

**THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA CALCULATION and SUMMARY SHEET**

Synthesis Run Number 18A From 6/4/47 Hr. 1600 to 6/5/47 Hr. 0700

FRESH FEED								LIQUID YIELDS										CATALYST DATA				
Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M.W.	C. N.		Oil Tank #					Water Tank #					In Reactor at Start of Period				
CO ₂		3.1		44	22	40.3		GAUGES, INCHES										282				
CO		35.0		28	9.80			Total	O/W	Oil	Gals.	Corr.	Total	Gauge	Gals.	Corr.	Total	Fresh Catalyst Charged				
CH ₄		3.2		16	.57			At End of Period					17.5					Catalyst Recharged				
H ₂		58.7		2	1.19			At Start of Period	6					6.25				Total				
N ₂		—		28	—			Production	9				8.8	10.25			47.3	Catalyst Taken Out				
Mol. Wt.					12.42			Samples										In Reactor at End of Period				
					1.52			Uncorrected Production										241				
								G. P. H.					1.5				7.9	Reactor d-P, H ₂ O				
								Temperature, °F										14				
								G.P.H. at 60°F					1.5				7.9	Pounds in Reactor				
								A.P.I. at 60°F					—				—	129				
								Pounds Per Hour					15.3				66.9	Density, lbs./cu. ft.				
																		84.6				
																		Bed Height, Feet				
																		Space Vel. SCFH/lb. cat.				
																		Inventory Figures				
																		From d-P Meters				
																		CATALYST ANALYSIS				
																		Particle Size				
																		Screen		Sedimentation		
																		Frac.	M	%	M	%
																		On 40	420+		80+	
																		100	419-150		80-40	
																		150	149-105		40-20	
																		200	104-74		20-10	
																		250	73-62		10-0	
																		325	61-44			
																		<325	43-0			
																		Density, lbs./cu. ft.		Chem. Anal.		
																		Aerated		% Fe		
																		Settled		% C		
																		Compacted		% Oil		
																		Sp. Grav.		Specific Surface		
																				m ² /gm		

FRESH FEED				WET GAS				RECYCLE	COMB. FEED	EFFLUENT	NET CHANGE ON REACTION														
%	m/hr	#/hr	%	Measured		At Wt. Balance		m/hr	m/hr	%	m/hr	%	Carbon			Hydrogen			Oxygen	Ultimate Oil			Unsat.		
				m/hr	#/hr	m/hr	#/hr						m/hr	a/hr	%	a/hr	%	a/hr	#/hr	#/gal	gal/hr				
CO																									
H ₂																									
CO ₂																									
N ₂																									
CH ₄																									
C ₂ H ₄																									
C ₂ H ₆																									
C ₃ H ₆																									
C ₃ H ₈																									
C ₄ H ₈																									
C ₄ H ₁₀																									
C ₅ H ₁₀																									
C ₆ H ₁₂																									
OIL																									
WATER																									
TOTAL																									
H ₂ +CO																									
H ₂ /CO																									
ULTIMATE YIELDS				WEIGHT BALANCE				#/hr		%		#/hr		EFFLUENT RATIOS		CONTRACTION:									
C ₁ +C ₂	% CO Fed	#/hr	H ₂ /CO		Gal/hr	H ₂ /CO		Wet Gas						H ₂ /H ₂ O	CO Conversion:										
			#/MCF	g/M ³		Gal/MCF	cc/M ³								C ₂ /C ₁										
C ₃ +								Oil						(H ₂) (C ₂)	H ₂ Conversion:										
C ₄ +								Water						(H ₂ O) (CO)											
C ₄ +								Total																	
Ult. Oil																									
CO ₂																									
H ₂ O																									

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 CALCULATION and SUMMARY SHEET**

Synthesis Run Number 18C From 6/6/47 Hr. 0700 to 6/7/47 Hr. 0700

FRESH FEED								LIQUID YIELDS										CATALYST DATA					
	Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M.W.	C. N.	OIL TANK #					WATER TANK #					In Reactor at Start of Period					
CO ₂			1.9		44	.84	40.1	GAUGES, INCHES										233					
CO			34.1		28	9.55		Total	O/W	Oil	Gals.	Corr.	Total	Gauge	Gals.	Corr.	Total	Fresh Catalyst Charged					
CH ₄			4.1		16	.66		At End of Period					56				Catalyst Recharged						
H ₂			59.2		2	1.18		At Start of Period					37.5				Total						
N ₂			0.7		28	.19		Production					66.2	18.5	1.2	82.6	Catalyst Taken Out						
Mol. Wt.								Samples					5			10	In Reactor at End of Period						
								Uncorrected Production					66.2			82.6	231						
								G. P. H.					2.75			2.9	Reactor d-P, H ₂ O						
								Temperature, °F									Pounds in Reactor						
								G.P.H. at 60°F					2.74			2.9	Density, lbs./cu. ft.						
								A.P.I. at 60°F					46.6			7.4	Bed Height, Feet						
								Pounds Per Hour					16.1			22.6							
FLOW CALCULATIONS								RUN CONDITIONS					DISTILLATIONS					CATALYST ANALYSIS					
								Generator Press.	209	ASTM					WATER					Space Vel. SCFH/lb. cat.			
Oxygen								O ₂ Preheat, °F	405	Prod.				Temp.	%	Inventory Figures							
Nat. Gas								Gas Preheat, °F	820	A.P.I.				200		From d-P Meters							
Total								Reactor Press.	200	I.B.P.				203									
Fresh Feed								Steam Back Press.	870	10%				208									
F. F. by C								Temperatures, °F		20													
Avg. F. F.								Heater Outlet	425	30													
Wet Gas								Catalyst #1	40	40													
Contraction								#2	615	50													
Recycle								#3	619	60													
Bleed								#4	667	70													
Total								#5	662	80													
Total Feed								Average	640	90													
Recycle/F.F.								Product Separator		E.P.													
Inlet Vel.										Rec.													
Steam Flow										Res.													
%CO → G ₂										Loss.													
CO ₂ → W.G. 14.5																							
WEIGHT BALANCE								PRODUCT INSPECTION					PHYSICAL TESTS					CATALYST ANALYSIS					
In	F. F. = SCFH x MW/379 =							Hempel Dist.					Chemicals					Density, lbs./cu. ft.					
Out	Wet Gas							°F					Water					Chem. Anal.					
	Oil							to 400					Product					Aerated					
	Water							400-550					Pour °F					Settled					
	Loss							550+					SUS @ °F					Compacted					
	Total												SFS @ °F					Sp. Grav.					
																		Specific Surface					
																		m ² /gm					

NAME GAS	FRESH FEED				WET GAS				RECYCLE	COMB. FEED	EFFLUENT				NET CHANGE ON REACTION				Ultimate Oil	Unsat.
	%	m/hr	#/hr	%	Measured	At Wt. Balance	Measured	At Wt. Balance			m/hr	m/hr	%	m/hr	%	Carbon		Hydrogen		
CO	34.1	6.57	18.52	17.25	2.05	57.40	2.22	62.11	5.84	12.43	21.01	8.06	16.50	-4.37	-4.37	33.69			-4.37	
H ₂	59.2	11.44	32.88	37.79	7.10	14.20	7.68	15.36	20.23	37.67	63.66	27.91	57.13	-3.76			-7.52			
CO ₂	1.9	.37	16.28	11.84	1.41	6.204	1.53	6.713	4.01	4.38	7.40	5.54	11.74	1.16	1.16	12.60			2.32	
N ₂	0.7	.14	3.92							.14	.24									
CH ₄	4.1	.79	12.64	6.65	.79	12.64	.85	13.68	2.25	3.04	5.14	3.10	6.35	.06	.06	.91	.24			
C ₂ H ₄				.66	.08	2.24	.09	2.42	.22	.22	.37	.31	.63	.07	.18	2.73	.36			
C ₂ H ₆				.56	.07	3.10	.08	2.27	.19	.19	.32	.27	.55	.08	.16	2.43	.48			
C ₃ H ₆																				
C ₃ H ₈				.36	.04	1.76	.04	1.90	.12	.12	.20	.16	.33	.04	.13	1.82	.32			
C ₄ H ₈				1.14	.14	7.84	.15	8.48	.39	.39	.66	.54	1.11	.15	.60	9.10	1.20		8.06	
C ₄ H ₁₀				.30	.04	2.32	.04	2.57	.10	.10	.17	.14	.29	.04	.16	2.73	.40		2.51	
C ₅ H ₁₀				.98	.12	8.40	.13	9.09	.33	.33	.56	.46	.94	.13	.65	9.66	1.30		9.09	
C ₆ H ₁₂				.46	.05	4.20	.05	4.54	.16	.16	.27	.21	.43	.05	.30	4.55	.60		4.54	
OIL								(12.72)				.10	.20		0.98	14.87	1.96		13.72	
WATER												2.05	4.20				.66		(0.33)	
TOTAL		19.33	240.24		11.87	175.14	12.86	189.49	32.84	59.17	100.00	49.85	100.00	6.47	99.99				37.92	
H ₂ +CO		19.03					9.90												6.76	
H ₂ /CO		1.74					2.46													

ULTIMATE YIELDS						WEIGHT BALANCE			EFFLUENT RATIOS		CONTRACTION: 33.5	
	% CO Fed	#/hr	H ₂ /CO		Gal/hr	Wet Gas	#/hr	%	#/hr	H ₂ /H ₂ O	C ₂ O/CO	C ₂ O/CO ₂
			#/MCF	g/M ³								
C ₁ +C ₂	6.07	5.73	.78	12.19		175.14	10.82	189.54	13.61			
C ₃ +	42.63	10.24	5.49	92.84		18.10		18.10	0.69			
C ₄ +	40.81	38.34	5.23	88.44		32.60		32.60	7.36			
Un. Oil		37.92	5.17	87.42	6.46							
CO ₂	17.60	50.85	6.94	117.36								
H ₂ O		26.90	5.03	85.06								

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 CALCULATION and SUMMARY SHEET**

Synthesis Run Number 18D From 6/18/47 Hr. 0700 to 6/18/47 Hr. 0700

FRESH FEED								LIQUID YIELDS										CATALYST DATA				
	Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M.W.	C. N.	OIL TANK #					WATER TANK #					In Reactor at Start of Period				
								GAUGES, INCHES										231				
								Total	O/W	Oil	Gals.	Corr.	Total Gals.	Gauge	Gals.	Corr.	Total Gals.	Fresh Catalyst Charged				
CO ₂			1.7		44	1.75	390											231				
CO			34.2		28	9.58		At End of Period	40.5					75.4				Catalyst Recharged				
CH ₄			3.1		16	1.50		At Start of Period	30					61				Total 231				
H ₂			60.1		2	1.20		Production	10.5			4.8	57.0	14.44			62.8	Catalyst Taken Out 5				
N ₂			0.9		28	1.16		Samples										In Reactor at End of Period 226				
Mol. Wt.						12.19		Uncorrected Production					56.0				62.8	Reactor d-P, H ₂ O 6				
						1.54		G. P. H.					2.3				3.9	Pounds in Reactor 93				
FLOW CALCULATIONS								RUN CONDITIONS										DISTILLATIONS				
	Coeff	Chart	Fp	Ft	F m.w.	SCFH	%	Generator Press.					ASTM					WATER				
Oxygen						1785		O ₂ Preheat, °F 453					Prod.					Temp. %				
Nat. Gas						2440		Gas Preheat, °F 790					A.P.I.					200				
Total						4225	42.3	Reactor Press. 200					I.B.P.					203				
Fresh Feed						6850		Steam Back Press. 840					10%					208				
F. F. by C						7510		Temperatures, °F					20									
Avg. F. F.								Heater Outlet 450					30									
Wet Gas						4320		Catalyst #1					40									
Contraction								#2					50									
Recycle						12100		#3					60									
Bleed						392		#4					70									
Total						12482		#5					80									
Total Feed						20002		Average					90									
Recycle/F.F.						1.66		Product Separator					E.P.									
Inlet Vel.						1.60							Rec.									
Steam Flow													Res.									
%CO → CO ₂							20.5						Loss.									
CO ₂ → W.G. 15.1	WEIGHT BALANCE								PRODUCT INSPECTION										PHYSICAL TESTS			
In	F. F. = SCFH x MW/379 =							241	Hempel Dist.					Chemicals					Water			
Out	Wet Gas							202	to 400					Neut. Sap.					Product			
	Oil							15.4	400-550					Hydrox. % Fe					Pour °F			
	Water							72.6	550+					% Alc					SUS @ °F			
	Loss																		SFS @ °F			
	Total							250											Sp. Grav.			
%CO → CO ₂								16.2											Specific Surface m ² /gm			

MAKE GAS	FRESH FEED				WET GAS				RECYCLE	COMB. FEED	EFFLUENT	NET CHANGE ON REACTION													
	%	m/hr	#/hr	%	Measured		At Wt. Balance					m/hr	m/hr	%	m/hr	%	Carbon		Hydrogen		Oxygen		Ultimate Oil		Unsat.
					m/hr	#/hr	m/hr	#/hr									m/hr	a/hr	%	a/hr	%	a/hr	#/hr	#/gal	
CO	34.2	6.78	189.84	18.92	2.16	60.48	2.19	61.45	6.22	12.00	24.66	8.41	18.10	-4.59	-4.59	32.30									
H ₂	60.1	11.91	228.82	54.15	6.18	12.36	6.28	12.56	17.82	29.73	56.40	24.10	51.87	-5.62			-11.24								
CO ₂	1.7	.34	14.96	14.48	1.65	73.60	1.68	73.76	4.76	5.10	9.68	6.44	13.86	1.34	1.34	19.76							2.68		
N ₂	0.9	.18	5.04	.06	.01	.28	.01	.28	.02	.20	.38	.03	.06	-.17											
CH ₄	3.1	.61	9.76	6.24	.71	11.36	.72	11.54	2.05	2.66	5.05	2.77	5.96	.11	.11	1.62	.44								
C ₂ H ₄				1.10	.13	3.64	.13	3.70	.76	.76	.68	.49	1.05	.13	.26	2.83	1.52								
C ₂ H ₆				.10	.01	.30	.01	.30	.03	.03	.06	.04	.09	.01	.02	.29	.06								
C ₃ H ₆				.83	.03	1.26	.03	1.28	.08	.08	.15	.11	.24	.03	.09	1.33	.18							1.15 6.25 .18	
C ₃ H ₈				2.22	.25	11.00	.25	11.18	.73	.73	1.38	.98	2.11	.25	.75	11.06	1.20								
C ₄ H ₈				.97	.11	6.16	.11	6.26	.32	.32	.61	.43	.93	.11	.44	6.49	.88							5.95 6.10 .98	
C ₄ H ₁₀				.32	.04	2.32	.04	2.36	.11	.11	.21	.15	.32	.04	.16	2.36	.40							2.36 4.86 .49	
C ₅ H ₁₀				.71	.08	5.60	.08	5.69	.23	.23	.44	.31	.67	.08	.40	5.90	.80							5.69 5.40 1.05	
C ₆ H ₁₂				.50	.06	5.04	.06	5.12	.16	.16	.30	.22	.47	.06	.36	5.31	.72							5.12 5.50 .93	
OIL								(9.24)				.07	.15		0.66	9.73	1.32				(3.68)			9.24 6.50 1.42	
WATER												1.91	4.11			7.36	1.91								
TOTAL								11.42	123.40	11.59	195.48	32.90	52.71	100.00	46.46	99.99	8.22								29.51 5.05
H ₂ +CO											8.47														
H ₂ /CO											2.87														
ULTIMATE YIELDS												WEIGHT BALANCE				EFFLUENT RATIOS				CONTRACTION: 41.5					
	% CO Fed	#/hr	#/MCF	H ₂ /CO g/M ³	Gal/hr	H ₂ /CO Gal/MCF	cc/M ³	Wet Gas				H ₂ /H ₂ O				C ₀ Conversion: 67.7									
C1+C2	5.74	5.78	.77	13.02				192.40 1.016 195.42				12.62				H ₂ Conversion: 47.2									
C3+	42.18	41.83	5.48	92.67				15.40 15.40				0.77				N ₂ +CO = 51.5									
C4+	29.79	28.67	3.82	64.60				32.60 32.60				(H ₂) (CO ₂) (H ₂ O) (CO) 9.66													
Utr. Oil		29.51	2.93	66.76	5.05	0.67	94.67	Total 240.40 98.8 243.42																	
CO ₂		19.76	58.80	7.83	132.41																				
H ₂ O		34.38	4.58	77.45																					

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 x #/MCF. cc/M³ = 141.3 x gal/MCF.

THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA CALCULATION and SUMMARY SHEET

Synthesis Run Number 18F From 6/9/47 Hr. 0700 to 6/10/47 Hr. 0720

FRESH FEED								LIQUID YIELDS								CATALYST DATA					
Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M. W.	C. N.		Oil Tank #	GAUGES, INCHES			Water Tank #			In Reactor at Start of Period						
								Total	O/W	Oil	Gals.	Corr.	Total	Gauge	Gals.	Corr.	Total	286.5			
CO ₂		1.7		44	1.75	286												Fresh Catalyst Charged			
CO		25.1		28	2.65		At End of Period	62.4						75.4				Catalyst Recharged			
CH ₄		2.8		16	1.45		At Start of Period	51.4						36				Total			
H ₂		58.8		2	1.19		Production	10.4						46.2	19.1		84.9	Catalyst Taken Out			
N ₂		0.6		28	1.17		Samples							5				In Reactor at End of Period			
Mol. Wt.					12.41		Uncorrected Production							51.2			89.9	287.0			
					1.53		G. P. H.							2.1			2.75	Reactor d-P, H ₂ O			
FLOW CALCULATIONS								RUN CONDITIONS								DISTILLATIONS					
	Coef	Chart	Fp	Ft	F m.w.	SCFH	%	Generator Press.	213	ASTM			WATER			In Reactor at Start of Period					
Oxygen						1820		O ₂ Preheat, °F	460	Prod.		Temp.	%	200							
Nat. Gas						2570		Gas Preheat, °F	770	A.P.I.				203							
Total						4390	42.0	Reactor Press.	200	I.B.P.				208							
Fresh Feed						7090		Steam Back Press.	610	10%											
F. F. by C						7610		Temperatures, °F		20											
Avg. F. F.								Heater Outlet	605	30											
Wet Gas						4500	40.9	Catalyst #1		40											
Contraction								#2	657	50											
Recycle						11220		#3	605	60											
Bleed						260		#4	663	70											
Total						11580		#5	602	80											
Total Feed						19190		Average	629	90											
Recycle/F.F.						1.52		Product Separator		E.P.											
Inlet Vel.						1.75				Rec.											
Steam Flow						101.4	18.0			Res.											
WEIGHT BALANCE								PRODUCT INSPECTION								CATALYST ANALYSIS					
In	F. F. = SCFH x MW/379 =					249.5		Hempel Dist.		Chemicals				Particle Size							
Out	Wet Gas					208		°F	%	A.P.I.	Oil	Water		Screen							
	Oil					14.1		to 400						Sedimentation							
	Water					31.1		400-550		Neut. #				Frac. M % M %							
	Loss							550+		Sap. #				On 40 420+ 80+							
	Total					283.2	101			Hydrox. #				100 419-150 80-40							
										% Fe				150 149-105 40-20							
										% C				200 104-74 20-10							
										% Oil				250 73-62 10-0							
										% Surface				325 61-44							
										m ² /gm				<325 43-0							

ORSAT	FRESH FEED				WET GAS				RECYCLE	COMB. FEED	EFFLUENT	NET CHANGE ON REACTION												
	%	m/hr	#/hr	%	Measured		At Wt. Balance					m/hr	m/hr	%	m/hr	%	Carbon		Hydrogen		Oxygen	Ultimate Oil		Unsat.
					m/hr	#/hr	m/hr	#/hr									m/hr	a/hr	%	a/hr		%	a/hr	
CO	25.1	2.05	197.40	19.40	2.30	41.40	2.75	49.51	5.92	12.97	25.63	8.67	19.00	-4.30	-4.30	39.01			-4.30					
H ₂	58.8	12.01	24.02	24.84	6.94	12.88	7.70	15.40	16.55	28.56	54.43	24.25	52.13	-4.31		-9.62								
CO ₂	1.7	.34	14.86	14.37	1.71	7.52	2.04	8.97	4.39	4.73	9.35	6.93	14.09	1.70	1.70	2.11			8.40					
N ₂	0.6	.12	3.36	1.36	.16	4.48	.19	5.36	.42	.54	1.07	.61	1.34	.07										
CH ₄	2.8	.36	8.56	6.28	.75	12.00	.90	14.35	1.92	2.48	4.90	2.82	6.18	.74	.74	4.82	1.36							
C ₂ H ₄				.86	.10	2.80	.12	3.35	.26	.26	.51	.38	.83	.12	.24	3.40	.48							
C ₂ H ₆				.75	.09	2.70	.11	3.23	.23	.23	.45	.34	.74	.11	.22	3.12	.66							
C ₃ H ₆				.68	.08	3.32	.09	3.97	.21	.21	.41	.30	.66	.09	.27	3.83	.54			3.57	6.25	.57		
C ₃ H ₈				.11	.01	.74	.01	.53	.03	.03	.06	.04	.09	.01	.03	.43	.08							
C ₄ H ₈				.75	.09	5.04	.11	6.03	.27	.23	.45	.34	.74	.11	.44	6.24	.88			5.73	6.10	.94		
C ₄ H ₁₀				.26	.04	3.22	.05	3.77	.11	.11	.22	.16	.35	.05	.20	2.84	.50			2.77	4.64	.57		
C ₅ H ₁₀				.53	.06	4.20	.07	5.02	.16	.16	.32	.23	.50	.07	.35	4.86	.70			5.02	5.40	.93		
C ₆ H ₁₂				.32	.04	3.36	.05	4.02	.10	.10	.20	.15	.33	.05	.30	4.26	.60			4.02	5.50	.73		
OIL								(2.94)				.02	.04		.21	2.98	.42			2.94	6.50	.45		
WATER												.90	1.97			2.40			(1.20)					
TOTAL		20.08	248.70		16.87	170.18	14.14	203.51	20.52	50.61	100.00	45.64	99.99	5.89		100.00			24.05		4.19			
H ₂ +CO		17.06					10.45																	
H ₂ /CO		1.70					2.80																	
ULTIMATE YIELDS												WEIGHT BALANCE		EFFLUENT RATIOS		CONTRACTION: 29.3								
%	H ₂ / CO		H ₂ / CO		Wet Gas		Oil		Water		Total		H ₂ /H ₂ O		CO ₂ /CO		(H ₂) (CO ₂)		(H ₂ O) (CO)		C ₀ Conversion: 60.99		H ₂ Conversion: 35.9	
CO Fed	#/hr	#/MCF	g/M ³	Gal/hr	Gal/MCF	cc/M ³	#/hr	%	#/hr	#/hr	%	#/hr	#/hr	%	#/hr	%	#/hr	%	#/hr	%	#/hr	%	#/hr	%
C ₁ +C ₂	11.37	11.97	1.57	26.55																				
C ₃ +	25.54	25.28	3.32	56.14																				
C ₄ +	21.28	20.78	2.73	46.16																				
Ult. Oil	24.05	3.16	53.44	4.19	.55	77.72																		
CO ₂	24.11	75.01	9.86	166.73																				
H ₂ O	16.20	2.13	36.02																					

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 x #/MCF. cc/M³ = 141.3 x gal/MCF.

**THE TEXAS COMPANY — MONTEBELLO LABORATORY
DATA CALCULATION and SUMMARY SHEET**

Synthesis Run Number 18B From 6/10/47 Hr. 0700 to 6/11/47 Hr. 0700

FRESH FEED								LIQUID YIELDS										CATALYST DATA				
Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M.W.	C. N.		Oil Tank #			Water Tank #				In Reactor at Start of Period							
CO ₂		17		44	74	38.3		GAUGES, INCHES							287							
CO		35.1		28	284			Total	O/W	Oil	Gals.	Corr.	Total Gals.	Gauge	Gals.	Corr.	Total Gals.	Fresh Catalyst Charged				
CH ₄		25		16	180			At End of Period						92.5	15			114				
H ₂		60.1		2	1.20			At Start of Period						75.25	5.5			Catalyst Recharged				
N ₂		0.6		28	17			Production						71.5	17.25	9.5	117.7	Total				
Mol. Wt.					12.35			Samples						5			5	Catalyst Taken Out				
					1.53			Uncorrected Production										249.4				
								G. P. H.										In Reactor at End of Period				
								Temperature, °F										151.7				
								G.P.H. at 60°F										7				
								A.P.I. at 60°F										Pounds in Reactor				
								Pounds Per Hour										5.12				
																		Density, lbs./cu. ft.				
																		Bed Height, Feet				
																		Space Vel. SCFH/lb. cat.				
																		Inventory Figures				
																		From d-P Meters				
																		CATALYST ANALYSIS				
																		Particle Size				
																		Screen		Sedimentation		
																		Frac.	M	%	M	%
																		On 40	420+		80+	
																		100	419-150		80-40	
																		150	149-105		40-20	
																		200	104-74		20-10	
																		250	73-62		10-0	
																		325	61-44			
																		<325	43-0			
																		Density, lbs./cu. ft.			Chem. Anal.	
																		Aerated			% Fe	
																		Settled			% C	
																		Compacted			% Oil	
																		Sp. Grav.			Specific Surface	
																					m ² /gm	

FRESH FEED				WET GAS				RECYCLE	COMB. FEED	EFFLUENT	NET CHANGE ON REACTION												
%	m/hr	#/hr	%	Measured		At Wt. Balance		m/hr	m/hr	%	m/hr	%	Carbon			Hydrogen			Oxygen	Ultimate Oil		Unsat.	
				m/hr	#/hr	m/hr	#/hr						m/hr	a/hr	%	a/hr	%	a/hr	#/hr	#/gal	gal/hr	%	
CO																							
H ₂																							
CO ₂																							
N ₂																							
CH ₄																							
C ₂ H ₄																							
C ₂ H ₆																							
C ₃ H ₆																							
C ₃ H ₈																							
C ₄ H ₈																							
C ₄ H ₁₀																							
C ₅ H ₁₀																							
C ₆ H ₁₂																							
OIL																							
WATER																							
TOTAL																							
H ₂ +CO																							
H ₂ /CO																							
ULTIMATE YIELDS				WEIGHT BALANCE				#/hr	%	#/hr	EFFLUENT RATIOS		CONTRACTION:										
%	CO Fed	#/hr	%	H ₂ /CO		H ₂ /CO		Wet Gas	Oil	Water	Total	H ₂ /H ₂ O	CO ₂ /CO	C ₂ (CO ₂)/H ₂ O(CO)	C ₀ Conversion:								
				#/MCF	g/M ³	Gal/hr	Gal/MCF									cc/M ³	H ₂ Conversion:						
C ₁ +C ₂																							
C ₃ +																							
C ₄ +																							
Ult. Oil																							
CO ₂																							
H ₂ O																							

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 CALCULATION and SUMMARY SHEET**

Synthesis Run Number 184 From 6/11/47 Hr. 0700 to 6/11/47 Hr. 1200

FRESH FEED								LIQUID YIELDS								CATALYST DATA			
Orsat	Corr. Fac.	Cor. Orsat	M. S.	M. W.	Calc. M.W.	C. N.		Oil Tank #	GAUGES, INCHES			Water Tank #			In Reactor at Start of Period				
CO ₂		1.6		44	.71	40.6		Total	O/W	Oil	Gals.	Corr.	Total	Gauge	Gals.	Corr.	Total	Gals.	151.75
CO		34.7		28	9.72			At End of Period	83.5					21.75					18.5
CH ₄		4.3		16	1.69			At Start of Period	78.5					15.0					56.5
H ₂		59.2		2	1.18			Production	4.0								29.7		226.75
N ₂		0.2		28	.06			Samples									5		150.50
Mol. Wt.					12.76			Uncorrected Production											76.25
					1.53			G. P. H.						4.50					
FLOW CALCULATIONS								RUN CONDITIONS								DISTILLATIONS			
	Coef	Chart	Fp	Ft	F.m.w.	SCFH	%	Generator Press.	218	ASTM			WATER			Space Vel. SCFH/lb. cat.			
Oxygen						1830		O ₂ Preheat, °F	470	Prod.			Temp.	%	Inventory Figures				
Nat. Gas						2500		Gas Preheat, °F	830	A.P.I.			200	From d-P Meters					
Total						4320	42.3	Reactor Press.	200	I.B.P.			203	CATALYST ANALYSIS					
Fresh Feed						6700		Steam Back Press.	750	10%			208	Particle Size					
F. F. by C						7400		Temperatures, °F		20				Screen					
Avg. F. F.								Heater Outlet	520	30				Sedimentation					
Wet Gas						3860		Catalyst #1		40				Frac.	M	%	M	%	
Contraction							46.3	#2	655	50				On 40	420+		80+		
Recycle						9750		#3	660	60				100	419-150		80-40		
Bleed						370		#4	655	70				150	149-105		40-20		
Total						10120		#5	650	80				200	104-74		20-10		
Total Feed						17520		Average	652	90				250	73-62		10-0		
Recycle/F.F.						1.37		Product Separator		E.P.				325	61-44				
Inlet Vel.						1.63				Res.				<325	43-0				
Steam Flow										Loss.									
CO ₂ → CO ₂						301													
WEIGHT BALANCE								PRODUCT INSPECTION								PHYSICAL TESTS			
In	F. F. = SCFH x MW/379 =					241		Hempel Dist.		Chemicals				Product	Pour °F	SUS @ °F	SFS @ °F	Chem. Anal.	
Out	Wet Gas					189		°F	%	A.P.I.	Oil	Water						% Fe	
	Oil					30.5		400-550										% C	
	Water					578		550+		Neut. Sap.								% Oil	
	Loss									Hydrox								Specific Surface	
	Total					2673	111			% Fe								m ² /gm	
										% Alc									

NAME GAS	FRESH FEED				WET GAS				RECYCLE	COMB. FEED		EFFLUENT		NET CHANGE ON REACTION									
	%	m/hr	#/hr	%	Measured	At Wt. Balance	m/hr	#/hr		m/hr	%	m/hr	%	Carbon		Hydrogen		Oxygen	Ultimate Oil		Unsat.		
ORSAT																							
CO	34.7	678	189.84	11.35	116	32.48	1.12	31.40	3.04	9.82	2.17	4.16	10.36	-5.66	-5.66	16.52		-5.66					
H ₂	59.2	1156	23.12	57.97	589	11.78	5.69	11.39	15.49	27.05	58.32	21.18	52.77	-5.87		-11.74							
CO ₂	1.6	.31	13.64	19.37	1.97	86.68	1.90	83.80	5.18	5.49	11.84	7.09	12.97	1.59	1.59	23.45			3.18				
N ₂	0.2	.12	3.36	.77	.08	2.24	.08	2.17	.21	.33	.71	.29	.74	.04									
CH ₄	4.3	.84	12.44	6.88	.70	11.20	.68	10.83	1.84	2.68	5.78	2.52	6.40	-.16	-.16	2.36		-.64					
C ₂ H ₄				.98	.10	2.80	.10	2.71	.26	.26	.56	.26	.91	.10	.20	2.95		.40					
C ₂ H ₆				.34	.03	.90	.03	.87	.09	.09	.19	.12	.30	.03	.06	.88		.18					
C ₃ H ₆				.90	.09	3.78	.09	3.65	.24	.24	.52	.33	.84	.09	.27	3.98		.54		3.29	6.25	.53	
C ₃ H ₈				.14	.01	.44	.01	.43	.04	.04	.09	.05	.13	.01	.03	1.44		.08					
C ₄ H ₈				.70	.07	3.92	.07	3.79	.19	.19	.41	.26	.66	.07	.28	4.13		.56		3.60	6.10	.59	
C ₄ H ₁₀				.12	.01	.58	.01	.56	.03	.03	.06	.04	.10	.01	.04	.59		.10		.56	4.16	.12	
C ₅ H ₁₀				.43	.04	2.80	.04	2.71	.12	.12	.26	.16	.41	.04	.20	2.95		.40		2.71	5.40	.50	
C ₆ H ₁₂				.14	.01	.84	.01	.81	.04	.04	.09	.05	.13	.01	.06	.88		.12		.81	5.50	.15	
OIL								(38.78)				.31	.78		2.77	40.86		5.54		(2.23)	38.78	6.50	5.97
WATER												2.48	6.30					4.46		(2.48)			
TOTAL		19.53	243.40		1218	160.44	9.83	155.12	26.77	46.36	100.00	39.99	100.00	9.78		99.99				49.75		7.86	
H ₂ +CO		18.34					6.81																
H ₂ /CO		1.70					5.08				2.75		5.09										
ULTIMATE YIELDS								WEIGHT BALANCE				EFFLUENT RATIOS		CONTRACTION: 50.1									
	%	H ₂ /CO						#/hr	%	#/hr													
C1+C2	6.19	.97	.13	2.20				Wet Gas	160.44	155.10	H ₂ /H ₂ O	8.54	CO Conversion:	83.5									
C3+	53.83	50.73	6.66	116.00				Oil	30.50	30.50	CO ₂ /CO	1.70	H ₂ Conversion:	50.8									
C4+	49.41	46.65	6.21	106.70				Water	57.80	57.80	(H ₂)/CO ₂	14.53	H ₂ +CO = 59.0										
Ult. Oil		49.75	6.72	113.64	7.86	1.06	149.78	Total	248.74	102.2	(H ₂)/CO												
CO ₂	23.45	70.16	9.48	160.31																			
H ₂ O		44.64	6.03	101.97																			

Yield Calculations assume "oil" is CH₂, and is found by difference on Carbon, and H₂O 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 x #/MCF. cc/M³ = 141.3 x gal/MCF.