.97	447.40	19.01	3.44	96.44	3.583	107.93	9.479	25.452	27.54	13.062	16.87	-12.39	-12.390	22.431			-12.390				
H2	59.380	25.28	50.96	50.619	9.17	18.49	10.259	20.68	25.236	50.516	54.65	35.495	45.12	-15.02			-30.042						
CO2	2.590	1.10	48.54	19.87	3.60	158.35	4.026	177.21	9.906	11.009	11.91	13.932	18.10	2.92	2.923	18.299			5.846				
N2	0.253	0.11	3.03	1.18	0.21	5.97	0.238	6.63	0.587	0.695	0.75	0.925	1.07	0.14									
CH4	0.257	0.11	1.75	4.48	0.81	13.01	0.908	14.56	2.232	2.341	2.53	3.140	4.08	0.80	0.799	5.002	3.196						
C2H4				1.10	0.20	5.61	0.224	6.23	0.550	0.550	0.60	0.774	1.01	0.22	0.443	2.805	0.886						67.67
C2H6				0.49	0.09	2.68	0.100	3.00	0.244	0.244	0.26	0.344	0.45	0.10	0.200	1.252	0.600						
C3H6				1.46	0.26	11.11	0.295	12.43	0.726	0.726	0.79	1.021	1.33	0.30	0.885	5.541	1.770			12.4 11.2	4.32 6.25	2.88 1.79	80.51
C3H8				0.34	0.06	2.69	0.068	3.01	0.168	0.168	0.18	0.236	0.31	0.07	0.204	1.277	0.544			3.0	4.24	0.71	
C4H8				0.96	0.16	8.75	0.175	9.79	0.430	0.430	0.47	0.605	0.79	0.18	0.700	4.382	1.400			9.8 8.8	5.00 6.10	1.96 1.44	78.63
C4H10				0.23	0.04	2.38	0.046	2.66	0.113	0.113	0.12	0.159	0.21	0.05	0.184	1.152	0.460			2.7	4.86	0.55	
C5H10				0.32	0.06	4.00	0.064	4.48	0.158	0.158	0.17	0.222	0.29	0.06	0.320	2.003	0.640			4.5	5.45	0.82	
C6H12				0.05	0.01	0.76	0.010	0.85	0.025	0.025	0.03	0.035	0.05	0.01	0.060	0.376	0.120			0.9	5.5	0.15	
OIL												0.567	0.74		5.667	35.478	11.334			79.5	6.47	12.29	
WATER												6.544	8.50				9.082		6.544 4.541				
TOTAL		42.57	551.68		18.11	330.23	20.266	369.56	49.354	92.427		76.961		22.57						107.5		17.04	
H2+CO		41.25					13.842		34.715					27.41									
H2/CO		1.58					2.86		2.66					1.21									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	9.059	22.09	1.413	23.80			
C3+	50.209	112.71	7.209	121.90	19.36	1.238	174.9
C4+	43.331	97.27	6.221	105.20	15.77	1.009	142.6
Ult. Oil		107.48	6.874	116.24	17.04	1.090	154.0
C02	18.299	128.67	8.230	139.17			
H20		117.90	7.541	127.52			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	330.23		369.56
Oil	56.30		56.30
Water	125.82		125.82
Total	512.35	92.87	551.68

EFFLUENT RATIOS	
H2/H20	5.424
C02/C0	0.393
(H2) (C02) / (H20) (C0)	2.132

CONTRACTION:	52.40
C0 Conversion:	77.57
H2 Conversion:	59.42
H_2+CO =	55.47

H_2+CO= 15635 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	33.22	2.175	7.07	0.452
Rec Oil	56.30	3.601	8.70	0.556
WSC	12.50	0.792	1.51	0.097
	102.10	6.530	1.728	1.105
H_2O	113.24	7.243	13.58	0.868

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 E From Hr. 0700 to Hr. 0700 Hrs. 84-108

FLOWS	SCFH	%
Oxygen	3806	
Nat. Gas	5498	
Total		
Fresh Feed	16566	
F. F. by C		
Avg. F. F.		
Wet Gas	6973	
Contraction		
Recycle	17223	
Bleed	1015	
Total	18238	
Total Feed	34804	
Recycle/F.F.	1.10	
Inlet Vel.	1.05	
Steam Flow		

RUN CONDITIONS	
Generator Press.	422
O_2 Preheat, °F	358
Gas Preheat, °F	722
Reactor Press.	418
Steam Back Press.	730
Temperatures, °F	
Heater Outlet	237
Catalyst #1	636
#2	636
#3	656
#4	664
#5	
Average	648
Product Separator	67

DISTILLATIONS								
	ASTM					Hempel Dist.		
Prod.	Naph					°F	%	A.P.I.
A.P.I.	55.5					to 400	68.6	56.5
I.B.P.	106					400-550	15.6	40.4
5%						550+	15.8	
10%	140							
20	171							
30	198					WATER		
40	218					Temp.	%	
50	240					200		
60	262					203		
70	293					208		
80	320							
90	356							
95	388							
E.P.	398							
Rec.	98.0							
Res.	1.5							
Loss	0.5							

CATALYST DATA	
In Reactor at Start of Period	745
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	43
In Reactor at End of Period	742
Reactor d-P, H_2O	
Pounds in Reactor	819
Density, lbs./cu. ft.	128
Bed Height, Feet	9.77
Space Vel. SCFH/lb. cat.	
Inventory Figures	20.23
From d-P Meters	
V/hr/V	2588

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	16.5	80+	
100	419-150	65.9	80-40	
150	149-105	9.9	40-20	
200	104-74	4.1	20-10	
250	73-62	0.8	10-0	
325	61-44	0.4		
<325	43-0	2.4		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	148		% Fe	
Settled	150		% C	8.63
Compacted	162		% Oil	
Sp. Grav.	4.4		Specific Surface	
				m^2/gm
% H_2 0.45			8.0	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.90
CH_4	85.24
C_2H_6	3.64
C_3H_8	2.53
C_4H_{10}	0.20
N_2	0.62
O_2	0.17
Mol	10.680

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	40.3	40.9				
Sap. No.	44.8	41.8				
Hydrox. No.						
Bromine No.	84.4					
% Fe						
% Alc		10.0				
°API	50.5	10.5				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		10.068			20.136
CO_2		0.276	0.28		0.552
CH_4		12.466	12.47	49.864	
C_2H_6		1.253	2.51	7.518	
C_3H_8		0.367	1.10	2.936	
C_4H_{10}		0.029	0.12	0.290	
N_2		0.090			
Total		14.506	16.47	60.608	20.688

OUT	Mol %	m/hr	C	H	O
CO_2		1.097	1.1		2.2
CO		15.990	16.0		16.0
CH_4		0.100	0.1	0.400	
H_2		26.352		52.704	
N_2		0.170			
H_2O				6.256	3.1
Total		43.709	17.2	59.360	21.3
Balance			104.4	97.940	103.0

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	76.59	15.99	447.98	17.703	3.257	91.23	3.915	106.97	8.519	24.509	26.60	12.334	16.2
H2	60.23	26.35	53.49	52.190	9.602	19.36	11.242	22.68	25.115	51.467	56.05	36.363	47.9
CO2	2.51	1.10	49.28	19.800	3.643	160.33	4.268	187.92	9.528	10.625	11.57	13.796	18.2
N2	0.39	0.17	4.76	0.963	0.177	4.96	0.207	5.81	0.463	0.633	0.69	0.670	0.9
CH4	0.23	0.10	1.60	4.480	0.824	13.22	0.965	15.49	2.156	2.256	2.46	3.121	4.1
C2H4				1.090	0.200	5.60	0.234	6.56	0.525	0.525	0.57	0.759	1.0
C2H6				0.503	0.093	2.60	0.109	3.28	0.242	0.242	0.26	0.351	0.5
C3H6				1.397	0.257	10.31	0.301	12.66	0.672	0.672	0.73	0.973	1.3
C3H8				0.447	0.082	3.62	0.096	4.24	0.215	0.215	0.23	0.311	0.4
C4H8				0.830	0.153	8.58	0.179	10.05	0.400	0.400	0.44	0.573	0.8
C4H10				0.223	0.041	2.38	0.048	2.79	0.107	0.107	0.12	0.155	0.2
C5H10				0.290 0.020	0.053 0.004	3.72 0.29	0.062 0.005	4.36 0.34	0.140 0.010	0.140 0.010	0.15 0.01	0.202 0.015	0.3 0.0
C6H12				0.063	0.012	1.01	0.014	1.18	0.030	0.030	0.03	0.044	0.1
OIL												0.494	0.7
WATER												5.833	7.7
TOTAL		43.71	556.01		18.399	327.21	21.553	394.13	48.122	91.830		76.000	
H2+CO		49.34					15.063		33.634				
H2/CO		1.65					2.05		2.95				

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-12.18	-12.18	23.86			-12.175				
H2	-15.10			-30.208						
CO2	3.17	3.17	19.83			6.342				
N2	0.04									
CH4	0.87	0.87	5.41	3.460						
C2H4	0.23	0.47	2.23	0.936						66.66
C2H6	0.11	0.22	1.36	0.654						
C3H6	0.30	0.90	5.65	1.806			12.66 11.39	4.32 6.25	2.93 1.82	74.91
C3H8	0.10	0.29	1.80	0.768			4.24	4.24	1.00	
C4H8	0.18	0.72	4.48	1.432			10.05 9.55	5.00 6.10	2.01 1.57	78.27
C4H10	0.05	0.19	1.20	0.480			2.79	4.86	0.57	
C5H10	0.06 0.01	0.31 0.03	1.94 0.15	0.620 0.060			4.70	5.45	0.86	
C6H12	0.01	0.08	0.53	0.168			1.18	5.5	0.21	
OIL		4.94	30.96	9.870			69.22	6.473	10.69	
WATER				0.954		5.833 4.977				
TOTAL	22.16						98.83		15.72	
H2+CO	27.28									
H2/CO	1.24									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	9.70	23.73	1.479	25.01			
C3+	7.45	16.90	1.053	17.81	3.93	0.245	34.62
C4+	8.30	18.72	1.166	19.72	3.65	0.227	32.08
Ult. Oil		98.83	6.158	104.13	15.72	0.930	138.47
C02	19.83	139.54	8.695	235.96			
H20		112.12	6.987	118.15			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	327.91		384.13
Oil	54.00		54.00
Water	124.58		124.58
Total	506.49	91.09	556.01

H_2+CO = 16048 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	35.62	2.219	7.58	0.472
Rec Oil	54.00	3.365	8.34	0.520
WSC	12.46	0.776	1.49	0.093
	102.08	6.360	17.41	1.085
H_2O	112.12	6.987	118.15	

EFFLUENT RATIOS	
H2/H20	6.23
C02/C0	1.1185
(H2) (C02) / (H20) (C0)	6.968

CONTRACTION:	50.69
C0 Conversion:	76.14
H2 Conversion:	57.32

H_2+CO = 64.43

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 F From Hr. 0700 to Hr. 0700 Hrs. 108-132

FLOWS	SCFH	%
Oxygen	3752	
Nat. Gas	5490	
Total		
Fresh Feed	16380	
F. F. by C		
Avg. F. F.		
Wet Gas	7036	
Contraction		
Recycle	16982	
Bleed	1004	
Total	17986	
Total Feed	34366	
Recycle/F.F.	1.10	
Inlet Vel.	1.03	
Steam Flow		

RUN CONDITIONS	
Generator Press.	422
O_2 Preheat, °F	405
Gas Preheat, °F	671
Reactor Press.	414
Steam Back Press.	706
Temperatures, °F	
Heater Outlet	237
Catalyst #1	639
#2	639
#3	658
#4	657
#5	
Average	648
Product Separator	70

DISTILLATIONS	ASTM					Hempel Dist.		
Prod.	Naph					°F	%	A.P.I.
A.P.I.	56.6					to 400	70.6	56.6
I.B.P.	102					400-550	16.0	40.3
5%						550+	13.4	
10%	148							
20	176							
30	200					WATER		
40	224					Temp.	%	
50	247					200		
60	268					203		
70	292					208		
80	322							
90	360							
95	392							
E.P.	403							
Rec.	98.0							
Res.	1.5							
Loss.	0.5							

CATALYST DATA	
In Reactor at Start of Period	742
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	41
In Reactor at End of Period	701
Reactor d-P, H_2O	
Pounds in Reactor	764
Density, lbs./cu. ft.	122
Bed Height, Feet	9.42
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	21.44
V/hr/V	2615

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	16.9	80+	
100	419-150	56.1	80-40	
150	149-105	8.2	40-20	
200	104-74	4.3	20-10	
250	73-62	1.0	10-0	
325	61-44	0.4		
<325	43-0	3.1		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	144		% Fe	
Settled	147		% C	
Compacted	160		% Oil	
Sp. Grav.	4.2		Specific Surface	
				m^2 gm
			7.3	ml.NH_3/gm

NATURAL GAS	%
CO_2	2.55
CH_4	94.17
C_2H_6	2.55
C_3H_8	0.77
C_4H_{10}	0.15
N_2	1.46
O_2	0.35
MW	19.025

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	39.1	40.1			
Sap. No.	42.9	41.1			
Hydrox. No.					
Bromine No.	91.1				
% Fe					
% Alc		10.0			
°API	50.7	10.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		9.952			19.904
CO_2		0.369	0.37		0.738
CH_4		12.192	12.19	48.768	
C_2H_6		1.238	2.48	7.428	
C_3H_8		0.401	1.20	3.208	
C_4H_{10}		0.022	0.09	0.220	
N_2		0.211			
Total			16.33	59.624	20.642

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		1.138	1.1		2.3
CO		15.930	15.9		15.9
CH_4		0.127	0.1	0.509	
H_2		25.955		51.710	
N_2		0.215			
H_2O				6.140	3.1
Total		43.265	17.2	58.358	21.3
Balance			105.3	97.88	103.1

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	36.820	15.930	446.20	19.76	3.669	102.8	4.140	115.965	9.379	25.309	27.84	13.52	18.1
H2	59.760	25.855	52.12	50.89	9.447	19.1	10.660	21.496	24.148	50.003	55.00	34.81	46.6
CO2	2.630	1.138	50.08	19.75	3.667	161.4	4.138	182.101	9.372	10.510	11.56	13.51	18.1
N2	0.497	0.215	6.02	0.69	0.129	3.6	0.146	4.074	0.329	0.544	0.60	0.475	0.6
CH4	0.293	0.127	2.04	4.09	0.760	12.2	0.858	13.755	1.942	2.069	2.28	2.80	3.7
C2H4				1.19	0.220	6.2	0.248	6.962	0.563	0.563	0.62	0.811	1.1
C2H6				0.48	0.089	2.7	0.100	3.024	0.228	0.228	0.25	0.328	0.4
C3H6				1.40	0.260	10.9	0.293	12.34	0.664	0.664	0.73	0.957	1.3
C3H8				0.21	0.040	1.8	0.045	1.99	0.101	0.101	0.11	0.146	0.2
C4H8				0.85	0.158	8.9	0.178	10.00	0.405	0.405	0.44	0.583	0.8
C4H10				0.25	0.047	2.7	0.053	3.09	0.120	0.120	0.13	0.173	0.2
C5H10				0.35	0.066	4.6	0.074	5.22	0.168	0.168	0.18	0.242	0.3
C6H12				0.07	0.014	1.2	0.016	1.33	0.035	0.035	0.04	0.052	0.1
OIL												0.496	0.7
WATER												5.790	7.8
TOTAL		43.265	556.46		18.565	338.0	20.949	450.36	47.455	90.720		74.694	
H2+CO		41.788					14.80		33.527	75.312		48.33	
H2/CO		1.62					2.57		2.57	1.98		2.57	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.79	-11.79	26.00			-11.79				
H2	-15.195			-30.39						
CO2	3.000	3.000	18.83			6.00				
N2	0.070									
CH4	0.731	0.731	4.59	2.92						
C2H4	0.248	0.496	3.12	0.99						69.7
C2H6	0.100	0.201	1.26	0.60						
C3H6	0.293	0.880	5.52	1.76			12.34 11.11	4.32 6.25	2.86 1.79	86.1
C3H8	0.045	0.135	0.85	0.36			1.99	4.24	0.47	
C4H8	0.178	0.713	4.47	1.42			10.00 9.50	5.00 6.10	2.00 1.56	76.4
C4H10	0.053	0.212	1.33	0.53			3.09	4.36	0.63	
C5H10	0.074	0.372	2.34	0.74			5.22	5.45	0.96	
C6H12	0.016	0.094	0.59	0.19			1.33	5.5	0.24	
OIL		4.956	31.11	9.91			69.52	6.5	10.70	
WATER				10.952		5.476 5.790				
TOTAL	22.18						99.76		15.97	
H2+CO	-26.985									
H2/CO	1.29									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	8.97	21.70	1.300	21.98			
C3+	wet gas 15.10	33.96	2.044	34.56	6.83	0.431	72.98
C4+		53.98	3.408	57.63	8.35	0.527	89.12
WS Chem		12.11	0.764	12.92	1.45	0.09155	12.936
Gen Oil		98.47	6.330	107.04	16.63	1.04955	174.936
C02	18.83	132.02	7.900	131.90			
H20		104.23	7.993	133.47	14.99	0.946	159.97

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	337.95	1.128	391.37
Oil	53.98		53.98
Water	121.11		121.11
Total	513.04	92.20	556.46

EFFLUENT RATIOS	
H2/H20	6.01
C02/C0	0.9993
(H2) (C02) / (H20) (C0)	6.0057

CONTRACTION: 51.27
C0 Conversion: 74.01
H2 Conversion: 58.77
H_2+C0= 64.58

H_2+C0= 15838 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	33.96	2.14	7.16	0.452
Rec Oil	53.98	3.41	8.35	0.527
WSC	12.11	0.765	1.45	0.092
	100.05	6.315	16.96	1.071
H_2O	109.00	6.882	13.070	0.825

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 G From Hr. 0700 to Hr. 0700 Hrs. 132-156

FLOWS	SCFH	%
Oxygen	3790	
Nat. Gas	5654	
Total		
Fresh Feed	16874	
F. F. by C		
Avg. F. F.		
Wet Gas	7711	
Contraction		
Recycle	10978	
Bleed	1041	
Total	18019	
Total Feed	34893	
Recycle/F.F.	1.07	
Inlet Vel.	1.05	
Steam Flow		

RUN CONDITIONS	
Generator Press.	425
O_2 Preheat, °F	375
Gas Preheat, °F	667
Reactor Press.	419
Steam Back Press.	720
Temperatures, °F	
Heater Outlet	203
Catalyst #1	631
#2	631
#3	654
#4	659
#5	
Average	644
Product Separator	70

DISTILLATIONS	ASTM					Hempel Dist.		
	Prod.	Naph				°F	%	A.P.I.
	A.P.I.	56.6				to 400	67.3	56.6
	I.B.P.	11.0				400-550	15.3	41.7
	5%					550+	17.4	
	10%	148						
	20	178						
	30	205				WATER		
	40	227				Temp.	%	
	50	246				200		
	60	269				203		
	70	293				208		
	80	322						
	90	356						
	95	384						
	E.P.	400						
	Rec.	98.0						
	Res.	1.5						
	Loss.	0.5						

CATALYST DATA	
In Reactor at Start of Period	701
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	57
In Reactor at End of Period	644
Reactor d-P, H_2O	
Pounds in Reactor	727
Density, lbs./cu. ft.	120
Bed Height, Feet	9.2
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	23.21
V/hr/V	2779

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	19.2	80+	
100	419-150	65.9	80-40	
150	149-105	7.5	40-20	
200	104-74	3.6	20-10	
250	73-62	0.6	10-0	
325	61-44	1.0		
<325	43-0	2.2		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	143		% Fe	
Settled	145		% C	8.63
Compacted	161		% Oil	
Sp. Grav.	4.2		Specific Surface	
				m^2/gm
% H_2 0.38			6.7	ml.NH_3/gm

NATURAL GAS	%
CO_2	2.38
CH_4	84.13
C_2H_6	8.34
C_3H_8	3.03
C_4H_{10}	0.20
N_2	1.68
O_2	0.23
MW	18.046

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	37.2	39.8				
Sap. No.	46.8	46.1				
Hydrox. No.						
Bromine No.	78.9					
% Fe						
% Alc		11.0				
°API	50.6	10.7				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		0.034 10.000			20.068
CO_2		0.355	0.36		0.710
CH_4		12.551	12.55	50.204	
C_2H_6		1.244	0.12	3.464	
C_3H_8		0.452	1.36	3.616	
C_4H_{10}		0.030	0.12	0.360	
N_2		0.251			
Total			16.87	61.594	20.778

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		1.037	1.0		2.1
CO		15.949	16.0		16.0
CH_4		0.530	0.5	2.220	
H_2		26.837		53.674	
N_2		0.169			
H_2O				56.00	2.8
Total		44.523	17.5	61.494	20.9
Balance			103.8	99.0	100.2

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	35.92	15.949	446.73	20.57	4.19	117.2	4.785	134.03	9.779	25.728	27.945	14.564	19.01
H2	60.28	26.837	54.10	52.52	10.69	21.5	12.217	24.63	24.969	51.806	56.271	37.186	48.53
CO2	2.33	1.037	45.64	16.74	3.41	149.9	3.894	171.40	7.958	8.995	9.770	11.952	15.47
N2	0.38	0.169	4.73	0.52	0.11	2.9	0.120	3.36	0.245	0.414	0.449	0.365	0.48
CH4	1.19	0.530	8.50	5.38	1.10	17.6	1.252	20.09	2.557	3.087	3.353	3.809	4.97
C2H4				1.01	0.21	5.8	0.234	6.57	0.480	0.480	0.521	0.714	0.93
C2H6				0.49	0.10	3.0	0.114	3.44	0.232	0.232	0.251	0.346	0.45
C3H6				1.21	0.25	10.4	0.281	11.83	0.573	0.573	0.622	0.854	1.12
C3H8				0.23	0.05	2.1	0.054	2.37	0.109	0.109	0.118	0.163	0.21
C4H8				0.74	0.15	9.5	0.173	9.68	0.353	0.353	0.383	0.526	0.69
C4H10				0.21	0.04	2.5	0.049	2.86	0.099	0.099	0.107	0.148	0.19
C5H10				0.31	0.06	4.4	0.071	4.97	0.145	0.145	0.157	0.216	0.28
C6H12				0.08	0.02	1.4	0.018	1.54	0.036	0.036	0.039	0.054	0.07
OIL												0.453	0.59
WATER												5.374	7.01
TOTAL		44.523	559.70		20.35	347.0	23.263	396.79	47.543	92.057		76.624	
H2+CO		42.786					17.002		34.748				
H2/CO		1.69					2.55		2.55				

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.164	-11.164	30.00			-11.164				
H2	-14.620			-29.240						
CO2	2.957	2.957	17.91			5.714				
N2	0.049									
CH4	0.722	0.722	4.53	2.888						
C2H4	0.234	0.468	2.93	0.936						65.63
C2H6	0.114	0.228	1.43	0.684						
C3H6	0.281	0.843	5.28	1.686			11.83 10.65	4.32 6.25	2.74 1.70	83.30
C3H8	0.054	0.162	1.02	0.432			2.37	4.24	0.56	
C4H8	0.173	0.692	4.34	1.384			9.68 9.20	5.00 6.10	1.94 1.51	77.19
C4H10	0.049	0.196	1.23	0.490			2.86	4.86	0.59	
C5H10	0.071	0.355	2.23	0.710			4.97	5.45	0.91	
C6H12	0.018	0.103	0.62	0.216			1.54	5.5	0.28	
OIL		4.533	28.42	9.066			63.58	6.460	9.83	
WATER				10.748		5.450 5.374				
TOTAL	-21.162						92.80		14.82	
H2+CO	-25.734									
H2/CO	1.31									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	8.888	21.60	1.332	22.524			
C3+	43.194	96.03	5.971	100.970	16.85	1.039	146.81
C4+	36.855	82.63	5.096	86.173	13.55	0.836	118.13
Ult. Oil		92.80	5.723	96.775	14.82	0.914	129.1
C02	17.910	125.76	7.755	131.137			
H20		97.50	6.013	101.690	13.59	0.838	118.4

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	347.02		396.79
Oil	50.32		50.32
Water	112.59		112.59
Total	509.93	91.11	559.70

EFFLUENT RATIOS	
H2/H20	6.919
C02/C0	0.8137
(H2) (C02) / (H20) (C0)	5.629

CONTRACTION:	47.75
C0 Conversion:	70.00
H2 Conversion:	54.48
H_2+CO =	60.26

H_2+CO= 16216 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	33.25	2.050	7.02	0.433
Rec 01	150.32	3.103	7.78	0.480
WSC	12.38	0.763	1.48	0.091
	95.95	5.917	16.28	1.004
H_2O	100.21	6.180	12.02	0.741

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 H From Hr. 0700 to 0700 Hrs. 156-180

FLOWS	SCFH	%
Oxygen	3743	
Nat. Gas	5615	
Total		
Fresh Feed	16636	
F. F. by C		
Avg. F. F.		
Wet Gas	8222	
Contraction		
Recycle	17438	
Bleed	1067	
Total	18505	
Total Feed	35141	
Recycle/F.F.	1.11	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	430
O_2 Preheat, °F	419
Gas Preheat, °F	685
Reactor Press.	423
Steam Back Press.	715
Temperatures, °F	
Heater Outlet	248
Catalyst #1	629
#2	629
#3	663
#4	665
#5	
Average	646
Product Separator	68

DISTILLATIONS	ASTM				Hempel Dist.		
Prod.	Naph				°F	%	A.P.I.
A.P.I.	56.6				to 400	64.6	56.6
I.B.P.	104				400-550	16.6	41.7
5%					550+	18.8	
10%	146						
20	179						
30	204						
40	228						
50	248						
60	269						
70	298						
80	322						
90	356						
95	388						
E.P.	401						
Rec.	97.5						
Res.	1.5						
Loss.	1.0						

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	644
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	25
In Reactor at End of Period	619
Reactor d-P, H_2O	
Pounds in Reactor	657
Density, lbs./cu. ft.	123
Bed Height, Feet	8.09
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	25.32
V/hr/V	

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	16.4	80+	
100	419-150	63.4	80-40	
150	149-105	8.6	40-20	
200	104-74	5.2	20-10	
250	73-62	1.0	10-0	
325	61-44	0.2		
<325	43-0	5.2		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	141		% Fe	
Settled	143		% C	
Compacted	160		% Oil	
Sp. Grav.	4.1		Specific Surface	
				m^2/gm
			5.7	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.88
CH_4	84.72
C_2H_6	8.70
C_3H_8	3.55
C_4H_{10}	0.22
N_2	0.73
O_2	0.20
MW	18.9958

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	38.0	39.7			
Sap. No.	39.8	41.0			
Hydrox No.					
Bromine No.	86.7				
% Fe					
% Alc		11.0			
°API	51.0	10.8			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		9.905			19.810
CO_2		0.278	0.28		0.556
CH_4		12.550	12.55	50.200	
C_2H_6		1.289	2.58	7.734	
C_3H_8		0.526	1.58	4.208	
C_4H_{10}		0.033	0.13	0.330	
N_2		0.108			
Total			17.12	62.472	20.366

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		1.045	1.1		2.1
CO		15.703	15.7		15.7
CH_4		0.503	0.5	2.012	
H_2		26.487		52.974	
N_2		0.158			
H_2O				6.316	3.2
Total		43.896	17.3	61.302	21.0
Balance			100.8	98.13	102.9

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	35.773	15.70	439.24	20.76	4.50	126.13	5.098	142.79	10.965	26.662	27.57	16.063	19.55
H2	60.340	26.49	53.40	54.04	11.72	23.63	13.272	26.75	28.547	55.034	56.90	41.219	50.89
CO2	2.380	1.05	45.99	15.41	3.34	147.17	3.786	166.61	8.142	8.187	8.50	11.928	14.52
N2	0.360	0.16	4.43	0.75	0.16	4.57	0.184	5.17	0.396	0.554	0.57	0.580	0.71
CH4	1.147	0.50	8.07	4.85	1.05	16.87	1.191	19.10	2.560	3.063	3.17	3.751	4.57
C2H4				0.80	0.17	4.98	0.197	5.52	0.424	0.424	0.44	0.621	0.76
C2H6				0.40	0.09	2.62	0.098	2.97	0.212	0.212	0.22	0.310	0.38
C3H6				1.16	0.25	10.56	0.284	11.96	0.611	0.611	0.63	0.895	1.09
C3H8				0.52	0.11	4.98	0.128	5.64	0.274	0.274	0.28	0.402	0.49
C4H8				0.75	0.16	9.14	0.195	10.35	0.397	0.397	0.41	0.582	0.71
C4H10				0.16	0.04	2.03	0.040	2.30	0.084	0.084	0.09	0.124	0.15
C5H10				0.33	0.07	5.05	0.082	5.72	0.174	0.174	0.18	0.256	0.31
C6H12				0.07	0.02	1.26	0.017	1.43	0.036	0.036	0.37	0.053	0.06
OIL												0.394	0.48
WATER												4.397	5.35
TOTAL		43.90	551.73		21.69	358.89	24.560	406.31	52.830	96.718		82.715	
H2+CO		42.19					18.370		39.512				
H2/CO		1.69					2.60		2.60				

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-10.605	-10.61	32.47			-10.605				
H2	-13.215			-26.430						
CO2	2.741	2.74	17.46			5.482				
N2	0.026									
CH4	0.693	0.69	4.38	2.752						
C2H4	0.197	0.39	2.51	0.788						65.02
C2H6	0.098	0.20	1.25	0.588						
C3H6	0.284	0.85	5.43	1.704			11.96 10.76	4.32 6.25	2.77 1.72	67.95
C3H8	0.128	0.38	2.45	1.024			5.64	4.24	1.33	
C4H8	0.185	0.74	4.71	1.480			10.35 9.83	5.0 6.10	2.07 1.61	81.82
C4H10	0.040	0.16	1.02	0.400			2.30	4.35	0.47	
C5H10	0.082	0.41	2.61	0.820			5.72	5.45	1.05	
C6H12	0.017	0.10	0.65	0.204			1.43	5.5	0.26	
OIL		3.94	25.08	7.876			55.23	6.455	8.56	
WATER				8.794		5.123 4.397				
TOTAL	-19.334						85.27		13.67	
H2+CO	23.820									
H2/CO	1.25									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	8.14	19.52	1.221	20.647			
C3+	41.95	92.63	5.793	97.960	16.51	1.033	145.963
C4+	34.07	75.03	4.692	79.342	12.41	0.776	109.649
Ult. Oil		85.27	5.333	90.18	13.67	0.855	120.81
C02	17.46	120.62	7.543	127.552			
H20		92.30	5.772	97.605	12.255	0.766	108.236

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	358.89		406.31
Oil	43.92		43.92
Water	101.50		101.50
Total	504.41	91.41	551.73

	H_2+CO= 15990 SCFH #/hr	#/M	gal/hr	GPM
C_3-C_5	37.40	2.339	7.95	0.497
Rec Oil	43.92	2.747	6.80	0.425
WSC	11.17	0.699	1.34	0.084
	92.49	5.784	16.09	1.006
H_2O	90.33	5.649	10.83	0.677

EFFLUENT RATIOS	
H2/H20	9.51
C02/C0	0.74
(H2) (C02) / (H20) (C0)	7.04

CONTRACTION: 44.05

C0 Conversion: 67.53

H2 Conversion: 49.99

H_2+CO= 56.46

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 I From Hr. 0700 to Hr. 0700 Hrs. 180-204

FLOWS	SCFH	%
Oxygen	3626	
Nat. Gas	5610	
Total		
Fresh Feed	16521	
F. F. by C		
Avg. F. F.		
Wet Gas	8724	
Contraction		
Recycle	17637	
Bleed	1091	
Total	18728	
Total Feed	35249	
Recycle/F.F.	1.13	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	433
O_2 Preheat, °F	380
Gas Preheat, °F	679
Reactor Press.	424
Steam Back Press.	703
Temperatures, °F	
Heater Outlet	322
Catalyst #1	626
#2	626
#3	650
#4	660
#5	
Average	641
Product Separator	71

DISTILLATIONS	ASTM	
Prod.	Naph	
A.P.I.	56.1	
I.B.P.	112	
5%		
10%	152	
20	187	
30	202	
40	234	
50	254	
60	278	
70	301	
80	328	
90	360	
95	389	
E.P.	403	
Rec.	97.0	
Res.	1.5	
Loss.	1.5	

Hempel Dist.		
°F	%	A.P.I.
to 400	64.0	56.1
400-550	16.0	43.2
550+	20.0	

WATER	
Temp.	%
200	
203	
208	

X-Ray Diffraction on Catalyst

$Fe_{30}C_9$ 30%

Fe_3O_4 65%

Fe 5%

CATALYST DATA	
In Reactor at Start of Period	619
Fresh Catalyst Charged	
Catalyst Recharged	
Total	
Catalyst Taken Out	24
In Reactor at End of Period	595
Reactor d-P, H_2O	
Pounds in Reactor	607
Density, lbs./cu. ft.	124
Bed Height, Feet	7.42
Space Vel. SCFH/lb. cat.	
Inventory Figures	27.22
From d-P Meters	
V/hr/V	3374

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	13.5	80+	
100	419-150	57.7	80-40	
150	149-105	9.7	40-20	
200	104-74	2.8	20-10	
250	73-62	1.4	10-0	
325	61-44	1.0		
<325	43-0	3.3		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	135		% Fe	65.6
Settled	137		% C	9.7
Compacted	151		% Oil	2.4(ext)
Sp. Grav.	4.0		Specific Surface	
% K_2O 0.12				m^2/gm
% H_2 0.63			5.4	ml.NH_3/gm
K_2O/100 Fe 0.18			<$1m^2$/g	N_2 ads.

NATURAL GAS	%
CO_2	2.06
CH_4	84.47
C_2H_6	8.52
C_3H_8	3.59
C_4H_{10}	0.21
N_2	0.33
O_2	0.22
MW	19.055

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	36.3	38.4				
Sap. No.	39.3	41.2				
Hydrox. No.						
Bromine No.	83.3					
% Fe						
% Alc		11.5				
°API	49.9	10.7				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	SCFH m/hr	C	H	O
O_2		9.601			19.202
CO_2		0.305	0.31		0.610
CH_4		12.503	12.50	50.012	
C_2H_6		1.261	2.52	7.566	
C_3H_8		0.531	1.59	4.248	
C_4H_{10}		0.031	0.12	0.310	
N_2		0.138			
Total			17.05	62.136	19.812

OUT	Mol %	SCFH-m/hr	C	H	O
CO_2		0.915	0.92		1.8
CO		15.157	15.16		15.2
CH_4		0.936	0.94	3.744	
H_2		26.267		52.534	
N_2		0.317			
H_2O				5.754	2.9
Total		43.592	17.01	62.032	19.9
Balance			99.8	99.8	100.3

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	Measured m/hr	Measured #/hr	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	34.770	15.16	424.55	21.96	5.06	141.59	5.732	160.55	10.851	26.008	27.96	16.583	20.69
H2	60.256	26.27	52.95	54.77	12.61	25.42	14.295	28.82	27.063	53.330	57.33	41.358	51.60
CO2	2.100	0.92	40.27	13.41	3.09	135.86	3.500	154.06	6.626	7.541	8.11	10.126	12.63
N2	0.727	0.32	8.88	1.24	0.29	7.98	0.323	9.05	0.611	0.928	1.00	0.934	1.17
CH4	2.147	0.94	15.02	5.69	1.31	21.00	1.484	23.81	2.810	3.746	4.03	4.294	5.36
C2H4				0.69	0.16	4.46	0.180	5.06	0.340	0.340	0.37	0.520	0.65
C2H6				0.34	0.08	2.38	0.090	2.70	0.169	0.169	0.18	0.259	0.32
C3H6				0.81	0.19	7.87	0.212	8.92	0.401	0.401	0.43	0.613	0.77
C3H8				0.14	0.03	1.46	0.037	1.66	0.070	0.070	0.08	0.107	0.13
C4H8				0.49	0.11	6.34	0.128	7.19	0.242	0.242	0.26	0.370	0.46
C4H10				0.16	0.04	2.09	0.041	2.37	0.077	0.077	0.08	0.118	0.15
C5H10				0.23	0.05	3.79	0.061	4.30	0.115	0.115	0.12	0.176	0.22
C6H12				0.07	0.02	1.35	0.018	1.53	0.034	0.034	0.04	0.052	0.07
OIL												0.392	0.49
WATER												4.255	5.31
TOTAL		43.59	541.67		23.02	361.59	26.102	410.02	49.415	93.001		80.157	
H2+CO		41.42					20.027		37.314				
H2/CO		1.73					2.49		2.49				

NET CHANGE ON REACTION	m/hr	a/hr	%	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	#/gal	gal/hr	Unsats. %
CO	-9.425	-9.425	37.81			-9.425				
H2	-11.972			-23.944						
CO2	2.585	2.585	17.05			5.170				
N2	0.006									
CH4	0.548	0.548	3.62	2.192						
C2H4	0.180	0.360	2.38	0.720						65.20
C2H6	0.090	0.180	1.19	0.540						
C3H6	0.212	0.636	4.20	1.272			8.92 8.03	4.32 6.25	2.06 1.28	84.31
C3H8	0.037	0.111	0.73	0.296			1.66	4.24	0.39	
C4H8	0.128	0.512	3.38	1.024			7.19 6.83	5.00 6.10	1.44 1.12	75.20
C4H10	0.041	0.164	1.09	0.410			2.37	4.36	0.49	
C5H10	0.061	0.305	2.01	0.610			4.30	5.45	0.79	
C6H12	0.018	0.108	0.71	0.220			1.53	5.5	0.28	
OIL		-3.916	25.34	7.832			54.32	6.50	8.43	
WATER				8.332		4.416 -4.255				
TOTAL	-17.491						77.38		12.39	
H2+CO	-21.397									
H2/CO	1.27									

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	3.452	16.55	1.054	17.823			
C3+	37.947	80.79	5.146	87.018			
C4+	18.924	70.21	4.472	75.621			
Ult. Oil		77.88	4.961	83.890	8.43	0.5369	75.863
CO2	17.054	113.79	7.248	122.563			
H20		158.98	10.126	171.23			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	361.59		410.02
Oil	40.64		40.64
Water	91.01		91.01
Total	493.24	91.06	541.67

H_2+CO= 15700 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	25.97	1.654	5.45	0.347
Rec Oil	40.64	2.589	6.26	0.399
WSC	10.47	0.667	1.26	0.080
	77.08	4.910	12.97	0.826
H_2O	80.54	5.130	9.66	0.615

EFFLUENT RATIOS	
H2/H20	9.719
C02/C0	0.610
(H2) (C02) / (H20) (C0)	5.928

CONTRACTION:	40.12
C0 Conversion:	62.18
H2 Conversion:	45.57
H_2+C0=	51.65

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at 0 C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 J From Hr. 1000 to Hr. 0700 Hrs. 204-225

FLOWS	SCFH	%
Oxygen	3624	
Nat. Gas	5733	
Total		
Fresh Feed	16861	
F. F. by C		
Avg. F. F.		
Wet Gas	7488	
Contraction		
Recycle	16835	
Bleed	1011	
Total	17847	
Total Feed	34708	
Recycle/F.F.	1.06	
Inlet Vel.	1.04	
Steam Flow		

RUN CONDITIONS	
Generator Press.	431
O_2 Preheat, °F	317
Gas Preheat, °F	736
Reactor Press.	422
Steam Back Press.	710
Temperatures, °F	
Heater Outlet	198
Catalyst #1	632
#2	632
#3	669
#4	664
#5	
Average	649
Product Separator	70

DISTILLATIONS									
	A S T M					Hempel Dist.			
Prod.	Naph					°F	%	A.P.I.	
A.P.I.	56.5					to 400	56.3	56.5	
I.B.P.	108					400-550	15.6	42.9	
5%						550+	18.1		
10%	150								
20	180								
30	207					WATER			
40	228					Temp.	%		
50	251					200			
60	272					203			
70	293					208			
80	323								
90	359								
95	388								
E.P.	403								
Rec.	97.0								
Res.	1.5								
Loss.	1.5								

CATALYST DATA	
In Reactor at Start of Period	595
Fresh Catalyst Charged	257
Catalyst Recharged	
Total	
Catalyst Taken Out	99
In Reactor at End of Period	753
Reactor d-P, H_2O	
Pounds in Reactor	937
Density, lbs./cu. ft.	134
Bed Height, Feet	10.60
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	17.19
V/hr/V	2410

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	14.9	80+	
100	419-150	63.7	80-40	
150	149-105	10.9	40-20	
200	104-74	6.7	20-10	
250	73-62	1.4	10-0	
325	-44	1.0		
<325	43-0	1.4		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	128		% Fe	
Settled	130		% C	
Compacted	147		% Oil	
Sp. Grav.	4.2		Specific Surface	
				m^2/gm
			6.1	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	2.06
CH_4	84.47
C_2H_6	8.52
C_3H_8	3.59
C_4H_{10}	0.21
N_2	0.93
O_2	0.22
MW	19.055

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	39.2	38.6				
Sap. No.	44.4	40.8				
Hydrox. No.						
Bromine No.	86.6					
% Fe						
% Alc		10.0				
°API	50.9	10.4				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		9.594			19.188
CO_2		0.312	0.31		0.624
CH_4		12.776	12.78	51.104	
C_2H_6		1.289	2.58	7.734	
C_3H_8		0.543	1.63	4.344	
C_4H_{10}		0.032	0.13	0.320	
N_2		0.141			
Total			17.42	63.502	19.812

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		0.887	0.9		1.8
CO		16.049	16.1		16.1
CH_4		1.084	1.1	4.336	
H_2		26.229		52.458	
N_2		0.240			
H_2O				5.344	2.7
Total		44.489	18.0	62.138	20.5
Balance			103.4	97.8	103.4

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	36.073	16.05	449.53	17.76	3.51	98.29	3.903	109.34	8.363	24.411	26.65	12.[illegible]5	16.13
H2	58.957	26.23	52.88	50.49	9.98	20.11	11.097	22.37	23.774	50.003	54.59	34.871	45.87
CO2	1.993	0.89	39.04	17.13	3.38	148.93	3.764	165.67	8.064	8.950	9.77	11.827	15.56
N2	0.540	0.24	6.72	1.78	0.35	9.86	0.392	10.97	0.838	1.078	1.18	1.230	1.62
CH4	2.437	1.08	17.39	8.15	1.61	25.83	1.791	28.73	3.838	4.921	5.37	5.628	7.40
C2H4				1.13	0.22	6.23	0.247	6.93	0.530	0.530	0.58	0.777	1.02
C2H6				0.42	0.08	2.50	0.092	2.78	0.198	0.198	0.22	0.308	0.41
C3H6				1.32	0.26	10.98	0.290	12.21	0.622	0.622	0.68	0.912	1.20
C3H8				0.27	0.05	2.29	0.058	2.55	0.125	0.125	0.14	0.183	0.24
C4H8				0.88	0.17	9.71	0.192	10.80	0.412	0.412	0.45	0.604	0.80
C4H10				0.24	0.05	2.67	0.051	2.97	0.111	0.111	0.12	0.162	0.21
C5H10				0.34 0.05	0.07 0.01	4.70 0.72	0.075 0.011	5.23 0.80	0.160 0.024	0.160 0.024	0.18 0.26	0.235 0.035	0.31 0.05
C6H12				0.09	0.02	1.51	0.020	1.68	0.042	0.042	0.05	0.062	0.08
OIL												0.532	0.70
WATER												6.392	8.41
TOTAL		44.49	565.56		19.76	344.33	21.980	383.03	47.088	91.585		76.021	
H2+CO		42.28			13.49		15.000		32.137				
H2/CO		1.63			2.84		2.84		2.84	2.048		2.84	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-12.15	-12.15	24.319			-12.146				
H2	-15.13			-30.264						
CO2	2.88	2.88	17.926			5.754				
N2	0.15									
CH4	0.71	0.71	4.405	2.828						
C2H4	0.25	0.49	3.08	0.988						71.37
C2H6	0.09	0.18	1.15	0.552						
C3H6	0.29	0.87	5.42	1.740			12.2 11.0	4.32 6.25	2.93 1.76	82.72
C3H8	0.06	0.17	1.08	0.464			2.6	4.24	0.60	
C4H8	0.19	0.77	4.79	1.536			10.8 10.3	5.00 6.1	2.16 1.68	78.43
C4H10	0.05	0.20	1.27	0.51			3.0	4.86	0.61	
C5H10	0.08 0.01	0.38 0.06	2.34 0.34	0.75 0.11			6.0	5.45	1.11	
C6H12	0.02	0.12	0.75	0.24			1.7	5.50	0.31	
OIL		- 5.32	33.135	10.636			74.5	6.459	11.54	
WATER				9.91		4.955 6.392				
TOTAL	-22.51						106.4		17.01	
H2+CO	-27.28									
H2/CO	1.25									

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	8.629	21.05	1.31	22.152			
C3+	49.120	110.75	6.912	116.873			
C4+	42.616	95.99	5.990	101.295			
Ult. Oil		106.44	6.643	112.324	17.01	1.061	149.919
C02	17.926	126.63	7.903	133.639			
H20		115.16	7.187	121.530			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	344.33		383.03
Oil	57.05		57.05
Water	125.48		125.48
Total	526.86	93.16	565.56

EFFLUENT RATIOS	
H2/H20	5.455
C02/C0	0.964
(H2) (C02) / (H20) (C0)	5.260

CONTRACTION:	50.59
C0 Conversion:	75.68
H2 Conversion:	57.69
H_2+C0=	64.52

H_2+C0= 16023 SCFH

	#/hr	#/M	Gal/hr	GPM
C_3-C_5	36.24	2.262	7.62	0.476
Rec Oil	57.05	3.560	8.83	0.551
WSC	12.55	0.783	1.50	0.094
	105.84	6.605	17.95	1.120
H_2O	112.93	7.048	13.54	0.845

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 K From Hr. 0700 to Hr. 0700 Hrs. 225-249

FLOWS	SCFH	%
Oxygen	3651	
Nat. Gas	5724	
Total		
Fresh Feed	16721	
F. F. by C		
Avg. F. F.		
Wet Gas	7049	
Contraction		
Recycle	15752	
Bleed	1036	
Total	16778	
Total Feed	33499	
Recycle/F.F.	1.00	
Inlet Vel.	1.01	
Steam Flow		

RUN CONDITIONS	
Generator Press.	430
O_2 Preheat, °F	332
Gas Preheat, °F	707
Reactor Press.	423
Steam Back Press.	720
Temperatures, °F	
Heater Outlet	206
Catalyst #1	632
#2	632
#3	658
#4	646
#5	
Average	642
Product Separator	70

DISTILLATIONS	ASTM				Hempel Dist.		
Prod.	Naph				°F	%	A.P.I.
A.P.I.	56.4				to 400	70.6	56.4
I.B.P.	104				400-550	15.6	39.9
5%					550+	13.8	
10%	142						
20	174						
30	200				WATER		
40	222				Temp.	%	
50	244				200		
60	266				203		
70	294				208		
80	326						
90	356						
95	383						
E.P.	403						
Rec.	97.5						
Res.	1.5						
Loss.	1.0						

CATALYST DATA	
In Reactor at Start of Period	753
Fresh Catalyst Charged	51
Catalyst Recharged	
Total	
Catalyst Taken Out	42
In Reactor at End of Period	762
Reactor d-P, H_2O	
Pounds in Reactor	944
Density, lbs./cu. ft.	133
Bed Height, Feet	10.75
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	17.71
V/hr/V	2357

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	17.2	80+	
100	419-150	53.4	80-40	
150	149-105	10.2	40-20	
200	104-74	6.4	20-10	
250	73-62	0.3	10-0	
325	61-44	0.8		
<325	43-0	1.2		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	143		% Fe	
Settled	145		% C	6.65
Compacted	156		% Oil	
Sp. Grav.	4.3		Specific Surface	
				m^2/gm
			6.4	ml. NH_3/gm
% H_2 0.37				

NATURAL GAS	%
CO_2	1.98
CH_4	84.80
C_2H_6	8.60
C_3H_8	3.48
C_4H_{10}	0.20
N_2	0.69
O_2	0.17
MW	18.972

PRODUCT INSPECTION		Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.		40.5	39.0			
Sap. No.		49.3	46.3			
Hydrox. No.						
Bromine No.		89.5				
% Fe						
% Alc			11.0			
°API		50.3	10.6			

GENERATOR ELEMENTAL BALANCE — IN	Mol %	m/hr	C	H	O
O_2		9.658			19.316
CO_2		0.299	0.30		0.599
CH_4		12.819	12.82	51.276	
C_2H_6		1.299	2.60	7.794	
C_3H_8		0.525	1.58	4.200	
C_4H_{10}		0.030	0.12	0.300	
N_2		0.104			
Total			17.41	63.570	19.914

OUT	Mol %	m/hr	C	H	O
CO_2		1.088	1.1		2.2
CO		15.046	15.8		15.8
CH_4		0.993	1.0	3.972	
H_2		26.069		52.136	
N_2		0.124			
H_2O				5.624	28.2
Total		44.118	17.9	61.732	20.8
Balance			103.0	97.1	104.6

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	35.917	15.846	443.85	18.66	3.47	97.22	3.930	110.07	8.261	24.107	27.27	12.191	16.87
H2	59.086	26.068	52.55	47.56	8.85	17.84	10.020	20.20	21.064	47.132	53.32	31.084	43.01
CO2	2.467	1.088	47.88	19.03	3.54	155.80	4.008	176.35	8.425	9.513	10.76	12.433	17.20
N2	0.280	0.124	3.47	1.09	0.20	5.63	0.228	6.37	0.479	0.603	0.68	0.707	0.98
CH4	2.250	0.993	15.93	8.52	1.59	25.43	1.794	28.79	3.773	4.766	5.39	5.567	7.70
C2H4				1.42	0.26	7.40	0.412	8.38	0.627	0.627	0.71	1.039	1.44
C2H6				0.52	0.10	2.89	0.109	3.27	0.228	0.228	0.26	0.637	0.88
C3H6				1.41	0.26	11.07	0.298	12.53	0.625	0.625	0.71	0.923	1.28
C3H8				0.10	0.02	0.84	0.021	0.95	0.044	0.044	0.05	0.065	0.09
C4H8				0.89	0.17	9.26	0.137	10.49	0.392	0.322	0.44	0.579	0.80
C4H10				0.25	0.05	2.73	0.053	3.09	0.110	0.110	0.12	0.163	0.23
C5H10				0.39 0.06	0.07 0.01	4.98 0.37	0.090 0.014	5.64 0.99	0.168 0.027	0.168 0.027	0.19 0.03	0.248 0.041	0.34 0.06
C6H12				0.09	0.02	1.43	0.019	1.62	0.041	0.041	0.05	0.060	0.08
OIL												0.470	0.65
WATER												6.068	9.40
TOTAL		44.110	563.68		18.60	343.39	21.058	452.94	44.269	88.397		72.275	
H2+CO		41.914			12.32		13.950		29.325				
H2/CO		1.64			2.55		2.55		2.55	1.955		2.55	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.916	-11.916	24.80			-11.916				
H2	-16.048			-32.096						
CO2	2.920	2.920	18.425			5.840				
N2	0.104									
CH4	0.801	0.901	5.05	3.204						
C2H4	0.412	0.824	5.20	1.648						71.93
C2H6	0.109	0.218	1.38	0.654						
C3H6	0.298	0.894	5.64	1.788			12.53 11.28	4.32 6.25	2.90 1.80	92.95
C3H8	0.021	0.063	0.40	0.168			0.95	4.24	0.22	
C4H8	0.187	0.748	4.72	1.496			10.46 9.96	5.00 6.1	2.10 1.63	77.23
C4H10	0.053	0.212	1.34	0.530			3.09	4.36	0.64	
C5H10	0.080 0.014	0.400 0.070	2.52 0.44	0.800 0.140			6.62	5.45	1.21	
C6H12	0.019	0.114	0.72	0.228			1.62	5.50	0.29	
OIL		4.652	29.36	9.304			65.17	6.48	10.06	
WATER				12.136		6.068 - 6.076				
TOTAL	-22.946						97.74		15.63	
H2+CO	27.964									
H2/CO	1.35									

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	11.628	24.51	1.543	26.092			
C3+	45.135	35.29	2.222	37.574			
C4+	39.097	21.81	1.373	23.217			
Ult. Oil		96.29	6.061	102.491	15.627	0.0837	139.00
C02	13.425	128.51	8.090	136.802			
H20		109.47	6.891	116.526			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	343.39		388.77
Oil	54.21		54.21
Water	120.70		120.70
Total	518.30	91.95	563.68

H_2+CO= 15885 SCFH

	#/hr	#/M	Gal/hr	GPM
C_3-C_5	35.29	2.222	7.36	0.463
Rec Oil	154.21	3.413	8.37	0.527
WSC	13.28	0.336	1.59	0.100
	102.78	6.470	17.32	1.090
H_2O	107.42	6.762	12.88	0.811

EFFLUENT RATIOS	
H2/H20	5.115
C02/C0	1.019
(H2) (C02) / (H20) (C0)	5.212

CONTRACTION:	52.27
C0 Conversion:	75.20
H2 Conversion:	61.56
H_2+CO=	66.72

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 L From Hr. 0700 to Hr. 0700 Hrs. 249-273

FLOWS	SCFH	%
Oxygen	3730	
Nat. Gas	5692	
Total		
Fresh Feed	16969	
F. F. by C		
Avg. F. F.		
Wet Gas	7040	
Contraction		
Recycle	16710	
Bleed	1020	
Total	17730	
Total Feed	34699	
Recycle/F.F.	1.04	
Inlet Vel.	1.04	
Steam Flow		

RUN CONDITIONS	
Generator Press.	431
O_2 Preheat, °F	388
Gas Preheat, °F	665
Reactor Press.	422
Steam Back Press.	721
Temperatures, °F	
Heater Outlet	200
Catalyst #1	634
#2	633
#3	663
#4	654
#5	
Average	646
Product Separator	74

DISTILLATIONS								
	A S T M					Hempel Dist.		
Prod.	Naph					°F	%	A.P.I.
A.P.I.	56.4					to 400	70.3	56.4
I.B.P.	102					400-550	20.0	40.6
5%						550+	9.7	
10%	142							
20	170							
30	196					WATER		
40	220					Temp.	%	
50	242					200		
60	262					203		
70	290					208		
80	320							
90	351							
95	382							
E.P.	400							
Rec.	97.5							
Res.	1.5							
Loss.	1.0							

CATALYST DATA	
In Reactor at Start of Period	762
Fresh Catalyst Charged	50
Catalyst Recharged	
Total	
Catalyst Taken Out	36
In Reactor at End of Period	776
Reactor d-P, H_2O	
Pounds in Reactor	929
Density, lbs./cu. ft.	132
Bed Height, Feet	10.66
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	18.27
V/hr/V	2412

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M.	%
On 40	420+	18.8	80+	
100	419-150	63.2	80-40	
150	149-105	9.3	40-20	
200	104-74	6.1	20-10	
250	73-62	0.8	10-0	
325	61-44	0.8		
<325	43-0	0.9		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	148		% Fe	
Settled	150		% C	
Compacted	163		% Oil	
Sp. Grav.	4.3		Specific Surface	
				m^2/gm
			5.7	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.90
CH_4	85.29
C_2H_6	8.69
C_3H_8	3.37
C_4H_{10}	0.19
N_2	0.45
O_2	0.12
MW	18.899

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	50.4	43.4				
Sap. No.	43.4	41.7				
Hydrox. No.						
Bromine No.	94.5					
% Fe						
% Alc		10.0				
°API	49.7	10.6				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		9.861			19.722
CO_2		0.285	0.29		0.570
CH_4		12.810	12.81	51.240	
C_2H_6		1.304	2.61	7.824	
C_3H_8		0.506	1.52	4.048	
C_4H_{10}		0.029	0.12	0.290	
N_2		0.068			
Total			17.34	63.402	20.292

OUT	Mol %	m/hr	C	H	O
CO_2		0.975	1.0		2.0
CO		16.045	16.5		16.1
CH_4		0.885	0.9	3.540	
H_2		26.790		53.580	
N_2		0.077			
H_2O				5.388	2.7
Total		44.773	17.9	62.508	20.7
Balance			103.3	98.6	102.0

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	35.837	16.05	449.42	18.55	3.45	96.49	3.96	110.99	8.676	24.721	27.00	12.639	16.79
H2	59.836	26.79	54.01	49.95	9.28	18.70	10.67	21.51	23.365	50.155	54.78	34.037	45.21
CO2	2.177	0.98	42.91	18.45	3.43	150.87	3.94	173.54	8.632	9.607	10.49	12.575	16.71
N2	0.173	0.08	2.16	0.25	0.05	1.32	0.05	1.52	0.118	0.195	0.21	0.172	0.23
CH4	1.977	0.89	14.20	7.59	1.41	22.62	1.62	26.02	3.550	4.435	4.84	5.172	6.87
C2H4				1.15	0.21	5.98	0.25	6.88	0.536	0.536	0.59	0.781	1.04
C2H6				0.44	0.08	2.47	0.09	2.84	0.207	0.207	0.23	0.301	0.40
C3H6				1.47	0.27	11.49	0.31	13.22	0.686	0.686	0.75	1.000	1.33
C3H8				0.50	0.09	4.06	0.11	4.67	0.232	0.232	0.25	0.338	0.45
C4H8				0.94	0.17	9.76	0.20	11.23	0.438	0.438	0.48	1.138	1.51
C4H10				0.23	0.04	2.50	0.05	2.88	0.109	0.109	0.12	0.159	0.21
C5H10				0.40	0.07	5.19	0.09	5.97	0.187	0.187	0.20	0.272	0.36
C6H12				0.09	0.02	1.35	0.02	1.55	0.041	0.041	0.04	0.059	0.08
OIL												0.491	0.65
WATER												6.146	8.16
TOTAL		44.77	562.30		18.58	332.80	21.37	382.81	46.782	91.548		75.279	
H2+CO		42.84			12.72		14.64		32.041				
H2/CO		1.67			2.69		2.69		2.69	2.03		2.69	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-12.082	-12.082	24.699			-12.082				
H2	-16.118			-32.236						
CO2	2.068	2.068	18.497			5.236				
N2	-0.023									
CH4	0.737	0.737	4.593	2.948						
C2H4	0.245	0.490	3.053	0.980						70.73
C2H6	0.094	0.188	1.171	0.564						
C3H6	0.314	0.942	5.870	1.884			13.2 11.9	4.32 6.25	3.06 1.90	76.52
C3H8	0.106	0.318	1.981	0.948			4.7	4.24	1.10	
C4H8	0.200	0.800	4.985	1.600			11.2 10.7	5.00 6.10	2.25 1.75	79.58
C4H10	0.050	0.200	1.246	0.50			2.9	4.86	0.59	
C5H10	0.085	0.425	2.649	0.85			6.0	5.45	1.10	
C6H12	0.018	0.108	0.673	0.22			1.6	5.5	0.28	
OIL		4.906	30.576	9.91			69.7	6.5	10.57	
WATER				12.03		6.017 6.146				
TOTAL	-23.406						101.7		16.19	
H2+CO	28.200									
H2/CO	1.334									

ULTIMATE YIELDS

	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	8.817	21.54	1.327	22.439			
C3+	47.979	108.25	6.668	112.755			
C4+	40.122	90.36	5.566	94.121			
Ult. Oil		101.70	6.264	105.924	16.193	1.00	141.3
CO2	18.497	130.63	8.046	136.057			
H20		108.40	6.820	115.326	13.072	0.804	113.61

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	332.80		382.81
Oil	53.37		53.37
Water	126.52		126.52
Total	512.69	91.11	562.70

H_2+CO= 16235 SCFH

	#/hr	#/M	Gal/hr	GPM
C_3-C_5	39.52	2.434	8.38	0.516
Rec 01153.37	3.287	8.21	0.506	
WSC	12.65	0.779	1.52	0.094
	105.54	6.500	18.11	1.116
H_2O	113.87	7.014	13.65	0.841

EFFLUENT RATIOS	
H2/H20	5.538
C02/C0	0.99
(H2) (C02) / (H20) (C0)	5.493

CONTRACTION:	52.29
C0 Conversion:	75.30
H2 Conversion:	60.16
H_2+CO=	65.83

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 M From Hr. 0700 to Hr. 0700 Hrs. 273-293

FLOWS	SCFH	%
Oxygen	3964	
Nat. Gas	5628	
Total		
Fresh Feed	17077	
F. F. by C		
Avg. F. F.		
Wet Gas	7000	
Contraction		
Recycle	16693	
Bleed	1020	
Total	17713	
Total Feed	34790	
Recycle/F.F.	1.04	
Inlet Vel.	1.05	
Steam Flow		

RUN CONDITIONS	
Generator Press.	430
O_2 Preheat, °F	409
Gas Preheat, °F	696
Reactor Press.	420
Steam Back Press.	700
Temperatures, °F	
Heater Outlet	204
Catalyst #1	636
#2	635
#3	663
#4	553
#5	
Average	647
Product Separator	71

DISTILLATIONS	ASTM	Hempel Dist. °F	%	A.P.I.
Prod.	Naph			
A.P.I.	56.4	to 400	70.6	56.4
I.B.P.	102	400-550	18.0	38.8
5%		550+	11.4	
10%	141			
20	168			
30	196	WATER		
40	218	Temp.	%	
50	240	200		
60	262	203		
70	290	208		
80	314			
90	350			
95	382			
E.P.	403			
Rec.	98			
Res.	1.5			
Loss.	0.5			

CATALYST DATA	
In Reactor at Start of Period	776
Fresh Catalyst Charged	52
Catalyst Recharged	
Total	
Catalyst Taken Out	75
In Reactor at End of Period	753
Reactor d-P, H_2O	
Pounds in Reactor	944
Density, lbs./cu. ft.	132
Bed Height, Feet	10.83
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	18.09
V/hr/V	2390

CATALYST ANALYSIS

Particle Size

Screen Frac.	M	%	Sedimentation M	%
On 40	420+	15.5	80+	
100	419-150	63.7	80-40	
150	149-105	10.5	40-20	
200	104-74	7.7	20-10	
250	73-62	0.6	10-0	
325	61-44	0.2		
<325	43-0	1.9		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	148	% Fe	
Settled	151	% C	7.87
Compacted	162	% Oil	
Sp. Grav.	4.5	Specific Surface	
			m^2/gm
% H_2 0.32		8.4	$ml.NH_3/gm$

NATURAL GAS	%
CO_2	2.02
CH_4	83.86
C_2H_6	9.27
C_3H_8	3.80
C_4H_{10}	0.21
N_2	0.78
O_2	0.09
MW	19.1693

PRODUCT INSPECTION			Oil	Water	Product	Pour °F	SUS @ °F
		Neut. No.	44.9	42.5			
		Sap. No.	49.3	42.9			
		Hydrox. No.					
		Bromine No.	83.7				
		% Fe					
		% Alc		10.0			
		°API	49.7	10.6			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		10.473			20.946
CO_2		0.300	0.30		0.600
CH_4		12.448	12.45	49.792	
C_2H_6		1.376	2.75	8.256	
C_3H_8		0.564	1.69	4.512	
C_4H_{10}		0.031	0.12	0.310	
N_2		0.116			
Total			17.32	62.870	21.546

OUT	Mol %	m/hr	C	H	O
CO_2		1.107	1.1		2.21
CO		16.053	16.1		16.05
CH_4		0.841	0.8	3.36	
H_2		26.955		53.91	
N_2		0.102			
H_2O				6.08	3.03
Total		45.058	18.0	63.35	21.31
Balance			103.9	100.8	98.9

	FRESH FEED %	m/hr	#/hr	WET GAS %	Measured m/hr	Measured #/hr	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	%	EFFLUENT m/hr	%
CO	35.63	16.053	449.64	17.25	3.19	89.3	3.697	103.57	8.063	24.116	26.27	11.760	15.71
H2	59.82	26.955	54.34	51.09	9.44	19.0	10.949	22.08	23.877	50.832	55.38	34.826	46.53
CO2	2.46	1.107	48.72	19.66	3.63	159.8	4.213	185.39	9.186	10.223	11.21	13.399	17.90
N2	0.23	0.102	2.86	1.11	0.21	5.8	0.239	6.69	0.520	0.622	0.68	0.759	1.01
CH4	1.87	0.841	13.49	5.65	1.04	16.7	1.210	19.41	2.639	3.480	3.79	3.849	5.14
C2H4				1.22	0.23	6.3	0.261	7.32	0.570	0.570	0.62	0.931	1.11
C2H6				0.51	0.09	2.8	0.109	3.28	0.237	0.237	0.26	0.346	0.46
C3H6				1.47	0.27	11.5	0.316	13.28	0.687	0.687	0.75	1.003	1.34
C3H8				0.48	0.09	3.9	0.103	4.55	0.224	0.224	0.24	0.327	0.44
C4H8				0.91	0.17	9.5	0.196	11.00	0.427	0.427	0.47	0.623	0.83
C4H10				0.18	0.03	1.9	0.038	2.23	0.084	0.084	0.09	0.122	0.16
C5H10				0.38 0.02	0.07 0.00	4.9 0.3	0.081 0.005	5.70 0.34	0.176 0.009	0.176 0.009	0.19 0.01	0.257 0.014	0.34 0.02
C6H12				0.07	0.01	1.1	0.015	1.26	0.032	0.032	0.03	0.047	0.06
OIL												0.543	0.73
WATER												6.144	8.21
TOTAL		45.058	569.05		18.47	332.8	21.430	386.10	46.734	91.789		74.850	
H2+CO		43.008			12.63		14.646		31.940				
H2/CO		1.68			2.96		2.96		2.96	2.107		2.96	

NET CHANGE ON REACTION

	Carbon m/hr	a/hr	%	Hydrogen a/hr	%	Oxygen a/hr	Ultimate Oil #/hr	#/gal	gal/hr	Unsats. %
CO	-12.356	-12.356	23.03			-12.356				
H2	-16.006			-32.01						
CO2	3.106	3.106	19.35			6.212				
N2	0.137									
CH4	0.369	0.369	2.30	1.49						
C2H4	0.261	0.522	3.25	1.04						69.05
C2H6	0.109	0.218	1.36	1.31						
C3H6	0.316	0.948	5.91	1.90			13.3 12.0	4.32 5.25	3.07 1.91	74.48
C3H8	0.103	0.309	1.92	0.82			4.6	4.24	1.07	
C4H8	0.196	0.784	4.88	1.57			11.0 10.5	5.00 6.10	2.20 1.71	33.14
C4H10	0.038	0.152	0.95	0.38			2.2	4.86	0.46	
C5H10	0.081 0.005	0.405 0.025	2.52 0.16	0.81 0.05			6.0	5.45	1.11	
C6H12	0.015	0.090	0.56	0.18			1.3	5.50	0.23	
OIL		5.428	33.81	10.86			76.1	6.50	11.70	
WATER				11.62		5.810 - 6.144				
TOTAL	-23.626						108.0		17.12	
H2+CO	-28.362									
H2/CO	1.30									

ULTIMATE YIELDS

	% C0 Fed	#/hr	H2 / C0 #/MCF	H2 / C0 g/M3	Gal/hr	H2 / C0 Gal/MCF	H2 / C0 cc/M3
C1+C2	6.906	16.52	1.01	17.079			
C3+	50.707	114.41	7.019	118.691			
C4+	42.878	96.58	5.924	100.174			
Ult. Oil		107.98	6.624	112.011	17.117	1.050	148.37
C02	19.348	136.67	8.38	141.705			
H20		110.69	6.790	114.818			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	332.80		386.10
Oil	57.77		57.77
Water	125.18		125.18
Total	515.75	90.63	569.05

H_2+CO= 16300 SCFH

	#/hr	#/M	gal/hr	GPM
C_3-C_5	38.36	2.353	8.14	0.499
Rec 01	157.77	3.544	8.85	0.543
WSC	12.52	0.768	1.50	0.092
	108.65	6.665	18.49	1.134
H_2O	112.66	6.912	13.51	0.829

EFFLUENT RATIOS	
H2/H20	5.668
C02/C0	1.139
(H2) (C02) / (H20) (C0)	6.457

CONTRACTION:	52.44
C0 Conversion:	76.97
H2 Conversion:	59.38
H_2+CO=	65.95

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 N From Hr. 0700 to Hr. 0700 Hrs. 297-321

FLOWS	SCFH	%
Oxygen	3535	
Nat. Gas	5742	
Total		
Fresh Feed	16936	
F. F. by C		
Avg. F. F.		
Wet Gas	7472	
Contraction		
Recycle	16718	
Bleed	1026	
Total	17744	
Total Feed	34680	
Recycle/F.F.	1.05	
Inlet Vel.	1.04	
Steam Flow		

RUN CONDITIONS	
Generator Press.	433
O_2 Preheat, °F	419
Gas Preheat, °F	685
Reactor Press.	423
Steam Back Press.	720
Temperatures, °F	
Heater Outlet	246
Catalyst #1	632
#2	632
#3	678
#4	655
#5	
Average	649
Product Separator	67

DISTILLATIONS	ASTM				Hempel Dist.		
Prod.	Naph				°F	%	A.P.I.
A.P.I.	55.5				to 400	70.0	55.5
I.B.P.	106.0				400-550	15.3	39.5
5%					550+	14.7	
10%	148						
20	177						
30	203				WATER		
40	224				Temp.	%	
50	247				200		
60	268				203		
70	294				208		
80	320				X-Ray Diffraction		
90	352				on Catalyst		
95	378				$Fe_{20}C_9$	30%	
E.P.	400				Fe_3O_4	60%	
Rec.	98				Fe	10%	
Res.	1.5						
Loss.	0.5						

CATALYST DATA	
In Reactor at Start of Period	753
Fresh Catalyst Charged	50
Catalyst Recharged	
Total	
Catalyst Taken Out	71
In Reactor at End of Period	732
Reactor d-P, H_2O	
Pounds in Reactor	936
Density, lbs./cu. ft.	132
Bed Height, Feet	10.74
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	18.09
V/hr/V	2390

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M.	%
On 40	420+	12.8	80+	
100	419-150	64.6	80-40	
150	149-105	12.4	40-20	
200	104-74	7.4	20-10	
250	73-62	1.0	10-0	
325	61-44	0.4		
<325	43-0	1.4		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	149		% Fe	68.9
Settled	151		% C	6.45
Compacted	161		% Oil	1.9(ext)
Sp. Grav.	4.3		Specific Surface	
				m^2/gm
% K_2O	0.20			
% H_2	0.22		9.4	$ml.NH_3/gm$
K_2O/100 Fe	0.29		$<1m^2/g$	N_2 ads.

NATURAL GAS	%
CO_2	1.82
CH_4	84.75
C_2H_6	8.56
C_3H_8	3.48
C_4H_{10}	0.20
N_2	0.99
O_2	0.20
MW	18.9625

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.	43.6	42.9				
Sap. No.	43.8	43.4				
Hydrox. No.						
Bromine No.						
% Fe						
% Alc		10.0				
°API	49.3	10.7				

GENERATOR ELEMENTAL BALANCE

IN	Mol %	m/hr	C	H	O
O_2		9.357			18.714
CO_2		0.276	0.28		0.552
CH_4		12.840	12.84	51.360	
C_2H_6		1.297	2.59	7.782	
C_3H_8		0.527	1.58	4.216	
C_4H_{10}		0.030	0.12	0.300	
N_2		0.150			
Total			17.41	63.658	19.266

OUT	Mol %	m/hr	C	H	O
CO_2		0.933	0.9		1.9
CO		15.541	15.5		15.5
CH_4		1.786	1.8	7.144	
H_2		26.290		52.580	
N_2		0.135			
H_2O				3.826	1.9
Total		44.685	18.3	63.550	19.3
Balance			104.9	99.83	100.3

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	34.798	15.541	435.30	16.13	3.18	89.1	3.560	99.72	7.551	23.092	25.24	11.111	14.71
H2	50.833	26.290	53.00	49.67	9.79	19.7	10.964	22.10	23.254	49.544	54.15	34.218	45.31
CO2	2.087	0.933	41.06	17.44	3.44	151.3	3.849	169.40	8.163	9.096	9.94	12.012	15.90
N2	0.303	0.135	3.78	0.51	0.10	2.3	0.113	3.17	0.240	0.375	0.41	0.353	0.47
CH4	3.997	1.786	28.65	11.28	2.22	35.7	2.490	39.95	5.281	7.067	7.72	7.771	10.29
C2H4				1.20	0.24	6.7	0.265	7.44	0.563	0.563	0.62	0.828	1.10
C2H6				0.42	0.08	2.5	0.092	2.75	0.195	0.195	0.21	0.287	0.38
C3H6				1.32	0.26	10.9	0.291	12.25	0.616	0.616	0.67	0.907	1.20
C3H8				0.45	0.09	3.9	0.100	4.39	0.212	0.212	0.23	0.312	0.41
C4H8				0.87	0.17	9.6	0.191	10.74	0.405	0.405	0.44	0.596	0.79
C4H10				0.20	0.04	2.3	0.045	2.60	0.095	0.095	0.10	0.140	0.19
C5H10				0.40 0.02	0.08 0.01	5.5 0.4	0.088 0.006	6.20 0.40	0.188 0.010	0.188 0.010	0.21 0.01	0.276 0.016	0.37 0.02
C6H12				0.08	0.02	1.4	0.018	1.51	0.038	0.038	0.04	0.056	0.07
OIL												0.495	0.66
WATER												6.149	8.14
TOTAL		44.685	561.79		19.72	341.8	22.073	452.00	46.818	91.496		75.527	
H2+CO		41.831			12.97		14.524		30.805				
H2/CO		1.69			3.08		3.079		3.08	2.145		3.079	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.981	-11.981	22.90			-11.981				
H2	-15.326			-30.65						
CO2	2.916	2.916	18.76			5.832				
N2	- 0.022									
CH4	0.704	0.704	4.53	2.82						
C2H4	0.265	0.530	3.41	1.06						73.01
C2H6	0.092	0.184	1.18	0.55						
C3H6	0.291	0.373	5.62	1.75			12.3 11.0	4.32 6.25	2.94 1.76	73.62
C3H8	0.100	0.300	1.93	0.90			4.4	4.24	1.04	
C4H8	0.191	0.764	4.92	1.53			10.7 10.2	5.00 6.10	2.15 1.67	90.51
C4H10	0.045	0.180	1.16	0.45			2.6	4.36	0.53	
C5H10	0.088 0.006	0.440 0.030	2.83 0.19	0.88 0.06			6.6	5.45	1.21	
C6H12	0.018	0.108	0.69	0.22			1.5	5.5	0.27	
OIL		4.952	31.86	9.90			69.4	6.52	10.64	
WATER				10.64		5.32 -6.149				
TOTAL	-22.613						101.3		16.09	
H2+CO	-27.307									
H2/CO	1.28									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2 / C0 #/MCF	H2 / C0 g/M3	Gal/hr	H2 / C0 Gal/MCF	H2 / C0 cc/M3
C1+C2	9.122	21.49	1.355	22.913			
C3+	49.201	107.47	6.778	114.615			
C4+	41.654	90.93	5.729	96.377			
Ult. Oil		101.32	6.390	108.054	16.086	1.0146	16.320
C02	18.763	128.34	8.095	136.886			
H20		110.78	6.987	118.150			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	341.76		382.62
Oil	60.25		60.25
Water	118.92		118.92
Total	520.93	92.73	561.79

	H_2+CO= 15854 SCFH #/hr	#/M	gal/hr	GPM
C_3-C_5	38.09	2.403	8.04	0.507
Rec 01	160.25	3.800	9.23	0.582
WSC	11.89	0.750	1.43	0.090
	110.23	6.953	18.70	1.180
H_2O	107.03	6.751	12.83	0.809

EFFLUENT RATIOS	
H2/H20	5.564
C02/C0	1.081
(H2) (C02)/(H20) (C0)	6.014

CONTRACTION:	50.60
C0 Conversion:	77.09
H2 Conversion:	58.30
H_2+C0=	65.28

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 0 From Hr. 0700 to Hr. 0700 Hrs. 321-345

FLOWS	SCFH	%
Oxygen	3671	
Nat. Gas	5998	
Total		
Fresh Feed	16993	
F. F. by C		
Avg. F. F.		
Wet Gas	7834	
Contraction		
Recycle	17163	
Bleed	1056	
Total	18219	
Total Feed	35212	
Recycle/F.F.	1.07	
Inlet Vel.	1.06	
Steam Flow		

RUN CONDITIONS	
Generator Press.	432
O_2 Preheat, °F	423
Gas Preheat, °F	676
Reactor Press.	423
Steam Back Press.	710
Temperatures, °F	
Heater Outlet	251
Catalyst #1	631
#2	631
#3	660
#4	641
#5	
Average	641
Product Separator	67

DISTILLATIONS — ASTM	
Prod.	Naph
A.P.I.	55.3
I.B.P.	107
5%	
10%	144
20	176
30	203
40	227
50	248
60	270
70	295
80	326
90	360
95	390
E.P.	406
Rec.	98
Res.	1.5
Loss.	0.5

Hempel Dist.		
°F	%	A.P.I.
to 400	72.0	55.3
400-550	17.3	38.5
550+	10.7	

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	732
Fresh Catalyst Charged	50
Catalyst Recharged	
Total	
Catalyst Taken Out	83
In Reactor at End of Period	699
Reactor d-P, H_2O	
Pounds in Reactor	862
Density, lbs./cu. ft.	129
Bed Height, Feet	10.13
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	19.71
V/hr/V	2542

CATALYST ANALYSIS — Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	14.9	80+	
100	419-150	64.1	80-40	
150	149-105	10.2	40-20	
200	104-74	6.4	20-10	
250	73-62	0.8	10-0	
325	61-44	0.2		
<325	43-0	3.4		

Density, lbs./cu. ft.		Chem. Anal.	
Aerated	146	% Fe	
Settled	148	% C	
Compacted	165	% Oil	
Sp. Grav.	4.5	Specific Surface	
			m^2/gm
		9.4	ml.NH_3/gm

NATURAL GAS	%
CO_2	1.88
CH_4	84.95
C_2H_6	8.60
C_3H_8	3.05
C_4H_{10}	0.12
N_2	1.11
O_2	0.29
MW	18.8593

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	43.4	42.8			
Sap. No.	48.8	45.3			
Hydrox. No.					
Bromine No.	84				
% Fe					
% Alc		11.0			
°API	49.2	10.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	~~SCFH~~ m/hr	C	H	O
O_2		9.732			19.464
CO_2		0.298	0.30		0.596
CH_4		13.445	13.45	53.780	
C_2H_6		1.361	2.72	8.166	
C_3H_8		0.483	1.45	3.864	
C_4H_{10}		0.019	0.08	0.190	
N_2		0.176			
Total			17.99	66.000	20.060

OUT	Mol %	~~SCFH~~ m/hr	C	H	O
CO_2		0.874	0.87		1.8
CO		16.155	16.16		16.2
CH_4		0.943	0.94	3.772	
H_2		26.713		53.426	
N_2		0.152			
H_2O				6.558	3.3
Total		44.837	17.97	63.756	21.2
Balance			99.90	96.60	105.6

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	Measured m/hr	Measured #/hr	At Wt. Balance m/hr	At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	36.03	16.155	452.50	18.40	3.80	106.5	4.328	121.23	8.843	24.998	26.91	13.171	17.01
H2	59.58	26.713	53.85	51.54	10.65	21.5	12.124	24.45	24.775	51.488	55.42	36.899	47.65
CO2	1.95	0.874	38.46	17.43	3.60	158.5	4.099	180.40	8.377	9.251	9.96	12.476	16.11
N2	0.34	0.152	4.26	0.46	0.10	2.7	0.109	3.06	0.222	0.374	0.40	0.331	0.43
CH4	2.10	0.943	15.13	7.82	1.62	25.9	1.840	29.52	3.760	4.703	5.06	5.60	7.23
C2H4				1.44	0.30	8.4	0.339	9.51	0.693	0.693	0.75	1.032	1.33
C2H6				0.51	0.11	3.2	0.119	3.60	0.245	0.245	0.26	0.364	0.47
C3H6				1.14	0.24	9.9	0.269	11.30	0.549	0.549	0.59	0.818	1.06
C3H8				0.12	0.03	1.1	0.028	1.25	0.057	0.057	0.06	0.085	0.11
C4H8				0.66	0.14	7.6	0.155	8.68	0.317	0.317	0.34	0.472	0.61
C4H10				0.15	0.03	1.9	0.036	2.12	0.073	0.073	0.08	0.109	0.14
C5H10				0.25 0.03	0.05 0.01	3.6 0.5	0.058 0.008	4.07 0.58	0.118 0.015	0.118 0.015	0.13 0.02	0.176 0.023	0.23 0.03
C6H12				0.04	0.01	0.7	0.009	0.76	0.019	0.019	0.02	0.028	0.04
OIL												0.475	0.61
WATER												5.377	6.94
TOTAL		44.837	564.20		20.67	352.0	23.523	400.54	48.070	92.90		77.436	
H2+CO		42.868			14.46		16.452		33.618				
H2/CO		1.65			2.80		2.80		2.80	2.06		2.80	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.827	-11.827	26.79			-11.827				
H2	-14.589			-29.178						
CO2	3.225	3.225	19.96			6.450				
N2	- 0.043									
CH4	0.897	0.897	5.55	3.588						
C2H4	0.339	0.678	4.20	1.356						72.54
C2H6	0.119	0.238	1.47	0.714						
C3H6	0.269	0.807	5.00	1.614			11.30 10.17	4.32 6.25	2.62 1.63	90.04
C3H8	0.028	0.084	0.52	0.224			1.25	4.24	0.30	
C4H8	0.155	0.620	3.84	1.240			8.68 8.25	5.00 6.1	1.74 1.35	80.37
C4H10	0.036	0.144	0.89	0.36			2.12	4.86	0.44	
C5H10	0.058 0.008	0.290 0.040	1.80 0.25	0.58 0.08			4.65	5.45	0.85	
C6H12	0.009	0.054	0.33	0.11			0.76	5.5	0.14	
OIL		4.75	29.40	9.50			66.55	6.51	10.22	
WATER				9.81		4.907 5.377				
TOTAL	-21.316						92.50		14.63	
H2+CO	-26.416									
H2/CO	1.23									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2 / C0 #/MCF	g/M3	Gal/hr	H2 / C0 Gal/MCF	cc/M3
C1+C2	11.221	27.50	1.693	28.628			
C3+	42.020	95.31	5.866	99.194			
C4+	36.506	82.76	5.094	86.139			
Ult. Oil		92.50	5.693	96.268	14.628	90.03	127.21
C02	19.962	141.94	8.736	147.725			
H20		96.87	5.962	100.817			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	351.95		400.54
Oil	52.22		52.22
Water	111.44		111.44
Total	515.61	91.39	564.20

EFFLUENT RATIOS	
H2/H20	6.862
C02/C0	0.947
(H2) (C02) / (H20) (C0)	6.50

CONTRACTION:	47.54
C0 Conversion:	73.21
H2 Conversion:	54.61
H_2+C0=	61.62

H_2+C0= 16247 SCFH

	#/hr	#/M	Gal/hr	GPM
C_3-C_5	28.76	1.770	6.09	0.375
Rec Oil	52.22	3.214	8.01	0.493
WSC	12.26	0.755	1.47	0.090
	93.24	5.739	15.57	0.958
H_2O	99.18	6.104	11.89	0.732

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 46 P From Hr. 0700 to Hr. 0700 Hrs. 345-369

FLOWS	SCFH	%
Oxygen	3913	
Nat. Gas	5616	
Total		
Fresh Feed	16725	
F. F. by C		
Avg. F. F.		
Wet Gas	7381	
Contraction		
Recycle	16624	
Bleed	1024	
Total	17653	
Total Feed	34378	
Recycle/F.F.	1.06	
Inlet Vel.	1.04	
Steam Flow		

RUN CONDITIONS	
Generator Press.	422
O_2 Preheat, °F	359
Gas Preheat, °F	689
Reactor Press.	413
Steam Back Press.	716
Temperatures, °F	
Heater Outlet	212
Catalyst #1	633
#2	632
#3	656
#4	646
#5	
Average	642
Product Separator	71

DISTILLATIONS	ASTM				Hempel Dist.		
Prod.	Naph				°F	%	A.P.I.
A.P.I.	55.1				to 400	71.6	55.1
I.B.P.	101				400-550	16.6	39.2
5%					550+	11.8	
10%	150						
20	179						
30	203						
40	227						
50	248						
60	272						
70	297						
80	323						
90	363						
95	394						
E.P.	408						
Rec.	98						
Res.	1.5						
Loss.	0.5						

WATER	
Temp.	%
200	
203	
208	

X-Ray Diffraction on Catalyst

$Fe_{20}C_9$ 40%

Fe_3O_4 55%

Fe 5%

CATALYST DATA	
In Reactor at Start of Period	699
Fresh Catalyst Charged	50
Catalyst Recharged	
Total	
Catalyst Taken Out	68
In Reactor at End of Period	681
Reactor d-P, H_2O	
Pounds in Reactor	854
Density, lbs./cu. ft.	128
Bed Height, Feet	10.11
Space Vel. SCFH/lb. cat.	
Inventory Figures	
From d-P Meters	19.58
V/hr/V	2506

CATALYST ANALYSIS				
Particle Size				
Screen			Sedimentation	
Frac.	M	%	M	%
On 40	420+	15.6	80+	
100	419-150	64.8	80-40	
150	149-105	9.1	40-20	
200	104-74	5.9	20-10	
250	73-62	0.4	10-0	
325	61-44	0.2		
<325	43-0	4.0		
Density, lbs./cu. ft.			Chem. Anal.	
Aerated	148		% Fe	64.1
Settled	150		% C	7.7
Compacted	163		% Oil	1.1(ext)
Sp. Grav.	4.4		Specific Surface	
% K_2O	0.17			m^2/gm
% H_2	0.36		9.4	ml.NH_3/gm
K_2O/100 Fe	0.26		$2.7m^2$/g N_2 ads.	

NATURAL GAS	%
CO_2	1.86
CH_4	85.25
C_2H_6	8.27
C_3H_8	3.24
C_4H_{10}	0.05
N_2	1.05
O_2	0.28
MW	18.8225

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	44.1	43.5			
Sap. No.	48.8	45.3			
Hydrox. No.					
Bromine No.	76				
% Fe					
% Alc		11.0			
°API	49.4	10.7			

GENERATOR ELEMENTAL BALANCE

IN	Mol %	[redacted] m/hr	C	H	O
O_2		10.367			20.734
CO_2		0.276	0.28		0.552
CH_4		12.633	12.63		
C_2H_6		1.226	2.45	50.532	
C_3H_8		0.480	1.44	7.356	
C_4H_{10}		0.007	0.03	3.840	
N_2		0.156		0.070	
Total			16.83	61.798	21.286

OUT	Mol %	[redacted]- m/hr	C	H	O
CO_2		1.087	1.1		2.2
CO		16.053	16.1		16.1
CH_4		0.045	0.1	0.180	
H_2		26.676		53.352	
N_2		0.268			
H_2O				8.192	4.1
Total		44.129	17.2	61.724	22.3
Balance			102.1	99.88	104.9

	FRESH FEED %	FRESH FEED m/hr	FRESH FEED #/hr	WET GAS %	WET GAS Measured m/hr	WET GAS Measured #/hr	WET GAS At Wt. Balance m/hr	WET GAS At Wt. Balance #/hr	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	36.377	16.053	449.64	19.03	3.71	103.8	4.234	118.60	8.865	24.918	27.47	13.099	17.47
H2	60.450	26.676	53.78	53.24	10.37	20.9	11.844	23.87	24.798	51.474	56.75	36.642	48.86
CO2	2.463	1.087	47.94	18.67	3.64	160.0	4.152	182.73	8.694	9.781	10.78	12.846	17.13
N2	0.607	0.268	7.51	0.72	0.14	4.0	0.161	4.51	0.336	0.604	0.67	0.497	0.66
CH4	0.103	0.045	0.72	3.91	0.76	12.2	0.869	13.95	1.821	1.866	2.06	2.690	3.59
C2H4				1.24	0.24	6.8	0.275	7.72	0.577	0.577	0.64	0.852	1.14
C2H6				0.50	0.10	2.9	0.111	3.34	0.232	0.232	0.26	0.343	0.46
C3H6				1.17	0.23	9.6	0.260	10.95	0.546	0.546	0.60	0.806	1.08
C3H8				0.20	0.04	1.7	0.043	1.92	0.091	0.091	0.10	0.134	0.18
C4H8				0.73	0.14	8.0	0.163	9.16	0.341	0.341	0.38	0.504	0.67
C4H10				0.15	0.03	1.7	0.034	1.99	0.071	0.071	0.08	0.105	0.14
C5H10				0.32 0.03	0.06 0.01	4.4 0.4	0.071 0.007	4.97 0.49	0.149 0.015	0.149 0.015	0.16 0.02	0.220 0.022	0.29 0.03
C6H12				0.08	0.02	1.3	0.017	1.44	0.035	0.035	0.04	0.052	0.07
OIL												0.497	0.66
WATER												5.689	7.59
TOTAL		44.129	559.49		19.48	337.6	22.245	385.64	46.577	90.700		74.998	
H2+CO		42.729			14.08		16.078		33.663				
H2/CO		1.66			2.80		2.80		2.80	2.065		2.80	

NET CHANGE ON REACTION	Carbon m/hr	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-11.819	-11.819	26.38			-11.819				
H2	-14.832			-29.664						
CO2	3.065	3.065	19.09			6.130				
N2	- 0.107									
CH4	0.824	0.824	5.13	3.296						
C2H4	0.275	0.550	3.43	1.100						69.80
C2H6	0.111	0.222	1.38	0.666						
C3H6	0.260	0.780	4.86	1.560			10.95 9.86	4.32 6.25	2.53 1.58	85.08
C3H8	0.043	0.129	0.80	0.344			1.92	4.24	0.45	
C4H8	0.163	0.652	4.06	1.304			9.16 8.70	5.00 6.1	1.83 1.43	82.15
C4H10	0.034	0.136	0.85	0.34			1.99	4.86	0.41	
C5H10	0.071 0.007	0.355 0.035	2.21 0.22	0.71 0.35			5.46	5.45	1.00	
C6H12	0.017	0.102	0.64	0.20			1.44	5.5	0.26	
OIL		4.969	30.95	9.94			69.62	6.52	10.68	
WATER				9.85		4.926 5.689				
TOTAL	-21.888						97.07		15.36	
H2+CO	-26.651									
H2/CO	1.255									

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	9.940	24.29	1.500	126.83			
C3+	44.586	100.54	6.208	104.98			
C4+	38.925	87.67	5.413	91.53			
Ult. Oil		97.07	5.993	101.34	15.363	94.867	134.05
C02	19.092	134.89	8.329	140.84			
H20		102.49	6.328	107.01			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	337.62		385.64
Oil	57.68		57.68
Water	116.17		116.17
Total	511.47	91.42	559.49

H_2+C0= 16194 SCFH

	#/hr	#/M	Gal/hr	GPM
C_3-C_5	30.92	1.909	6.48	0.400
Rec Oil	157.68	3.562	8.86	0.547
WSC	12.78	0.789	1.53	0.094
	101.38	6.260	16.87	1.042
H_2O	103.39	6.384	12.40	0.766

EFFLUENT RATIOS	
H2/H20	6.440
C02/C0	0.981
(H2) (C02) / (H20) (C0)	6.32

CONTRACTION:	49.59
C0 Conversion:	73.62
H2 Conversion:	55.60
H_2+C0=	62.37

Yield Calculations assume "oil" is CH2, and is found by difference on Carbon, and H20 by difference on Hydrogen. "Oil" figures therefore include hydrocarbon fraction of oxygenated compounds. Standard cubic feet measured at 60 F and 14.7 psig. Cubic Meters measured at O C. and 14.7 psig. g/M3 = 16.91 × #/MCF. cc/M3 = 141.3 × gal/MCF.