THE TEXAS COMPANY — MONTEBELLO LABORATORY

DATA SUMMARY SHEET

Synthesis Run Number 22F From 8/11/47 Hr. 0700 to 8/12/47 Hr. 0700

FLOWS	SCFH	%
Oxygen	1575	
Nat. Gas	2040	
Total	3615	43.7
Fresh Feed*	6680	
F. F. by C	6650	
Avg. F. F.	6665	
Wet Gas	1690	
Contraction		74.5
Recycle	8350	
Bleed	293	
Total	8843	
Total Feed	15393	
Recycle/F.F	1.30	
Inlet Vel.	1.05 Ft/Sec	
Steam Flow	111 #/hr	

RUN CONDITIONS	
Generator Press.	325
O_2 Preheat, °F	502
Gas Preheat, °F	810
Reactor Press.	294
Steam Back Press.	900
Temperatures, °F	
Heater Outlet	352
Catalyst #1	660
#2	664
#3	612
#4	600
#5	535
Average	618
Product Separator	

DISTILLATIONS	ASTM
Prod.	Gaso
A.P.I.	48.9
I.B.P.	112
5%	
10%	144
20	168
30	186
40	208
50	238
60	262
70	288
80	318
90	356
95	386
E.P.	407
Rec.	98.0
Res.	1.0
Loss.	1.0

Hempel Dist.	°F	%	A.P.I.
to 400		70.0	57.4
400-550		16.3	39.3
550+		13.7	

WATER	Temp.	%
	200	
	203	
	208	

CATALYST DATA	
In Reactor at Start of Period	449.0
Fresh Catalyst Charged	30.0
Catalyst Recharged	
Total	479.0
Catalyst Taken Out	41.5
In Reactor at End of Period	437.5
Reactor d-P, H_2O	
Pounds in Reactor	2540
Density, lbs./cu. ft.	36.4
Bed Height, Feet	13.5
Space Vel. SCFH/lb. cat.	
Inventory Figures	15.2
From d-P Meters	22.6

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	30	80+	36.0
	100	419-150	16.7	80-40	13.0
	150	149-105	14.2	40-20	12.0
	200	104-74	5.1	20-10	31.0
	250	73-62	2.5	10-0	8.0
	325	61-44	3.5		
	<325	43-0	55.0		

Density, lbs./cu. ft		Chem. Anal.	
Aerated		% Fe	
Settled		% C	
Compacted		% Oil	
Sp. Grav.	3.9	Specific Surface	
			m^2/gm

NATURAL GAS	%
CO_2	1.51
CH_4	77.92
C_2H_6	15.07
C_3H_8	5.54
C_4H_{10}	
N_2	
O_2	

PRODUCT INSPECTION					
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	26.0	30.95			
Sap. No.	30.3	132.44			
Hydrax. No.	36.0				
Bromine No.	84.16				
% Fe					
% Alc		9.3			

GENERATOR ELEMENTAL BALANCE — IN	#/hr Mol %	SCFH m/hr	C	H	O
O_2	132.99	4.156			8.312
CO_2	3.56	.081	.081		.162
CH_4	67.10	4.194	4.194	16.776	
C_2H_6	24.27	.809	1.618	4.854	
C_3H_8	13.11	.298	.894	2.384	
C_4H_{10}					
N_2					
Total	241.03	9.538	6.787	24.014	8.474

Less H_2O 203.39

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.1	.369	.369		.738
CO	32.1	5.645	5.645		5.645
CH_4	3.3	.580	.580	2.320	
H_2	61.9	10.886		21.772	
N_2	0.6	.106			
H_2O				-78	2.091
Total		17.586	6.594	24.014	8.474

	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	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	32.1	5.645	158.06	2.10	.084	2.63	.075	2.11	.490	6.14	15.00	.565	1.83
H2	61.9	10.886	21.77	38.01	1.561	3.12	1.252	2.50	8.169	19.06	46.58	9.421	30.44
CO2	2.1	.369	16.24	37.31	1.663	73.17	1.334	58.68	8.705	9.08	22.19	10.039	32.44
N2	0.6	.106	2.97	2.90	.129	3.61	.103	2.90	.677	.79	1.93	.780	2.52
CH4	3.3	.580	9.28	11.84	.528	8.45	.423	6.78	2.763	3.34	8.16	3.186	10.31
C2H4				3.50	.156	4.37	.125	3.50	.817	.82	2.00	.942	3.05
C2H6				1.20	.054	1.62	.043	1.30	.280	.28	.68	.323	1.05
C3H6				2.85	.127	5.33	.102	4.27	.665	.67	1.64	.767	2.48
C3H8													
C4H8				1.90	.085	3.74	.068	3.00	.443	.44	1.08	.511	1.65
C4H10				.75	.033	1.85	.027	1.48	.175	.18	.44	.202	.65
C5H10				.50	.022	1.28	.018	1.03	.117	.12	.29	.125	.40
C6H12				.15	.007	.59	.006	.47	.035	.04	.10	.041	.13
OIL								50.54				.361	1.17
WATER												3.640	11.78
TOTAL		17.586	208.32		4.455	109.76		88.02	23.332	40.918		30.903	
H2+CO		16.531											
H2/CO		1.83					16.69			3.10		16.67	

	RECYCLE m/hr	COMB. FEED m/hr	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %	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	.490	6.14	15.00	.565	1.83	-5.570	-5.570	1.33			-5.570				
H2	8.169	19.06	46.58	9.421	30.44	-9.634			-19.268						
CO2	8.705	9.08	22.19	10.039	32.44	.965	.966	17.09			1.930				
N2	.677	.79	1.93	.780	2.52	-.003									
CH4	2.763	3.34	8.16	3.186	10.31	-.159	-.159	-9.78	-.628						
C2H4	.817	.82	2.00	.942	3.05	.125	.250	4.43	.500						>74.47
C2H6	.280	.28	.68	.323	1.05	.043	.086	1.52	.258						
C3H6	.665	.67	1.64	.767	2.48	.102	.306	6.42	.612			3.84		.6	>99
C3H8															
C4H8	.443	.44	1.08	.511	1.65	.068	.272	4.82	.544			2.85		.57	>71.70
C4H10	.175	.18	.44	.202	.65	.027	.108	1.91	.270			1.48		.30	
C5H10	.117	.12	.29	.125	.40	.018	.090	1.54	.180			1.03		.19	
C6H12	.035	.04	.10	.041	.13	.006	.036	.64	.072			.47		.09	
OIL				.361	1.17		3.614	64.02	7.228			50.54		7.78	
WATER				3.640	11.78				10.232		(3.640) 5.116				
TOTAL	23.332	40.918		30.903		14.010						60.21		9.44	

NET CHANGE ON REACTION	m/hr	a/hr	%	a/hr	%	a/hr
	Carbon			Hydrogen		Oxygen
CO	-5.570	-5.570	1.33			-5.570
H2	-9.634			-19.268		
CO2	.965	.966	17.09			1.930
N2	-.003					
CH4	-.159	-.159	-9.78	-.628		
C2H4	.125	.250	4.43	.500		
C2H6	.043	.086	1.52	.258		
C3H6	.102	.306	6.42	.612		
C3H8						
C4H8	.068	.272	4.82	.544		
C4H10	.027	.108	1.91	.270		
C5H10	.018	.090	1.54	.180		
C6H12	.006	.036	.64	.072		
OIL		3.614	64.02	7.228		
WATER				10.232		(3.640) 5.116
TOTAL	14.010					

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	3.17	2.30	.367	6.20			
C3+	78.46	60.65	9.712	164.2			
C4+	72.98	56.38	9.031	152.7			
Ult. Oil		60.21	9.620	162.7	9.44	1.507	212.4
CO2	17.59	42.44	6.774	114.5			
H2O		65.5	10.45	176.7			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	109.76		88.02
Oil	31.1		
Water	89.2		
Total	230.06	110.44	208.32

EFFLUENT RATIOS	
H2/H2O	2.388
C02/CO	17.77
(H2) (C02) / (H20) (CO)	45.98

CONTRACTION: 79.67

C0 Conversion: 98.67

H2 Conversion: 88.50

91,972

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 226 From 8/12/47 Hr. 0700 to 8/13/47 Hr. 0700

FLOWS	SCFH	%
Oxygen	1640	
Nat. Gas	2110	
Total	3750	43.8
Fresh Feed	5900	
F. F. by C	6400	
Avg. F. F.	6400	
Wet Gas	1540	
Contraction		76.0
Recycle	8350	
Bleed	300	
Total	8650	
Total Feed	13050	
Recycle/F.F.	1.35	
Inlet Vel.	1.06 ft/sec	
Steam Flow	128 #/hr	

RUN CONDITIONS	
Generator Press.	3/9
O_2 Preheat, °F	509
Gas Preheat, °F	809
Reactor Press.	290
Steam Back Press.	900
Temperatures, °F	
Heater Outlet	395
Catalyst #1	666
#2	656
#3	611
#4	597
#5	561
Average	618
Product Separator	

DISTILLATIONS	A S T M					Hempel Dist.		
						°F	%	A.P.I.
Prod.								
A.P.I.						to 400		
I.B.P.						400-550		
5%						550+		
10%								
20								
30						WATER		
40						Temp.	%	
50						200		
60						203		
70						208		
80								
90								
95								
E.P.								
Rec.								
Res.								
Loss.								

CATALYST DATA	
In Reactor at Start of Period	437.5
Fresh Catalyst Charged	—
Catalyst Recharged	—
Total	437.5
Catalyst Taken Out	72.0
In Reactor at End of Period	365
Reactor d-P, H_2O	
Pounds in Reactor	388.8
Density, lbs./cu. ft.	23.8
Bed Height, Feet	24.0
Space Vel. SCFH/lb. cat.	
Inventory Figures	17.5
From d-P Meters	20.9

CATALYST ANALYSIS	Particle Size				
	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	3.5	80+	42.0
	100	419-150	18.7	80-40	7.0
	150	149-105	15.1	40-20	7.0
	200	104-74	6.3	20-10	33.0
	250	73-62	1.2	10-0	11.0
	325	61-44	2.1		
	<325	43-0	53.1		
Density, lbs./cu. ft.				Chem. Anal.	
Aerated				% Fe	
Settled				% C	
Compacted				% Oil	
Sp. Grav. 3.8				Specific Surface	
					m^2 gm

NATURAL GAS	%
CO_2	1.35
CH_4	77.49
C_2H_6	12.57
C_3H_8	7.09
C_4H_{10}	
N_2	
O_2	

PRODUCT INSPECTION						
	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.		28.32				
Sap. No.		130.76				
Hydrox. No.						
Bromine No.						
% Fe						
% Alc						

GENERATOR ELEMENTAL BALANCE

IN	#/hr ~~Mol %~~	SCFH m/hr	C	H	O
O_2	138.46	4.327			8.654
CO_2	3.30	.075	.075		.150
CH_4	68.02	4.314	4.314	17.256	
C_2H_6	22.65	.755	1.510	4.530	
C_3H_8	18.61	.423	1.269	3.384	
C_4H_{10}					
N_2					
Total	252.04	9.894	7.168	25.170	8.804

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.4	.389	.389		.778
CO	34.5	5.598	5.598		5.598
CH_4	2.7	.438	.438	1.752	
H_2	57.5	9.655		19.310	
N_2	0.9	.146			
H_2O				4.108	2.428
Total		16.226	6.425	25.170	8.804

Loss H2O 208.34

	FRESH FEED			WET GAS					RECYCLE	COMB. FEED		EFFLUENT		NET CHANGE ON REACTION								
					Measured		At Wt. Balance							Carbon			Hydrogen		Oxygen	Ultimate Oil			Unsats.
	%	m/hr	#/hr	%	m/hr	#/hr	m/hr	#/hr	m/hr	m/hr	%	m/hr	%	m/hr	a/hr	%	a/hr	%	a/hr	#/hr	#/gal	gal/hr	%
CO	34.5	5.598	156.74	8.63	.107	3.00	.101	2.84	.600	6.20	15.86	.701	2.22	-5.497	-5.497	1.80			-5.497				
H2	58.5	9.656	19.31	40.63	1.652	3.30	1.565	3.18	9.273	18.93	48.44	10.838	34.25	-8.091			-16.182						
CO2	2.4	.389	17.12	21.00	.854	37.58	.809	36.59	4.793	5.18	13.25	5.602	17.70	.420	.420	7.50			.840				
N2	0.9	.146	4.09	3.70	.150	4.20	.142	3.98	.844	.99	2.53	.986	3.12	-.004									
CH4	7.7	.438	7.01	15.81	.642	10.27	.608	9.73	3.606	4.05	10.36	4.214	13.32	.170	.170	3.04	.680						
C2H4				5.30	.215	6.03	.204	5.70	1.210	1.21	3.10	1.414	4.47	.240	.408	7.29	.816						6.892
C2H6				2.39	.097	2.91	.092	2.76	.545	.53	1.41	.637	2.01	.092	.184	3.29	.552						
C3H6				4.55	.184	7.81	.176	7.40	1.048	1.05	2.69	1.224	3.87	.176	.528	9.43	1.056			6.46		1.07	86.60
C3H8				.71	.029	1.28	.027	1.21	.162	.16	.41	.189	.60	.027	.081	1.45	.216						
C4H8				2.31	.094	5.26	.089	4.98	.527	.53	1.36	.616	1.95	.089	.356	6.36	.712			4.73		.78	54.31
C4H10				.43	.017	.99	.016	.94	.088	.10	.26	.114	.36	.016	.064	1.14	.160			.94		.19	
C5H10				.50	.020	1.40	.019	1.30	.114	.11	.28	.133	.42	.019	.095	1.70	.190			1.30		.24	
C6H12															3.191	57.00	6.382						
OIL								44.67				.319	1.01				5.418			44.67		6.87	
WATER												4.657	14.72						(4.657 2.709)				
TOTAL		16.227	204.27		4.063	84.02	3.848		22.823	39.075		31.644		12.379						58.30		9.15	
H2+CO		15.254																					
H2/CO		1.72					15.50			3.05		15.46											

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	13.62	11.18	1.934	32.70			
C3+	77.08	60.50	10.465	176.96			
C4+	66.20	54.89	8.976	151.78			
Ult. Oil		58.30	10.084	170.45	9.85	1.583	223.7
C02	7.50	19.47	3.195	54.03			
H20		83.83	14.500	245.20			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	84.02		79.37
Oil	35.3		
Water	89.4		
Total	208.72	102.18	204.27

EFFLUENT RATIOS	
H2/H20	2.327
C02/CO	7.991
(H2) (C02) / (H20) (C0)	18.60

CONTRACTION:	76.29
C0 Conversion:	98.20
H2 Conversion:	83.79

89,078

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 22 H From 8/3/67 Hr. 0700 to 8/4/67 Hr. 0700

FLOWS	SCFH	%
Oxygen	1620	
Nat. Gas	2080	
Total	3700	43.9
Fresh Feed	6150	
F. F. by C	6340	
Avg. F. F.		
Wet Gas	1860	
Contraction		70.8
Recycle	8100	
Bleed	312	
Total	8412	
Total Feed	14752	
Recycle/F.F.	1.30	
Inlet Vel.	1.03 Ft/sec	
Steam Flow	109 #/hr	

RUN CONDITIONS	
Generator Press.	328
O_2 Preheat, °F	473
Gas Preheat, °F	800
Reactor Press.	287
Steam Back Press.	900
Temperatures, °F	
Heater Outlet	327
Catalyst #1	646
#2	649
#3	618
#4	600
#5	558
Average	614
Product Separator	

DISTILLATIONS	ASTM				Hempel Dist. °F	%	A.P.I.
Prod.	GASO						
A.P.I.					to 400		
I.B.P.					400-550		
5%					550+		
10%							
20							
30					WATER		
40					Temp.	%	
50					200		
60					203		
70					208		
80							
90							
95							
E.P.							
Rec.							
Res.							
Loss.							

CATALYST DATA	
In Reactor at Start of Period	365.5
Fresh Catalyst Charged	
Catalyst Recharged	
Total	365.5
Catalyst Taken Out	166.5
In Reactor at End of Period	199.0
Reactor d-P, H_2O	
Pounds in Reactor	101.8
Density, lbs./cu. ft.	9.8
Bed Height, Feet	18.0
Space Vel. SCFH/lb. cat.	
Inventory Figures	31.8
From d-P Meters	61.5

CATALYST ANALYSIS	Particle Size				
	Screen :			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	1.5	80+	28.0
	100	419-150	9.1	80-40	5.0
	150	149-105	8.3	40-20	21.0
	200	104-74	11.2	20-10	44.0
	250	73-62	0.9	10-0	2.0
	325	61-44	1.1		
	<325	43-0	68.0		
	Density, lbs./cu. ft.			Chem. Anal.	
	Aerated			% Fe	
	Settled			% C	
	Compacted			% Oil	
	Sp. Grav. 3.2			Specific Surface	
					m^2/gm

NATURAL GAS	%
CO_2	1.73
CH_4	77.60
C_2H_6	15.18
C_3H_8	5.50
C_4H_{10}	
N_2	
O_2	

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.		29.42			
Sap. No.		131.32			
Hydrox. No.					
Bromine No.					
% Fe					
% Alc					

GENERATOR ELEMENTAL BALANCE

IN	#/hr Mol %	SCFH m/hr	C	H	O
O_2	136.77	4.274			8.548
CO_2	4.18	.095	.095		.190
CH_4	68.14	4.259	4.259	17.036	
C_2H_6	24.99	.833	1.666	4.998	
C_3H_8	13.29	.302	.906	2.416	
C_4H_{10}					
N_2					
Total	247.37	9.763	6.926	24.450	8.738

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.3	.385	.385		.770
CO	73.9	5.671	5.671		5.671
CH_4	3.1	.519	.519	2.076	
H_2	58.3	9.920		19.840	
N_2	1.2	.201			
H_2O				2.534	2.267
Total		16.696	6.575	24.450	8.738

Loss #/hr 206.02

	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	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	37.9	5.671	158.79	2.68	.132	3.70	.109	3.05	.595	6.27	16.11	.704	2.34
H2	59.3	9.920	19.84	38.90	1.909	3.82	1.572	3.15	8.634	18.53	47.66	10.206	33.86
CO2	2.5	.418	18.39	35.24	1.730	76.48	1.426	63.01	7.822	8.24	21.17	9.248	30.68
N2	1.2	.201	5.63	1.80	.088	2.46	.072	2.03	.400	.60	1.54	.472	1.57
CH4	3.1	.518	8.29	10.52	.516	8.26	.425	6.80	2.335	2.86	7.35	2.760	9.16
C2H4				3.48	.171	4.79	.141	3.95	.772	.77	1.98	.913	3.03
C2H6				1.43	.070	2.00	.058	1.73	.317	.32	.82	.375	1.24
C3H6				2.84	.139	5.84	.114	4.81	.630	.63	1.62	.744	2.47
C3H8				.34	.017	.75	.014	.62	.075	.08	.21	.089	.30
C4H8				1.68	.082	4.59	.068	3.78	.371	.37	.95	.439	1.45
C4H10				.49	.024	.23	.020	.19	.109	.11	.28	.129	.43
C5H10				.46	.023	1.61	.019	1.33	.102	.10	.27	.121	.40
C6H12				.15	.007	.59	.006	.49	.033	.03	.08	.049	.16
OIL								47.35				.338	1.12
WATER												3.556	11.80
TOTAL		16.728	210.94		4.908	115.22	4.044		22.195	38.923		30.143	
H2+CO		15.591											
H2/CO		1.75					14.42			2.96		14.50	

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	-5.562	-5.562	1.92			-5.562				
H2	-8.348			16.696						
CO2	1.008	1.008	17.77			2.016				
N2	-.129									
CH4	-.093	-.093	-1.64	-.372						
C2H4	.141	.282	4.97	.564						20.88
C2H6	.058	.116	2.05	.348						
C3H6	.114	.342	6.03	.684			4.33		.69	89.31
C3H8	.014	.042	.74	.112						
C4H8	.068	.272	4.80	.544			3.39		.59	77.42
C4H10	.020	.080	1.40	.200			.19		.04	
C5H10	.019	.095	1.68	.190			4.33		.25	
C6H12	.006	.036	.64	.036			.49		.09	
OIL		3.382	59.64	6.764			47.35		7.28	
WATER				7.626		(3.556) 3.813				
TOTAL	12.664						57.28		8.94	

ULTIMATE YIELDS	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr.	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	5.38	4.19	.709	11.89			
C3+	74.93	58.57	9.912	167.61			
C4+	68.16	53.14	8.993	152.07			
Ult. Oil		57.28	9.694	163.86	8.94	1.513	213.8
CO2	17.77	44.62	7.551	127.69			
H20		64.01	10.833	183.20			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	115.22		94.94
Oil	30.6		
Water	85.4		
Total	231.22	109.61	210.94

EFFLUENT RATIOS	
H2/H20	2.870
C02/C0	13.136
(H2) (C02) / (H20) (C0)	37.70

CONTRACTION: 75.82

C0 Conversion: 88.08

H2 Conversion: 84.15

89.218

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 225 From 8/14/47 Hr. 0700 to 8/15/47 Hr. 0700

FLOWS	SCFH	%
Oxygen	1630	
Nat. Gas	2090	
Total	3720	43.9
Fresh Feed	5800	
F. F. by C	6500	
Avg. F. F.		
Wet Gas	1750	
Contraction		73.9
Recycle	9650	
Bleed	318	
Total	9968	
Total Feed	16468	
Recycle/F.F.	1.50	
Inlet Vel.	1.02 ft/sec	
Steam Flow	72.9 #/hr	

RUN CONDITIONS	
Generator Press.	323
O_2 Preheat, °F	404
Gas Preheat, °F	777
Reactor Press.	292
Steam Back Press.	830
Temperatures, °F	
Heater Outlet	289
Catalyst #1	615
#2	644
#3	646
#4	639
#5	588
Average	626
Product Separator	

DISTILLATIONS	ASTM	Hempel Dist. °F	%	A.P.I.
Prod.	6450			
A.P.I.	50.4	to 400	68.3	58.9
I.B.P.	108	400-550	17.0	38.3
5%		550+	n/a	
10%	138			
20	166			
30	188			
40	208			
50	234			
60	260			
70	286			
80	312			
90	340			
95	358			
E.P.	399			
Rec.	—			
Res.	—			
Loss.	—			

WATER	
Temp.	%
200	
203	
208	

CATALYST DATA	
In Reactor at Start of Period	199.0
Fresh Catalyst Charged	53.0
Catalyst Recharged	125.0
Total	377.0
Catalyst Taken Out	44.0
In Reactor at End of Period	333.0
Reactor d-P, H_2O	
Pounds in Reactor	258.0
Density, lbs./cu. ft.	8.0
Bed Height, Feet	
Space Vel. SCFH/lb. cat.	
Inventory Figures	19.5
From d-P Meters	25.0

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	2.2	80+	23.0
	100	419-150	7.2	80-40	6.0
	150	149-105	8.6	40-20	17.0
	200	104-74	6.0	20-10	47.0
	250	73-62	2.1	10-0	7.0
	325	61-44	1.9		
	<325	43-0	72.0		

Density, lbs./cu. ft.	Chem. Anal.
Aerated	% Fe
Settled	% C
Compacted	% Oil
Sp. Grav. 3.3	Specific Surface
	m^2/gm

NATURAL GAS	%
CO_2	.94
CH_4	79.25
C_2H_6	14.63
C_3H_8	5.18
C_4H_{10}	
N_2	
O_2	

PRODUCT INSPECTION				
	Oil	Water	Product	Pour °F	SUS @ °F
Neut. No.	28.0	34.67			
Sap. No.	27.5	131.88			
Hydrox. No.	34.0				
Bromine No.	9238				
% Fe					
% Alc		10.7			

GENERATOR ELEMENTAL BALANCE

IN	#/hr Mol %	SCFH m/hr	C	H	O
O_2	137.63	4.301			8.602
CO_2	2.29	.052	.052		.104
CH_4	68.94	4.371	4.371	17.484	
C_2H_6	24.21	.807	1.614	4.842	
C_3H_8	12.58	.286	.858	2.288	
C_4H_{10}					
N_2	0				
Total	246.65	9.817	6.895	24.614	8.706

Loss H_2O 207.55

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.6	.446	.446		.892
CO	32.9	5.642	5.642		5.642
CH_4	7.1	.532	.532	2.128	
H_2	60.4	10.359		20.718	
N_2	1.0	.171			
H_2O				1.768	1.772
Total		17.150	6.620	24.614	8.706

	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	COMB. FEED %	EFFLUENT m/hr	EFFLUENT %
CO	32.9	5.646	157.98	3.70	.171	4.79	.173	4.84	.973	6.61	15.21	1.146	3.26
H2	60.4	10.359	20.72	41.60	1.921	3.84	1.941	3.88	10.941	21.30	49.02	12.882	36.70
CO2	9.6	.446	19.62	27.18	1.255	55.22	1.268	55.80	7.149	7.60	17.49	8.447	23.98
N2	1.0	.172	4.82	2.36	.109	3.05	.110	3.08	.621	.79	1.82	.731	2.08
CH4	3.1	.531	8.50	14.19	.655	10.48	.662	10.57	3.732	4.26	9.80	4.394	12.52
C2H4				3.30	.152	4.26	.154	4.30	.868	.87	2.00	1.022	2.91
C2H6				1.82	.084	2.52	.085	2.55	.479	.49	1.10	.564	1.61
C3H6				3.04	.140	5.88	.141	5.94	.800	.80	1.84	.941	2.68
C3H8				.43	.020	.88	.020	.89	.113	.11	.25	.133	.38
C4H8				1.62	.075	4.20	.076	4.24	.426	.43	.99	.502	1.43
C4H10				.37	.017	.99	.017	1.00	.087	.10	.23	.114	.32
C5H10				.40	.018	1.57	.018	1.53	.105	.11	.25	.123	.35
C6H12													
OIL								43.30				.309	.88
WATER												3.825	10.90
TOTAL		17.150	211.64		4.617	97.62	4.665		26.301	43.457		35.103	
H2+CO		13.984											
H2/CO		1.84					11.22			3.22		11.24	

NET CHANGE ON REACTION	Carbon a/hr	Carbon %	Hydrogen a/hr	Hydrogen %	Oxygen a/hr	Ultimate Oil #/hr	Ultimate Oil #/gal	Ultimate Oil gal/hr	Unsats. %
CO	-5.469	3.07			-5.469				
H2	-8.418		16.836						
CO2	.822	14.56			1.684				
N2									
CH4	.131	2.32	.524						
C2H4	.154	5.46	.616						64.5
C2H6	.085	3.02	.510						
C3H6	.141	7.50	.846			5.35		.86	87.6
C3H8	.020	1.06	.160						
C4H8	.076	5.39	.608			4.03		.66	81.4
C4H10	.017	1.21	.170			1.00		.21	
C5H10	.018	1.60	.180			1.53		.28	
C6H12									
OIL	3.093	54.81	6.186			43.30		6.66	
WATER			7.036		3.825 / 3.518				
TOTAL	12.485					55.21		8.67	
H2+CO									
H2/CO									

ULTIMATE YIELDS

	% CO Fed	#/hr	H2/CO #/MCF	H2/CO g/M3	Gal/hr	H2/CO Gal/MCF	H2/CO cc/M3
C1+C2	10.80	8.94	1.476	34.96			
C3+	71.57	56.90	9.393	198.84			
C4+	63.01	50.07	8.266	139.78			
Ult. Oil		55.21	9.114	154.05	8.67	1.431	202.06
C02	14.56	36.18	5.973	101.00			
H20		68.85	11.366	192.20			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	97.62		98.64
Oil	32.2		
Water	80.8		
Total	210.62	99.52	211.64

EFFLUENT RATIOS	
H2/H20	3.367
C02/C0	7.345
(H2) (C02) / (H20) (C0)	24.74

CONTRACTION: 72.80

C0 Conversion: 96.93

H2 Conversion: 81.26

24.886

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 22-J From 8/15/47 Hr. 0700 to 8/16/47 Hr. 0700

FLOWS	SCFH	%
Oxygen	1618	
Nat. Gas	2075	
Total	3693	43.8
Fresh Feed	5960	
F. F. by C	6450	
Avg. F. F.		
Wet Gas	1647	
Contraction		74.5
Recycle	8150	
Bleed	292	
Total	8442	
Total Feed	14892	
Recycle/F.F.	1.31	
Inlet Vel.	1.10 ft/sec	
Steam Flow	130 #/hr	

RUN CONDITIONS	
Generator Press.	329
O_2 Preheat, °F	400
Gas Preheat, °F	786
Reactor Press.	317
Steam Back Press.	339
Temperatures, °F	
Heater Outlet	338
Catalyst #1	610
#2	605
#3	649
#4	645
#5	584
Average	615
Product Separator	

DISTILLATIONS	ASTM				Hempel Dist.		
					°F	%	A.P.I.
Prod.	Grav.						
A.P.I.					to 400		
I.B.P.					400-550		
5%					550+		
10%							
20							
30					WATER		
40					Temp.	%	
50					200		
60					203		
70					208		
80							
90							
95							
E.P.							
Rec.							
Res.							
Loss							

CATALYST DATA	
In Reactor at Start of Period	333.0
Fresh Catalyst Charged	28.0
Catalyst Recharged	
Total	361.0
Catalyst Taken Out	92.5
In Reactor at End of Period	268.5
Reactor d-P, H_2O	19.0
Pounds in Reactor	162.0
Density, lbs./cu. ft.	14.0
Bed Height, Feet	30.0
Space Vel. SCFH/lb. cat.	
Inventory Figures	24.0
From d-P Meters	35.5

CATALYST ANALYSIS — Particle Size	Screen			Sedimentation	
	Frac.	M	%	M	%
	On 40	420+	2.3	80+	27.0
	100	419-150	9.9	80-40	6.0
	150	149-105	8.8	40-20	17.0
	200	104-74	8.3	20-10	45.0
	250	73-62	1.1	10-0	5.0
	325	61-44	1.2		
	<325	43-0	69.1		

Density, lbs./cu. ft.	Chem. Anal.	
Aerated	% Fe	
Settled	% C	
Compacted	% Oil	
Sp. Grav. 3.2	Specific Surface	
		m^2/gm

NATURAL GAS	%
CO_2	1.43
CH_4	78.68
C_2H_6	15.15
C_3H_8	4.74
C_4H_{10}	
N_2	
O_2	

PRODUCT INSPECTION	Oil	Water	Product	Pour °F	SUS @ °F	
Neut. No.		35.64				
Sap. No.		131.32				
Hydrox. No.						
Bromine No.						
% Fe						
% Alc						

GENERATOR ELEMENTAL BALANCE

IN	#/hr Mol %	SCFH m/hr	C	H	O
O_2	136.61	4.269			8.538
CO_2	3.43	.078	.078		.156
CH_4	68.93	4.308	4.308	17.232	
C_2H_6	24.87	.829	1.658	4.974	
C_3H_8	11.44	.260	.780	2.080	
C_4H_{10}					
N_2					
Total	245.28	9.744	6.824	24.286	8.694

Less H_2O 207.62

OUT	Mol %	SCFH m/hr	C	H	O
CO_2	2.4	.408	.408		.816
CO	34.0	5.786	5.786		5.786
CH_4	2.2	.374	.374	1.496	
H_2	61.0	10.381		20.762	
N_2	.4	.068			
H_2O				2.028	2.028
Total		17.018	6.568	24.286	8.694

FRESH FEED	%	m/hr	#/hr
CO	34.0	5.786	162.01
H2	61.0	10.381	20.76
CO2	2.4	.408	17.95
N2	0.4	.068	1.90
CH4	2.2	.374	5.98
C2H4			
C2H6			
C3H6			
C3H8			
C4H8			
C4H10			
C5H10			
C6H12			
OIL			
WATER			
TOTAL		17.018	208.60
H2+CO		16.167	
H2/CO		1.80	

WET GAS	%	Measured m/hr	Measured #/hr	At Wt. Balance m/hr	At Wt. Balance #/hr
CO	3.44	.150	4.20	.130	3.65
H2	31.47	1.368	2.74	1.189	2.38
CO2	39.81	1.730	76.12	1.504	66.15
N2	1.73	.075	2.10	.065	1.82
CH4	11.44	.497	7.95	.432	6.91
C2H4	3.99	.173	4.84	.150	4.21
C2H6	1.70	.074	2.22	.064	1.93
C3H6	3.23	.140	5.88	.122	6.11
C3H8	.46	.020	.88	.017	.76
C4H8	1.73	.075	4.20	.065	3.65
C4H10	.46	.020	1.16	.017	1.01
C5H10	.46	.020	1.40	.017	1.22
C6H12	.09	.004	.34	.003	.30
OIL					45.16
WATER					
TOTAL		4.346	114.03	3.777	
H2+CO					
H2/CO				9.15	

RECYCLE	COMB. FEED		EFFLUENT	
m/hr	m/hr	%	m/hr	%
.766	6.56	16.70	.896	3.00
7.010	17.39	44.26	8.199	27.48
8.867	9.28	23.62	10.371	34.78
.385	.46	1.17	.450	1.51
2.548	2.92	7.43	2.980	9.99
.889	.89	2.27	1.039	3.48
.379	.38	.97	.443	1.49
.719	.72	1.83	.841	2.82
.102	.10	.25	.119	.40
.385	.39	.99	.450	1.51
.102	.10	.25	.119	.40
.102	.10	.25	.119	.40
.020	.02	.05	.023	.08
			.323	1.08
			3.464	11.61
22.274	39.292		29.836	
	2.65		9.15	

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	-5.656	-.0656	2.25			-5.656				
H2	-9.192			-18.384						
CO2	1.096	1.096	18.94			2.192				
N2	-.003									
CH4	.058	.058	1.00	.232						
C2H4	.150	.300	5.18	.600						71.25
C2H6	.064	.128	2.21	.384						
C3H6	.122	.366	6.33	.732			4.60		.74	87.53
C3H8	.017	.051	.88	.136						
C4H8	.065	.260	4.49	.520			3.47		.57	78.99
C4H10	.017	.068	1.18	.170			1.01		.21	
C5H10	.017	.085	1.47	.170			1.22		.23	
C6H12	.003	.018	.31	.036			.30		.05	
OIL		3.226	55.76	6.452			45.16		6.95	
WATER				8.952		(3.464)				
TOTAL						4.476	55.76		8.75	

ULTIMATE YIELDS	% C0 Fed	#/hr	H2/C0 #/MCF	H2/C0 g/M3	Gal/hr	H2/C0 Gal/MCF	H2/C0 cc/M3
C1+C2	8.39	7.07	1,154	19.51			
C3+	70.49	57.21	9.337	157.89			
C4+	63.21	51.34	8,379	141.69			
Ult. Oil		55.76	9.100	153.88	8.75	1.428	20206
C02	18.90	48.21	7.868	133.05			
H20		62.35	10.176	172.08			

WEIGHT BALANCE	#/hr	%	#/hr
Wet Gas	114.03		99.10
Oil	34.0		
Water	75.5		
Total	223.53	107.16	208.60

EFFLUENT RATIOS	
H2/H20	2.37
C02/C0	11.52
(H2) (C02) / (H20) (C0)	27.31

CONTRACTION: 77.81

C0 Conversion: 97.75

H2 Conversion: 88.55

91.841

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.