

Table 1
Gas Phase Tests

<u>Catalyst</u>	<u>Batch #</u>	<u>Composition (wt%)</u>		<u>Gas Phase Run #</u>	<u>Pressure (Psig)</u>	<u>Temp. (°C)</u>	<u>GHSV (h⁻¹)</u>	<u>CO/H₂</u>	<u>Usage (ΔCO/ΔH₂)</u>	<u>X_{CO+H₂}</u>	<u>X_{CO}</u>	<u>X_{H₂}</u>	<u>Bulk Activity, mol syngas/kg cat/hr</u>	<u>Specific Activity, mol CO/mol metal/min</u>
Fe/Zr/SiO ₂	8466-40	<u>Fe</u> 2.4	<u>Zr</u> 7.3	8413-88-40	300	220	1000	1.0	1.0	2.2	2.2	2.2	N.D.	N.D.
					300	240	1000	1.0	1.0	1.7	1.7	1.7	N.D.	N.D.
					300	280	1000	1.0	1.0	5.6	5.6	5.6	N.D.	N.D.
Co/Zr/SiO ₂	8466-45	<u>Co</u> 4.0	<u>Zr</u> 4.8	8413-93-45	300	220	1000	1.0	0.43	18	11	25	22.2	0.16
					300	240	1000	1.0	0.42	49	29	69	61.3	0.44
					300	260	1000	1.0	0.42	66	39	92	82.7	0.60
Co/Zr/SiO ₂	8466-46	<u>Co</u> 4.4	<u>Zr</u> 2.3	8413-99-46	300	220	1000	1.0	0.37	10	5	15	14.0	0.08
					300	240	1000	1.0	0.43	33	20	46	46.5	0.32
					300	260	1000	1.0	0.49	56	37	75	78.9	0.58
Co/Zr/SiO ₂	8466-47	<u>Co</u> 4.6	<u>Zr</u> 0.7	7743-2-47	300	220	1000	1.0	0.18	7	2	11	9.4	0.03
					300	240	1000	1.0	0.35	25	13	38	36.1	0.20
					300	260	1000	1.0	0.61	69	53	86	98.5	0.79
Co/SiO ₂	8466-49	<u>Co</u> 4.2		7743-8-49	300	220	1000	1.0	0.03	4	0.2	8	6.2	0.004
					300	240	1000	1.0	0.33	16	8	24	24.0	0.14
					300	260	1000	1.0	0.35	22	12	32	32.8	0.20
Co/Zr/SiO ₂ "Basecase"	8466-18	<u>Co</u> 3.6	<u>Zr</u> 6.6	8413-28-18	300	220	1000	0.94	0.55	28	20	35	31.3	0.31
					300	240	1000	0.94	0.50	49	33	63	55.4	0.51
					300	260	1000	0.94	0.43	65	40	88	73.6	0.62

Table 1 (Cont'd)

Gas Phase Tests

Catalyst	Batch #	Gas Phase Run #	Selectivity, Wt%						
			C ₁ -	C ₂₋₄ -	C ₅₋₁₁ -	C ₁₂₋₁₈ -	C ₁₉₋₂₃ -	C ₂₄ ⁺	C ₅₋₂₃ -
Fe/Zr/SiO ₂	8466-40	8413-88-40	NO MASS BALANCES WERE CALCULATED						
			18	28	47	6	1	0.2	54
Co/Zr/SiO ₂	8466-45	8413-93-45	15	15	30	19	12	10	61
			20	15	29	19	9	8	57
			25	28	36	8	3	0.2	47
Co/Zr/SiO ₂	8466-46	8413-99-46	10	11	28	22	19	9	69
			15	14	29	21	13	6	63
			22	28	39	7	3	0.4	49
Co/Zr/SiO ₂	8466-47	7743-2-47	15	21	41	16	6	0.6	63
			36	18	20	11	9	5	40
			22	32	42	4	1	0.2	47
Co/SiO ₂	8466-49	7743-8-49	9	17	25	10	21	18	56
			18	33	44	3	1	0.2	48
			10	23	49	16	2	0.2	67
Co/Zr/SiO ₂	8466-18	8413-28-18	10	15	39	25	8	3	72
"Basecase"			15	16	30	21	7	12	58

TABLE 2
COMPARATIVE CATALYST TEST DATA
- SLURRY TESTS -

24

Catalyst Ref. Inv.	Composition, wt. %		P, psig	T, °C	SV, l/g/hr	Feed CO/H ₂	Usage CO/H ₂	Conv. H ₂ /CO	Conv. H ₂	Conv. CO	Bulk Activity mol syngas/ kg cat/hr	Specific Activity mol CO/ mol metal/min	Hydrocarbon Selectivity, wt. %						Fuels	
													C ₁	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ -C ₂₈	C ₂₉ -C ₃₃	
Co ₂ (CO) ₈ / Zr(OPr) ₄ /Al ₂ O ₃ 7595-60-C43.4	Co 3.11	Zr 6.84	309	220.9	1.65	1.05	0.57	17.0	23.2	12.6	13.1	0.12	13.6	24.9	33.2	14.3	7.6	6.4	55.1	
			305	250.8	1.64	1.57	0.67	25.3	38.9	16.6	18.5	0.19	11.5	10.4	29.2	15.3	12.5	21.1	57.0	
			305	281.0	1.64	1.57	0.59	31.7	51.2	19.4	23.2	0.22	20.6	20.2	30.4	12.1	3.9	4.8	46.4	
Ru ₂ (CO) ₁₂ / Zr(OPr) ₄ /Al ₂ O ₃ 7887-36-47H	Ru 2.75	Zr 4.93	316	241.1	2.04	1.87	0.95	7.5	10.6	5.7	6.8	0.20	9.7	11.5	12.2	20.5	18.5	27.6	51.2	
			607	281.6	2.04	1.77	0.67	25.4	45.4	14.2	23.2	0.51	14.6	13.6	37.1	20.1	9.3	5.3	66.5	
			600	276.7	0.97	1.33	0.51	39.9	61.6	23.6	17.3	0.36	9.3	10.2	36.7	27.5	8.7	7.6	72.9	
Co ₂ (CO) ₈ /Al ₂ O ₃ 7887-67-445	Co 4.71		300	239.4	2.06	1.50	0.67	16.7	25.1	11.1	15.4	0.13	9.6	11.5	23.7	22.7	15.3	17.2	61.7	
			300	240.9	1.07	1.84	0.79	21.6	34.3	14.7	10.3	0.09	7.6	9.8	24.9	22.1	14.9	20.7	61.9	
			300	238.7	2.07	2.00	0.88	14.7	23.4	10.3	13.6	0.13	7.9	9.4	20.6	25.0	18.4	18.7	64.0	
FeCo ₃ (CO) ₁₂ / Al ₂ O ₃ 8385-22-677	Fe 0.85	Co 2.60	315	242.6	1.86	1.02	0.42	20.2	28.7	11.9	16.8	0.14	10.1	11.0	26.0	20.4	16.7	15.8	63.1	
			320	261.1	1.09	2.14	0.40	17.5	39.0	7.4	8.5	0.07	13.8	15.7	33.5	21.2	10.0	5.8	64.7	
			308	281.0	1.92	2.02	0.60	24.5	46.2	13.8	21.0	0.22	16.9	15.8	35.6	19.3	7.9	4.5	62.8	
Co ₂ (CO) ₈ / Ti(OPr) ₄ /Al ₂ O ₃ 7888-1-589	Co 3.49	Ti 8.65	300	239	0.90	2.02	0.60	24.0	46.0	13.1	9.6	0.10	7.1	12.3	30.4	22.8	12.6	14.8	65.8	
			600	258	1.07	1.57	0.46	26.2	42.5	14.4	21.9	0.20	15.4	15.5	34.3	18.8	7.9	8.1	61.0	
			310	282	1.82	1.51	0.56	20.7	34.3	11.7	16.8	0.16	24.8	15.6	30.3	16.9	9.3	3.1	56.5	
Co ₂ (CO) ₈ / Zr(OPr) ₄ /Al ₂ O ₃ 7888-33-731	Co 5.87	Zr 4.39	300	239	0.86	1.95	0.41	19.4	40.7	8.5	7.5	0.04	8.0	11.3	32.9	22.5	12.2	13.1	67.6	
			305	262	0.86	1.95	0.51	32.3	63.0	16.5	12.4	0.08	7.7	9.6	29.2	24.1	12.9	16.5	66.2	
			300	259	1.73	0.98	0.41	35.8	50.3	21.0	27.6	0.16	14.1	12.0	34.4	19.8	9.2	10.5	63.4	
FeCo ₃ (CO) ₁₂ / K/Al ₂ O ₃ 8385-60-707	Fe 0.78	Co 2.44	K 0.02	320	240	1.6	0.64	11.9	21.9	6.9	8.4	0.10	9.8	11.7	31.0	22.1	14.6	10.8	67.7	
				320	260	1.6	0.68	20.6	37.2	12.5	14.5	0.18	10.0	11.6	34.1	24.9	12.3	7.1	71.3	
				296	262	1.5	1.01	0.50	41.0	55.0	27.3	0.27	19.1	15.7	35.4	17.4	7.5	4.9	60.3	
2Co ₂ (CO) ₈ / Zr(OPr) ₄ /Al ₂ O ₃ 8523-1-4	Co 5.87	Zr 7.82	302	241	2.0	0.99	0.51	42.5	56.0	29.0	35.1	0.29	7.9	17.7	37.0	21.4	8.9	9.1	69.9	
			307	258	2.0	1.48	0.53	34.5	56.0	19.9	28.7	0.24	7.2	10.8	34.1	27.9	8.6	11.4	70.6	
			302	260	1.0	1.87	0.58	37.6	68.3	21.2	15.8	0.14	4.9	7.1	30.2	26.2	17.2	18.4	69.6	

¹ Synthesis Gas Activation

² H₂ Activation

TABLE 2 (CONTINUED)
COMPARATIVE CATALYST-TEST DATA
H₂ ACTIVATED CATALYSTS

Catalyst/ Run NO.	Composition, Wt.-%		P, psia	T, °C	W, L/Hr	Feed CO/H ₂	Usage CO/H ₂	4 Conv. H ₂ +CO	4 Conv. H ₂	5 Conv. CO	Bulk Activity mol syngas/ kg cat/hr	Specific Activity mol CO/ mol metal/min	Hydrocarbon Selectivity, Wt.-%						Fuels	
	Co	Zr											C ₁ -	C ₂ -C ₄ -	C ₅ -C ₁₁ -	C ₁₂ -C ₁₈ -	C ₁₉ -C ₂₄ -	C ₂₄ +C ₅ -23-		
Co(NO ₃) ₂ /Zr(OPr) ₄ / Al ₂ O ₃ 7888-85-2	4.25	7.10	310	241	1.0	2.00	0.54	20.8	40.6	10.9	11.4	0.09	5.2	4.2	11.2	16.9	23.7	30.8	51.8	
			310	20	2.0	1.58	0.60	24.8	39.9	15.3	27.7	0.24	12.0	9.1	22.7	25.8	14.1	16.3	62.6	
			310	281	2.0	1.60	0.60	33.4	57.2	18.2	37.2	0.30	14.9	11.2	23.7	18.9	13.4	17.9	56.0	
Co ₂ (CO) ₈ /Zr(OPr) ₄ / Al ₂ O ₃ 8523-41-9	10.8	8.5	303	239	2.0	1.00	0.43	32.7	45.7	19.7	30.7	0.07	7.7	15.0	22.0	22.6	13.9	18.8	58.5	
			310	239	2.0	2.00	0.44	14.5	30.3	6.7	13.5	0.03	8.3	13.8	22.2	21.0	15.7	19.0	58.9	
			310	268	1.0	1.00	0.50	45.9	61.3	30.4	21.5	0.06	15.0	14.0	27.4	20.0	9.8	13.8	57.2	
Co ₂ (CO) ₈ /Zr(OPr) ₄ / SiO ₂ 8670-11-18	4.9	9.3	310	240	2.0	1.00	0.47	40.8	55.5	26.2	36.5	0.23	8.1	14.5	37.4	24.9	8.2	6.9	70.5	
			310	261	1.0	1.50	0.43	42.9	75.1	21.4	19.1	0.12	11.0	12.9	37.4	23.3	8.0	7.4	68.7	
			310	282	1.0	2.00	0.59	41.4	78.0	23.1	18.5	0.14	13.5	15.4	32.1	23.9	9.6	5.5	65.6	
Co ₂ (CO) ₈ /Zr(OPr) ₄ / Al ₂ O ₃ 8623-1-4	5.0	7.82	302	241	2.0	0.99	0.51	42.5	56.0	29.0	35.3	0.29	7.9	13.7	37.0	23.4	8.9	9.1	69.3	
			307	258	2.0	1.48	0.53	34.5	56.0	19.9	28.7	0.24	7.2	10.8	34.1	27.9	8.6	11.4	70.6	
			302	260	1.0	1.87	0.58	37.6	68.3	21.2	15.8	0.14	4.9	7.1	26.2	26.2	17.2	18.4	69.6	
Co ₂ (CO) ₈ /Fe ₃ (CO) ₁₂ / Zr(OPr) ₄ /SiO ₂	4.91	0.93	9.09	300	241	2.0	1.6	0.55	37.3	61.6	21.7	34.1	4.8	9.2	29.4	29.0	14.5	13.1	72.9	
				300	261	2.0	1.0	0.30	33.9	46.4	21.4	30.3	13.1	19.8	39.7	17.1	5.5	4.8	62.3	
				315	280	2.0	2.0	0.59	27.3	52.0	15.2	24.4	15.8	19.4	41.8	18.2	3.6	1.2	63.6	

TABLE 2 (CONTINUED)
COMPARATIVE CATALYST TEST DATA
(H₂ ACTIVATED CATALYSTS)

Catalyst/ Run No.	Composition, Wt.-%	P, psig	T, °C	LV, l/g/hr	Feed CO/H ₂	Usage CO/H ₂	X Conv. H ₂ +CO	X Conv. H ₂	X Conv. CO	Bulk Activity mol syngas/ kg cat/hr	Specific Activity mol CO/ mol H ₂ /min	Hydrocarbon Selectivity, Wt.-%							
												C ₁ -	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ -	C ₅ -2	
Co ₂ (CO) ₈ /Zr(OPr) ₄ /MgO-3.6SiO ₂	Co	Zr	301	240	2.0	1.0	0.45	24.4	33.7	15.1	21.8	0.138	10.5	19.4	28.9	24.8	8.3	8.1	62.0
0670-60-25	4.8	9.4	302	261	2.0	1.5	0.52	22.8	37.6	13.0	20.4	0.143	19.1	27.2	34.5	12.0	4.2	3.0	50.7
			300	260	2.0	2.0	0.52	18.0	35.8	9.2	16.0	0.112	17.8	27.4	33.9	14.3	4.9	1.7	53.1
Co ₂ (CO) ₈ /Ti (OPr) ₄ /SiO ₂	Co	Ti	298	240	2.0	1.0	0.32	20.0	30.2	9.8	17.9	0.083	12.6	26.5	37.1	16.4	5.2	2.2	58.7
0670-57-27	5.2	4.8	300	261	2.0	1.0	0.58	33.0	41.8	24.2	29.5	0.206	15.3	13.7	29.6	21.3	10.6	9.6	61.5
			300	282	2.0	1.0	0.54	41.1	53.3	28.8	36.7	0.245	23.5	17.3	34.3	15.2	6.0	3.7	55.5
Co ₂ (CO) ₈ /Zr (OPr) ₄ /SiO ₂	Co	Zr	300	242	1.8	0.52	0.49	65.8	67.1	63.2	62.9	0.323	20.6	26.7	38.0	10.7	2.5	1.4	51.2
Extended Test 0062-1-31	5.3	10.2	300	260	2.0	1.0	0.53	53.9	70.4	37.4	48.1	0.312	13.2	14.4	41.7	18.9	7.5	4.2	68.1
Ru ₃ (CO) ₁₂ /Zr (OPr) ₄ /SiO ₂	Ru	Zr	300	240	2.0	1.0	0.25	5.8	9.4	2.3	5.2	0.042	11.1	7.3	13.9	20.4	20.5	26.7	54.8
	4.1	4.7	305	260	2.0	1.0	0.44	9.3	12.9	5.7	8.3	0.104	19.4	10.6	19.8	11.2	14.9	24.1	45.9
			300	262	1.0	1.0	0.21	6.8	11.3	2.3	3.0	0.021	25.4	15.6	19.0	7.7	11.2	21.1	37.9
0062-16-37																			
Co ₂ (CO) ₈ /Zr (OPr) ₄ /SiO ₂	Co	Zr	305	241	2.0	1.0	0.56	20.5	26.8	14.5	18.3	0.134	13.3	13.2	42.5	15.8	8.2	7.0	66.5
0062-41-46	4.8	2.7	295	262	2.0	0.96	0.45	39.8	53.7	25.2	35.5	0.223	15.5	11.6	36.0	19.5	8.7	8.7	64.2
			300	260	1.0	1.0	0.54	40.1	52.3	28.0	17.9	0.128	15.3	13.8	35.6	17.8	8.8	8.8	62.2

TABLE 3
SLURRY SCREENING SUMMARY
BB62-16-37
19.2 wt.% (83.1g) $\text{Ru}_3(\text{CO})_{12}/\text{Zr}(\text{OPr})_4/\text{SiO}_2$

Sample No.	Time on Stream h	P psig	T °C	SV, mL/g cat/hr	x $\text{CO}+\text{H}_2$	x CO	x H_2	Feed CO/H_2	Usage $\Delta\text{CO}/\Delta\text{H}_2$	Bulk Activity mol syngas/kg cat/h	Specific Activity mol CO/mol Co/min	Selectivity H ₂ %						
												C ₁	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ ⁺	C ₅ -C ₂₃
3	44	310	242	2.0	47.8	44.6	49.4	0.5	0.45	42.7	0.55	8.2	7.8	16.3	33.6	17.1	17.1	67.0
6	116	300	241	1.0	36.8	35.9	37.3	0.5	0.48	16.4	0.22	6.5	3.8	13.0	26.8	22.0	28.0	61.8
9	186	300	239	1.0	20.8	13.1	28.4	1.0	0.46	9.3	0.12	6.4	5.5	20.3	21.3	21.3	25.2	62.9
12	282	300	240	2.0	5.8	2.3	9.4	1.0	0.26	6.2	0.04	11.1	7.3	13.9	20.4	20.5	26.7	54.8
15	354	305	260	2.0	9.3	5.7	12.9	1.0	0.44	8.3	0.10	19.4	10.6	19.8	11.2	14.9	24.1	45.9
18	497	300	262	1.0	6.8	2.3	11.3	1.0	0.21	3.0	0.02	25.4	15.6	19.0	7.7	11.2	21.1	37.9
21	545	300	260	1.0	19.5	15.8	21.4	0.5	0.38	8.7	0.10	45.6	14.3	14.4	8.1	6.8	10.8	29.3
24	617	305	260	2.0	10.4	11.4	9.8	0.55	0.64	9.2	0.15	51.3	12.6	15.0	8.1	6.4	6.6	29.5
27	689	300	240	1.0	11.1	9.5	12.0	0.5	0.40	5.0	0.06	33.8	12.8	15.5	16.5	10.2	11.3	42.2
30	785	300	281	1.0	21.6	17.0	23.7	0.5	0.35	9.6	0.10	52.9	15.4	13.7	10.8	4.2	3.0	28.7

TABLE 4

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : RU/ZR/SILICA
SAMPLE NO: 8862+16+37+3

REACTOR LOADING, MLS :	450.0	T, C :	242.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	310	CO/H ₂ :	0.50
TIME ON STREAM, HRS :	43.5	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H ₂ :	0.45	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	47.82	MOL SYNGAS/KG CAT/HR:	42.677
%CO CONV. :	44.65	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	49.41	MOL CO/MOL METAL/MIN:	0.547

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	19.26	H ₂ O:	26.69
OXYGENATES :	0.18	CO :	47.56
CO ₂ :	0.12	H ₂ :	6.19

+++++

HYDROCARBON SELECTIVITY, WT%:

C ₁ :	8.17	C ₄ +ENE :	1.75
C ₂ +ANE :	1.07	C ₅ +C ₁₁ :	16.33
C ₂ +ENE :	0.16	C ₁₂ +C ₁₈ :	33.58
C ₃ +ANE :	1.12	C ₁₉ +C ₂₃ :	17.09
C ₃ +ENE :	1.87	C ₂₄ +C ₃₄ :	14.33
C ₄ ISO+ANE:	1.78	C ₃₅ +	2.76

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C₅+C₁₁): 16.33
DIESEL (C₉+C₂₅) : 60.71

+++++

% ELEMENTAL RECOVERY: CARBON : 99.63
HYDROGEN: 100.18
OXYGEN : 103.99

+++++

TABLE 5

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 3

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	8.17	46.21	0.00	0.00	0.00	0.00
2	1.07	3.23	0.16	0.51	0.00	0.00
3	1.12	2.29	1.87	4.04	0.00	0.00
4	1.75	2.74	1.75	2.83	0.02	0.04
5	1.88	2.37	1.92	2.48	0.08	0.10
6	2.68	2.82	0.00	0.00	0.00	0.00
7	1.78	1.61	0.25	0.23	0.00	0.00
8	1.32	1.05	0.22	0.18	0.12	0.09
9	1.40	0.99	0.19	0.14	0.10	0.07
10	1.84	1.17	0.22	0.15	0.12	0.08
11	1.97	1.14	0.15	0.09	0.10	0.06
12	2.59	1.38	0.11	0.06	0.13	0.07
13	3.43	1.69	0.00	0.00	0.17	0.08
14	4.20	1.92	0.00	0.00	0.18	0.08
15	4.92	2.10	0.00	0.00	0.28	0.12
16	5.40	2.16	0.00	0.00	0.46	0.19
17	5.61	2.12	0.00	0.00	1.07	0.41
18	4.63	1.65	0.00	0.00	0.40	0.14
19	4.61	1.56	0.00	0.00	0.52	0.18
20	3.75	1.20	0.00	0.00	0.10	0.03
21	3.01	0.92	0.00	0.00	0.16	0.05
22	2.49	0.73	0.00	0.00	0.14	0.04

TABLE 5 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 3

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	2.21	0.62	0.00	0.00	0.09	0.02
24	1.92	0.51	0.00	0.00	0.19	0.05
25	1.77	0.46	0.00	0.00	0.05	0.01
26	1.53	0.38	0.00	0.00	0.04	0.01
27	1.51	0.36	0.00	0.00	0.00	0.00
28	1.43	0.33	0.00	0.00	0.00	0.00
29	1.15	0.26	0.00	0.00	0.00	0.00
30	1.03	0.22	0.00	0.00	0.04	0.01
31	0.98	0.20	0.00	0.00	0.07	0.01
32	0.83	0.17	0.00	0.00	0.04	0.01
33	0.81	0.16	0.00	0.00	0.05	0.01
34	0.83	0.16	0.00	0.00	0.05	0.01
35	0.78	0.14	0.00	0.00	0.00	0.00
36	0.67	0.12	0.00	0.00	0.00	0.00
37	0.51	0.09	0.00	0.00	0.00	0.00
38	0.36	0.06	0.00	0.00	0.00	0.00
39	0.29	0.05	0.00	0.00	0.00	0.00
40	0.16	0.03	0.00	0.00	0.00	0.00

TABLE 6

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+6

REACTOR LOADING, MLS :	450.0	T, C :	241.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	300	CU/H2:	0.50
TIME ON STREAM, HRS :	115.5	SV, L/G/HR:	1.00		

USAGE RATIO, CU/H2 :	0.48	BULK ACTIVITY,	
%OVERALL CONV., CU+H2:	36.81	MOL SYNGAS/KG CAT/HR:	16.433
%CO CONV-	35.88	SPECIFIC ACTIVITY,	
%H2 CONV-	37.28	MOL CO/MOL METAL/MIN:	0.220

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	16.28	H2O:	23.65
OXYGENATES :	0.03	CO :	52.70
CO2 :	0.00	H2 :	7.34

HYDROCARBON SELECTIVITY, WT%:

C1 :	6.48	C4+ENE :	0.88
C2+ANE :	0.00	C5+C11 :	12.96
C2+ENE :	0.18	C12+C18:	26.75
C3+ANE :	0.67	C19+C23:	21.99
C3+ENE :	0.97	C24+34 :	24.90
C4 ISO+ANE:	1.07	C35+ :	3.15

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	12.96
DIESEL (C9+C25) :	61.60

% ELEMENTAL RECOVERY:	CARBON :	103.14
	HYDROGEN:	106.98
	OXYGEN :	108.92

TABLE 7

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 6

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	6.48	46.27	0.00	0.00	0.00	0.00
2	0.00	0.00	0.18	0.72	0.00	0.00
3	0.67	1.74	0.97	2.64	0.00	0.00
4	1.05	2.07	0.88	1.80	0.02	0.04
5	1.05	1.66	0.97	1.58	0.05	0.08
6	1.28	1.70	0.50	0.68	0.00	0.00
7	1.23	1.41	0.31	0.36	0.01	0.02
8	1.10	1.10	0.36	0.37	0.02	0.02
9	1.36	1.22	0.42	0.38	0.03	0.02
10	1.73	1.40	0.47	0.39	0.04	0.03
11	1.63	1.19	0.34	0.25	0.07	0.05
12	2.07	1.39	0.23	0.16	0.11	0.07
13	2.53	1.57	0.14	0.09	0.12	0.08
14	3.15	1.82	0.00	0.00	0.15	0.09
15	3.71	2.00	0.00	0.00	0.14	0.07
16	4.23	2.14	0.00	0.00	0.19	0.10
17	4.74	2.26	0.00	0.00	0.25	0.12
18	4.72	2.12	0.00	0.00	0.25	0.11
19	4.92	2.10	0.00	0.00	0.39	0.16
20	4.49	1.82	0.00	0.00	0.13	0.05
21	4.17	1.61	0.00	0.00	0.14	0.05
22	3.87	1.43	0.00	0.00	0.12	0.04

TABLE 7 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 6

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	3.65	1.29	0.00	0.00	0.11	0.04
24	3.41	1.15	0.00	0.00	0.09	0.03
25	3.20	1.04	0.00	0.00	0.09	0.03
26	2.95	0.92	0.00	0.00	0.07	0.02
27	2.79	0.84	0.00	0.00	0.00	0.00
28	2.46	0.71	0.00	0.00	0.00	0.00
29	2.25	0.63	0.00	0.00	0.00	0.00
30	1.96	0.53	0.00	0.00	0.00	0.00
31	1.74	0.46	0.00	0.00	0.00	0.00
32	1.46	0.37	0.00	0.00	0.00	0.00
33	1.32	0.33	0.00	0.00	0.00	0.00
34	1.13	0.27	0.00	0.00	0.00	0.00
35	0.96	0.22	0.00	0.00	0.00	0.00
36	0.76	0.17	0.00	0.00	0.00	0.00
37	0.54	0.12	0.00	0.00	0.00	0.00
38	0.38	0.08	0.00	0.00	0.00	0.00
39	0.29	0.06	0.00	0.00	0.00	0.00
40	0.22	0.04	0.00	0.00	0.00	0.00

TABLE 8

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+9

REACTOR LOADING, MLS :	450.0	T, C :	239.0	FEED RATIO,	
CATALYST LOADING, WT% :	19.2	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	186.5	SV, L/G/HR:	1.00		

USAGE RATIO, CO/H ₂ :	0.46	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	20.75	MOL SYNGAS/KG CAT/HR:	9.263
%CO CONV. :	13.14	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	28.36	MOL CO/MOL METAL/MIN:	0.121

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	5.49	H ₂ O:	8.65
OXYGENATES :	0.03	CO :	80.93
CO ₂ :	0.13	H ₂ :	4.77

HYDROCARBON SELECTIVITY, WT%:

C1 :	6.38	C4+ENE :	1.81
C2+ANE :	0.00	C5+C11 :	20.27
C2+ENE :	0.49	C12+C18:	21.29
C3+ANE :	0.48	C19+C23:	21.32
C3+ENE :	1.82	C24+34 :	23.23
C4 ISO+ANE:	0.92	C35+ :	1.99

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	20.27
DIESEL (C9+C25) :	56.96

% ELEMENTAL RECOVERY:	CARBON :	98.59
	HYDROGEN:	99.03
	OXYGEN :	101.50

TABLE 9

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 9

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	6.38	41.66	0.00	0.00	0.00	0.00
2	0.00	0.00	0.49	1.84	0.00	0.00
3	0.48	1.13	1.82	4.53	0.00	0.00
4	0.92	1.67	1.81	3.37	0.00	0.00
5	1.04	1.51	2.27	3.39	0.72	1.04
6	2.21	2.68	1.08	1.34	0.00	0.00
7	2.38	2.49	0.69	0.74	0.03	0.03
8	1.54	1.41	1.30	1.21	0.06	0.06
9	1.48	1.21	1.20	0.99	0.13	0.11
10	1.48	1.09	1.17	0.87	0.25	0.18
11	0.65	0.44	0.46	0.31	0.14	0.09
12	0.99	0.61	0.56	0.35	0.17	0.10
13	1.34	0.76	0.54	0.31	0.09	0.05
14	2.17	1.14	0.23	0.12	0.07	0.04
15	2.78	1.37	0.15	0.08	0.06	0.03
16	3.50	1.62	0.00	0.00	0.04	0.02
17	4.23	1.84	0.00	0.00	0.03	0.01
18	4.03	1.66	0.00	0.00	0.30	0.12
19	4.21	1.64	0.00	0.00	0.26	0.10
20	4.35	1.61	0.00	0.00	0.00	0.00
21	4.23	1.49	0.00	0.00	0.05	0.02
22	4.21	1.42	0.00	0.00	0.04	0.01

TABLE 9 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 9

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	3.94	1.27	0.00	0.00	0.04	0.01
24	3.87	1.20	0.00	0.00	0.00	0.00
25	3.53	1.05	0.00	0.00	0.00	0.00
26	3.11	0.89	0.00	0.00	0.00	0.00
27	2.82	0.78	0.00	0.00	0.00	0.00
28	2.35	0.62	0.00	0.00	0.00	0.00
29	1.92	0.49	0.00	0.00	0.00	0.00
30	1.61	0.40	0.00	0.00	0.00	0.00
31	1.32	0.32	0.00	0.00	0.00	0.00
32	1.10	0.26	0.00	0.00	0.00	0.00
33	0.86	0.19	0.00	0.00	0.00	0.00
34	0.74	0.16	0.00	0.00	0.00	0.00
35	0.62	0.13	0.00	0.00	0.00	0.00
36	0.49	0.10	0.00	0.00	0.00	0.00
37	0.36	0.07	0.00	0.00	0.00	0.00
38	0.26	0.05	0.00	0.00	0.00	0.00
39	0.19	0.04	0.00	0.00	0.00	0.00
40	0.07	0.01	0.00	0.00	0.00	0.00

TABLE 10

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : RU/ZR/SILICA
SAMPLE NO: 8862*16*37*12

REACTOR LOADING, MLS :	450.0	T, C :	240.0	FEED RATIO,
CATALYST LOADING, WT%:	19.2	P, PSIG :	300	CO/H ₂ :
TIME ON STREAM, HRS :	281.5	SV, L/G/HR:	2.00	1.00

USAGE RATIO, CO/H ₂ :	0.25	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ :	5.84	MOL SYNGAS/KG CAT/HR:
%CO CONV. :	2.31	SPECIFIC ACTIVITY,
%H ₂ CONV. :	9.37	MOL CO/MOL METAL/HR:
		0.042

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	1.38	H ₂ O:	2.90
OXYGENATES :	0.01	CO :	89.70
CO ₂ :	0.07	H ₂ :	5.94

HYDROCARBON SELECTIVITY, WT%:

C1 :	11.12	C4+ENE :	2.12
C2+ANE :	0.00	C5+C11 :	13.94
C2+ENE :	0.86	C12+C18 :	20.44
C3+ANE :	0.67	C19+C23 :	20.51
C3+ENE :	2.18	C24+34 :	24.13
C4 ISO+ANE:	1.47	C35+ :	2.56

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	13.94
DIESEL (C9+C25) :	52.10

% ELEMENTAL RECOVERY:	CARBON :	100.69
	HYDROGEN:	98.94
	OXYGEN :	102.71

TABLE 11

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 12

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	11.12	56.30	0.00	0.00	0.00	0.00
2	0.00	0.00	0.86	2.49	0.00	0.00
3	0.67	1.24	2.18	4.20	0.00	0.00
4	1.47	2.05	2.12	3.07	0.00	0.00
5	1.53	1.72	2.62	3.04	0.00	0.00
6	1.55	1.46	0.31	0.30	0.16	0.15
7	1.04	0.85	0.84	0.70	0.00	0.00
8	0.90	0.64	0.77	0.56	0.08	0.06
9	0.98	0.62	0.67	0.43	0.00	0.00
10	0.92	0.53	0.73	0.42	0.04	0.02
11	0.44	0.23	0.32	0.17	0.05	0.02
12	0.82	0.39	0.54	0.26	0.12	0.06
13	1.16	0.51	0.69	0.31	0.11	0.05
14	1.53	0.62	0.79	0.33	0.14	0.06
15	2.21	0.84	0.52	0.20	0.16	0.06
16	3.29	1.18	0.00	0.00	0.15	0.05
17	3.84	1.30	0.00	0.00	0.13	0.04
18	4.19	1.34	0.00	0.00	0.05	0.02
19	4.28	1.29	0.00	0.00	0.04	0.01
20	4.23	1.22	0.00	0.00	0.03	0.01
21	4.06	1.11	0.00	0.00	0.05	0.01
22	4.04	1.06	0.00	0.00	0.02	0.00

TABLE 11 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 12

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	3.72	0.93	0.00	0.00	0.04	0.01
24	3.60	0.86	0.00	0.00	0.01	0.00
25	3.39	0.78	0.00	0.00	0.01	0.00
26	3.10	0.69	0.00	0.00	0.00	0.00
27	2.80	0.60	0.00	0.00	0.00	0.00
28	2.51	0.52	0.00	0.00	0.00	0.00
29	2.13	0.42	0.00	0.00	0.00	0.00
30	1.82	0.35	0.00	0.00	0.00	0.00
31	1.53	0.28	0.00	0.00	0.00	0.00
32	1.29	0.23	0.00	0.00	0.00	0.00
33	1.04	0.18	0.00	0.00	0.00	0.00
34	0.89	0.15	0.00	0.00	0.00	0.00
35	0.75	0.12	0.00	0.00	0.00	0.00
36	0.60	0.10	0.00	0.00	0.00	0.00
37	0.44	0.07	0.00	0.00	0.00	0.00
38	0.34	0.05	0.00	0.00	0.00	0.00
39	0.25	0.04	0.00	0.00	0.00	0.00
40	0.18	0.03	0.00	0.00	0.00	0.00

TABLE 12

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+15

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	305	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	353.5	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H ₂ :	0.44	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	9.29	MOL SYNGAS/KG CAT/HR:	8.294
%CO CONV.	5.67	SPECIFIC ACTIVITY,	
%H ₂ CONV.	12.91	MOL CO/MOL METAL/MIN:	0.104

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	1.99	H ₂ O:	3.72
OXYGENATES :	0.03	CO :	88.30
CO ₂ :	0.14	H ₂ :	5.82

HYDROCARBON SELECTIVITY, WT%:

C1 :	19.43	C4+ENE :	3.15
C2+ANE :	0.00	C5+C11 :	19.83
C2+ENE :	1.11	C12+C18:	11.22
C3+ANE :	1.06	C19+C23:	14.88
C3+ENE :	3.76	C24+34 :	22.30
C4 ISO+ANE:	1.49	C35+ :	1.76

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	19.83
DIESEL (C9+C25) :	37.71

% ELEMENTAL RECOVERY:	CARBON :	98.57
	HYDROGEN:	98.38
	OXYGEN :	100.72

TABLE 13

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 15

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	19.43	66.81	0.00	0.00	0.00	0.00
2	0.00	0.00	1.11	2.18	0.00	0.00
3	1.06	1.33	3.76	4.92	0.00	0.00
4	1.49	1.41	3.15	3.09	0.00	0.00
5	1.51	1.15	3.16	2.48	0.00	0.00
6	1.77	1.13	1.21	0.79	0.46	0.30
7	2.92	1.61	0.31	0.18	0.00	0.00
8	1.57	0.76	0.75	0.37	0.64	0.31
9	1.77	0.76	0.81	0.35	0.11	0.05
10	1.50	0.58	0.88	0.35	0.10	0.04
11	0.21	0.07	0.12	0.04	0.02	0.01
12	0.40	0.13	0.22	0.07	0.05	0.02
13	0.58	0.17	0.30	0.09	0.06	0.02
14	0.79	0.22	0.24	0.07	0.08	0.02
15	1.19	0.31	0.22	0.06	0.09	0.02
16	1.78	0.43	0.00	0.00	0.08	0.02
17	2.38	0.55	0.00	0.00	0.04	0.01
18	2.47	0.54	0.00	0.00	0.23	0.05
19	2.53	0.52	0.00	0.00	0.03	0.01
20	2.96	0.58	0.00	0.00	0.06	0.01
21	2.99	0.56	0.00	0.00	0.06	0.01
22	3.08	0.55	0.00	0.00	0.05	0.01

TABLE 13 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 15

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	3.08	0.52	0.00	0.00	0.05	0.01
24	3.10	0.50	0.00	0.00	0.01	0.00
25	2.93	0.46	0.00	0.00	0.04	0.01
26	2.78	0.42	0.00	0.00	0.03	0.00
27	2.67	0.39	0.00	0.00	0.00	0.00
28	2.39	0.33	0.00	0.00	0.00	0.00
29	2.15	0.29	0.00	0.00	0.01	0.00
30	1.85	0.24	0.00	0.00	0.00	0.00
31	1.51	0.19	0.00	0.00	0.00	0.00
32	1.21	0.15	0.00	0.00	0.00	0.00
33	0.91	0.11	0.00	0.00	0.00	0.00
34	0.71	0.08	0.00	0.00	0.00	0.00
35	0.56	0.06	0.00	0.00	0.00	0.00
36	0.42	0.05	0.00	0.00	0.00	0.00
37	0.30	0.03	0.00	0.00	0.00	0.00
38	0.22	0.02	0.00	0.00	0.00	0.00
39	0.16	0.02	0.00	0.00	0.00	0.00
40	0.11	0.01	0.00	0.00	0.00	0.00

TABLE 14

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+18

REACTOR LOADING, MLS :	450.0	T, C :	262.0	FEED RATIO,
CATALYST LOADING, WT%:	19.2	P, PSIG :	300	CO/H ₂ :
TIME ON STREAM, HRS :	497.0	SV, L/G/HR:	1.00	1.00

+++++

USAGE RATIO, CO/H ₂ :	0.21	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ :	6.81	MOL SYNGAS/KG CAT/HR:
%CO CONV. :	2.32	SPECIFIC ACTIVITY,
%H ₂ CONV. :	11.31	MOL CO/MOL METAL/MIN:

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	2.34	H ₂ O:	6.14
OXYGENATES :	0.10	CO :	85.71
CO ₂ :	0.14	H ₂ :	5.56

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	25.36	C4+ENE :	3.66
C2+ANE :	2.03	C5+C11 :	19.04
C2+ENE :	1.37	C12+C18:	7.69
C3+ANE :	1.64	C19+C23:	11.25
C3+ENE :	4.92	C24+34 :	18.96
C4 ISO+ANE:	1.99	C35+ :	2.10

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	19.04
DIESEL (C9+C25) :	29.16

+++++

% ELEMENTAL RECOVERY:	CARBON :	103.04
	HYDROGEN:	106.39
	OXYGEN :	108.86

+++++

TABLE 15

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 18

CARBON NO.	NtALKANES		1tALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	25.36	69.40	0.00	0.00	0.00	0.00
2	2.03	2.96	1.37	2.15	0.00	0.00
3	1.64	1.63	4.92	5.13	0.00	0.00
4	1.99	1.50	3.66	2.86	0.00	0.00
5	1.92	1.17	3.72	2.32	0.00	0.00
6	1.11	0.57	1.76	0.92	0.00	0.00
7	1.79	0.78	0.71	0.32	0.19	0.08
8	1.54	0.59	0.86	0.33	0.11	0.04
9	1.39	0.48	0.84	0.29	0.12	0.04
10	1.32	0.41	0.80	0.25	0.23	0.07
11	0.35	0.10	0.23	0.06	0.07	0.02
12	0.42	0.11	0.25	0.07	0.10	0.03
13	0.51	0.12	0.25	0.06	0.09	0.02
14	0.64	0.14	0.16	0.04	0.04	0.01
15	0.82	0.17	0.15	0.03	0.02	0.00
16	1.14	0.22	0.00	0.00	0.02	0.00
17	1.38	0.25	0.00	0.00	0.02	0.00
18	1.68	0.29	0.00	0.00	0.01	0.00
19	1.90	0.31	0.00	0.00	0.03	0.00
20	2.12	0.33	0.00	0.00	0.03	0.01
21	2.28	0.34	0.00	0.00	0.03	0.00
22	2.37	0.34	0.00	0.00	0.03	0.00

TABLE 15 (CONTINUED)
HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 18

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	2.41	0.33	0.00	0.00	0.03	0.00
24	2.42	0.31	0.00	0.00	0.03	0.00
25	2.38	0.30	0.00	0.00	0.03	0.00
26	2.25	0.27	0.00	0.00	0.03	0.00
27	2.10	0.24	0.00	0.00	0.02	0.00
28	1.93	0.21	0.00	0.00	0.02	0.00
29	1.74	0.19	0.00	0.00	0.02	0.00
30	1.57	0.16	0.00	0.00	0.01	0.00
31	1.40	0.14	0.00	0.00	0.01	0.00
32	1.21	0.12	0.00	0.00	0.00	0.00
33	0.99	0.09	0.00	0.00	0.00	0.00
34	0.81	0.07	0.00	0.00	0.00	0.00
35	0.66	0.06	0.00	0.00	0.00	0.00
36	0.50	0.04	0.00	0.00	0.00	0.00
37	0.36	0.03	0.00	0.00	0.00	0.00
38	0.26	0.02	0.00	0.00	0.00	0.00
39	0.19	0.01	0.00	0.00	0.00	0.00
40	0.13	0.01	0.00	0.00	0.00	0.00

TABLE 16

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+21

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	300	CO/H ₂ :	0.52
TIME ON STREAM, HRS :	545.0	SV, L/G/HR:	1.00		

+++++

USAGE RATIO, CO/H ₂ :	0.38	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	19.53	MOL SYNGAS/KG CAT/HR:	8.720
%CO CONV. :	15.85	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	21.44	MOL CO/MOL METAL/MIN:	0.099

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	7.26	H ₂ O:	11.58
OXYGENATES :	0.24	CO :	71.59
CO ₂ :	0.15	H ₂ :	9.19

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	45.59	C4+ENE :	1.59
C2+ANE :	4.02	C5+C11 :	14.41
C2+ENE :	0.51	C12+C18:	8.11
C3+ANE :	2.72	C19+C23:	6.84
C3+ENE :	2.36	C24+34 :	9.83
C4 ISO+ANE:	3.11	C35+ :	0.92

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 14.41
DIESEL (C9+C25) : 21.67

+++++

% ELEMENTAL RECOVERY: CARBON : 100.50
HYDROGEN: 102.18
OXYGEN : 105.75

+++++

TABLE 17

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 21

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	45.59	82.78	0.00	0.00	0.00	0.00
2	4.02	3.89	0.51	0.53	0.00	0.00
3	2.72	1.79	2.36	1.63	0.00	0.00
4	3.00	1.50	1.59	0.82	0.11	0.05
5	2.68	1.08	1.31	0.54	0.21	0.09
6	0.00	0.00	2.37	0.82	0.00	0.00
7	1.77	0.51	0.17	0.05	0.05	0.02
8	1.47	0.37	0.17	0.04	0.07	0.02
9	1.38	0.31	0.14	0.03	0.08	0.02
10	1.37	0.28	0.14	0.03	0.10	0.02
11	0.76	0.14	0.09	0.02	0.08	0.01
12	0.87	0.15	0.08	0.01	0.10	0.02
13	0.92	0.15	0.06	0.01	0.10	0.02
14	1.00	0.15	0.00	0.00	0.11	0.02
15	1.03	0.14	0.00	0.00	0.12	0.02
16	1.06	0.14	0.00	0.00	0.12	0.02
17	1.13	0.14	0.00	0.00	0.14	0.02
18	1.18	0.13	0.00	0.00	0.08	0.01
19	1.28	0.14	0.00	0.00	0.11	0.01
20	1.32	0.14	0.00	0.00	0.07	0.01
21	1.30	0.13	0.00	0.00	0.09	0.01
22	1.24	0.12	0.00	0.00	0.08	0.01

TABLE 17 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 21

CARBON NO.	N ^o ALKANES		1 ^o ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.26	0.11	0.00	0.00	0.08	0.01
24	1.24	0.11	0.00	0.00	0.07	0.01
25	1.20	0.10	0.00	0.00	0.07	0.01
26	1.13	0.09	0.00	0.00	0.06	0.00
27	1.05	0.08	0.00	0.00	0.05	0.00
28	0.97	0.07	0.00	0.00	0.05	0.00
29	0.88	0.06	0.00	0.00	0.04	0.00
30	0.79	0.05	0.00	0.00	0.03	0.00
31	0.70	0.05	0.00	0.00	0.02	0.00
32	0.58	0.04	0.00	0.00	0.01	0.00
33	0.49	0.03	0.00	0.00	0.01	0.00
34	0.39	0.02	0.00	0.00	0.00	0.00
35	0.30	0.02	0.00	0.00	0.00	0.00
36	0.22	0.01	0.00	0.00	0.00	0.00
37	0.16	0.01	0.00	0.00	0.00	0.00
38	0.11	0.01	0.00	0.00	0.00	0.00
39	0.08	0.00	0.00	0.00	0.00	0.00
40	0.06	0.00	0.00	0.00	0.00	0.00

TABLE 18

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+24

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	305	CO/H2:	0.55
TIME ON STREAM, HRS :	617.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.64	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	10.37	MOL SYNGAS/KG CAT/HR:	9.256
%CO CONV-	11.41	SPECIFIC ACTIVITY,	
%H2 CONV-	9.80	MOL CO/MOL METAL/MIN:	0.148

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	2.96	H2O:	5.00
OXYGENATES :	0.04	CO :	81.14
CO2 :	0.09	H2 :	10.76

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	51.28	C4+ENE :	0.91
C2+ANE :	2.63	C5+C11 :	14.98
C2+ENE :	1.23	C12+C18:	8.09
C3+ANE :	3.14	C19+C25:	6.37
C3+ENE :	1.38	C24+34 :	6.16
C4 ISO+ANE:	3.36	C35+ :	0.47

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	14.98
DIESEL (C9+C25) :	20.12

+++++

% ELEMENTAL RECOVERY:	CARBON :	94.70
	HYDROGEN:	100.01
	OXYGEN :	97.26

+++++

TABLE 19

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 24

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	51.28	85.43	0.00	0.00	0.00	0.00
2	2.63	2.34	1.23	1.17	0.00	0.00
3	3.14	1.91	1.38	0.87	0.00	0.00
4	3.36	1.54	0.91	0.43	0.00	0.00
5	3.34	1.24	0.83	0.31	0.23	0.09
6	2.44	0.76	0.30	0.10	0.00	0.00
7	2.12	0.57	0.10	0.03	0.04	0.01
8	1.68	0.39	0.11	0.03	0.07	0.02
9	1.45	0.30	0.09	0.02	0.04	0.01
10	1.34	0.25	0.09	0.02	0.04	0.01
11	0.57	0.10	0.04	0.01	0.04	0.01
12	0.75	0.12	0.04	0.01	0.07	0.01
13	0.89	0.13	0.04	0.01	0.08	0.01
14	1.02	0.14	0.00	0.00	0.10	0.01
15	1.09	0.14	0.00	0.00	0.11	0.01
16	1.13	0.13	0.00	0.00	0.12	0.01
17	1.20	0.13	0.00	0.00	0.13	0.01
18	1.21	0.13	0.00	0.00	0.11	0.01
19	1.28	0.13	0.00	0.00	0.16	0.02
20	1.23	0.12	0.00	0.00	0.10	0.01
21	1.17	0.11	0.00	0.00	0.10	0.01
22	1.11	0.10	0.00	0.00	0.10	0.01

TABLE 19 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 24

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.04	0.09	0.00	0.00	0.09	0.01
24	0.95	0.07	0.00	0.00	0.07	0.01
25	0.86	0.07	0.00	0.00	0.07	0.01
26	0.76	0.06	0.00	0.00	0.06	0.00
27	0.66	0.05	0.00	0.00	0.05	0.00
28	0.58	0.04	0.00	0.00	0.04	0.00
29	0.50	0.03	0.00	0.00	0.03	0.00
30	0.42	0.03	0.00	0.00	0.03	0.00
31	0.35	0.02	0.00	0.00	0.02	0.00
32	0.28	0.02	0.00	0.00	0.02	0.00
33	0.23	0.01	0.00	0.00	0.01	0.00
34	0.18	0.01	0.00	0.00	0.00	0.00
35	0.15	0.01	0.00	0.00	0.00	0.00
36	0.11	0.01	0.00	0.00	0.00	0.00
37	0.08	0.00	0.00	0.00	0.00	0.00
38	0.06	0.00	0.00	0.00	0.00	0.00
39	0.04	0.00	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 20

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : RU/ZR/SILICA
SAMPLE NO: 8862+16+37+27

REACTOR LOADING, MLS :	450.0	T, C :	240.0	FEED RATIO,	
CATALYST LOADING, WT%:	19.2	P, PSIG :	300	CO/H2:	0.50
TIME ON STREAM, HRS :	689.0	SV, L/G/HR:	1.00		

USAGE RATIO, CO/H2 :	0.40	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	11.13	MOL SYNGAS/KG CAT/HR:	4.964
%CO CONV.	9.49	SPECIFIC ACTIVITY,	
%H2 CONV.	11.95	MOL CO/MOL METAL/MIN:	0.058

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	3.45	H2O:	7.41
OXYGENATES :	0.05	CO :	78.06
CO2 :	0.18	H2 :	10.84

HYDROCARBON SELECTIVITY, WT%:

C1 :	33.80	C4+ENE :	1.01
C2+ANE :	3.40	C5+C11 :	15.51
C2+ENE :	0.00	C12+C18:	16.46
C3+ANE :	2.99	C19+C23:	10.16
C3+ENE :	1.07	C24+34 :	10.40
C4 ISO+ANE:	4.34	C35+ :	0.87

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 15.51
DIESEL (C9+C25) : 36.24

% ELEMENTAL RECOVERY: CARBON : 98.28
HYDROGEN: 100.06
OXYGEN : 104.19

TABLE 21

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 27

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	33.80	77.90	0.00	0.00	0.00	0.00
2	3.40	4.18	0.00	0.00	0.00	0.00
3	2.99	2.50	1.07	0.94	0.00	0.00
4	4.16	2.65	1.01	0.66	0.17	0.11
5	3.79	1.94	1.10	0.58	0.00	0.00
6	1.52	0.65	0.00	0.00	0.00	0.00
7	1.38	0.51	0.02	0.01	0.08	0.03
8	1.42	0.46	0.08	0.03	0.03	0.01
9	1.70	0.49	0.09	0.03	0.04	0.01
10	2.17	0.56	0.12	0.03	0.08	0.02
11	1.69	0.40	0.08	0.02	0.13	0.03
12	1.94	0.42	0.07	0.02	0.15	0.03
13	2.11	0.42	0.06	0.01	0.18	0.04
14	2.23	0.42	0.00	0.00	0.20	0.04
15	2.22	0.39	0.00	0.00	0.20	0.03
16	2.20	0.36	0.00	0.00	0.23	0.04
17	2.17	0.33	0.00	0.00	0.23	0.04
18	2.12	0.31	0.00	0.00	0.16	0.02
19	2.08	0.29	0.00	0.00	0.15	0.02
20	2.01	0.26	0.00	0.00	0.15	0.02
21	1.91	0.24	0.00	0.00	0.14	0.02
22	1.79	0.21	0.00	0.00	0.13	0.02

TABLE 21 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 27

CARBON NO.	n-ALKANES		1-ALKENE		BRANCHED WT %	ISOMERS MOLE %
	WT %	MOLE %	WT %	MOLE %		
23	1.66	0.19	0.00	0.00	0.12	0.01
24	1.52	0.17	0.00	0.00	0.11	0.01
25	1.83	0.19	0.00	0.00	0.07	0.01
26	1.21	0.12	0.00	0.00	0.08	0.01
27	1.06	0.10	0.00	0.00	0.07	0.01
28	0.93	0.09	0.00	0.00	0.05	0.00
29	0.81	0.07	0.00	0.00	0.04	0.00
30	0.69	0.06	0.00	0.00	0.03	0.00
31	0.59	0.05	0.00	0.00	0.02	0.00
32	0.50	0.04	0.00	0.00	0.02	0.00
33	0.41	0.03	0.00	0.00	0.01	0.00
34	0.34	0.03	0.00	0.00	0.01	0.00
35	0.28	0.02	0.00	0.00	0.00	0.00
36	0.21	0.02	0.00	0.00	0.00	0.00
37	0.15	0.01	0.00	0.00	0.00	0.00
38	0.10	0.01	0.00	0.00	0.00	0.00
39	0.07	0.00	0.00	0.00	0.00	0.00
40	0.05	0.00	0.00	0.00	0.00	0.00

TABLE 22

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Ru/Zr/SILICA
SAMPLE No: 8862+16+37+30

REACTOR LOADING, MLS :	450.0	T, C :	281.0	FEED RATIO,
CATALYST LOADING, WT% :	19.2	P, PSIG :	300	CO/H ₂ :
TIME ON STREAM, HRS :	785.0	SV, L/G/HR:	1.00	0.49

USAGE RATIO, CO/H ₂ :	0.35	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ :	21.48	MOL SYNGAS/KG CAT/HR:
%CO CONV. :	17.04	SPECIFIC ACTIVITY,
%H ₂ CONV. :	23.66	MOL CO/MOL METAL/MIN:

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	7.20	H ₂ O:	15.17
OXYGENATES :	0.15	CO :	68.01
CO ₂ :	0.39	H ₂ :	9.07

HYDROCARBON SELECTIVITY, WT%:

C1 :	52.87	C4+ENE :	1.23
C2+ANE :	4.83	C5+C11 :	13.72
C2+ENE :	0.00	C12+C18:	10.83
C3+ANE :	3.67	C19+C23:	4.17
C3+ENE :	1.71	C24+34 :	2.77
C4 ISO+ANE:	3.93	C35+ :	0.28

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	13.72
DIESEL (C9+C25) :	20.64

% ELEMENTAL RECOVERY:	CARBON :	99.68
	HYDROGEN:	103.31
	OXYGEN :	112.49

TABLE 23

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 30

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	52.87	84.78	0.00	0.00	0.00	0.00
2	4.83	4.13	0.00	0.00	0.00	0.00
3	3.67	2.14	1.71	1.04	0.00	0.00
4	3.79	1.67	1.23	0.56	0.15	0.07
5	3.50	1.25	1.06	0.39	0.32	0.12
6	1.54	0.46	0.02	0.01	0.00	0.00
7	1.21	0.31	0.06	0.02	0.05	0.01
8	1.12	0.25	0.07	0.02	0.07	0.01
9	1.29	0.26	0.06	0.01	0.09	0.02
10	1.55	0.28	0.08	0.01	0.15	0.03
11	1.24	0.20	0.05	0.01	0.18	0.03
12	1.32	0.20	0.04	0.01	0.21	0.03
13	1.38	0.19	0.00	0.00	0.21	0.03
14	1.40	0.18	0.00	0.00	0.22	0.03
15	1.42	0.17	0.00	0.00	0.23	0.03
16	1.39	0.16	0.00	0.00	0.23	0.03
17	1.29	0.14	0.00	0.00	0.21	0.02
18	1.15	0.12	0.00	0.00	0.14	0.01
19	1.02	0.10	0.00	0.00	0.13	0.01
20	0.86	0.08	0.00	0.00	0.09	0.01
21	0.72	0.06	0.00	0.00	0.07	0.01
22	0.62	0.05	0.00	0.00	0.06	0.01

TABLE 23 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+16+37

SAMPLE NO. 30

CARBON NO.	N*ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.54	0.04	0.00	0.00	0.05	0.00
24	0.47	0.04	0.00	0.00	0.04	0.00
25	0.40	0.03	0.00	0.00	0.04	0.00
26	0.33	0.02	0.00	0.00	0.03	0.00
27	0.28	0.02	0.00	0.00	0.02	0.00
28	0.24	0.02	0.00	0.00	0.02	0.00
29	0.20	0.01	0.00	0.00	0.01	0.00
30	0.17	0.01	0.00	0.00	0.01	0.00
31	0.15	0.01	0.00	0.00	0.01	0.00
32	0.13	0.01	0.00	0.00	0.01	0.00
33	0.11	0.01	0.00	0.00	0.00	0.00
34	0.09	0.00	0.00	0.00	0.00	0.00
35	0.07	0.00	0.00	0.00	0.00	0.00
36	0.07	0.00	0.00	0.00	0.00	0.00
37	0.05	0.00	0.00	0.00	0.00	0.00
38	0.04	0.00	0.00	0.00	0.00	0.00
39	0.03	0.00	0.00	0.00	0.00	0.00
40	0.02	0.00	0.00	0.00	0.00	0.00

TABLE 24
Slurry Screening Summary
8862-41-46
20.0 wt% (83.7g) $\text{Co}_2(\text{CO})_8/\text{Zr}(\text{OPr})_4/\text{SiO}_2$

Sample No.	Time on Stream h	P psig	T °C	SV, NL/9 cat/hr	wt%CO+H ₂	wt%CO	wt%H ₂	Feed CO/H ₂	Usage ΔCO/ΔH ₂	Bulk Activity mol syngas/kg cat/h	Specific Activity mol CO/mol metal/min	Selectivity Wt%						
												C ₁	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ ⁺	C ₅ -C ₂₃
3	72	300	241	2.0	45.7	43.3	46.8	0.5	0.46	40.8	0.260	16.2	15.1	33.7	20.3	7.7	2.0	61.7
6	144	300	240	1.0	46.2	47.1	45.7	0.5	0.51	20.6	0.142	13.9	15.1	37.3	18.2	8.2	7.5	63.7
9	215	300	242	1.0	35.5	23.7	47.3	1.0	0.60	15.8	0.107	9.8	10.1	31.3	26.0	12.6	11.2	68.9
12	313	305	241	2.0	20.5	14.6	26.8	1.0	0.56	18.3	0.134	13.3	13.2	42.5	15.8	8.2	7.0	66.5
16	384	295	262	2.0	39.8	25.2	53.7	0.96	0.45	35.5	0.223	15.5	11.6	36.0	19.5	8.7	8.7	64.2
18	482	300	260	1.0	40.1	28.0	52.3	1.0	0.54	17.9	0.128	15.3	13.8	35.6	17.8	8.8	8.8	62.2
21	553	295	261	1.0	53.7	54.0	53.5	0.49	0.50	24.0	0.161	21.7	15.8	27.8	17.0	10.0	7.6	54.8
24	648	300	262	2.0	35.5	30.8	37.9	0.49	0.40	31.7	0.184	32.0	23.0	34.7	8.5	1.6	0.2	44.8
27	720	290	242	1.0	30.0	28.2	30.9	0.49	0.45	13.4	0.084	25.0	21.3	29.9	14.3	5.2	4.3	49.4
30	816	295	281	2.0	46.1	40.8	48.8	0.49	0.41	41.2	0.244	41.4	26.6	25.2	4.6	2.2	0.1	32.0
33	888	295	280	2.0	30.3	18.5	42.1	1.0	0.44	27.1	0.168	29.5	17.6	41.0	8.9	2.8	0.2	52.7

TABLE 25

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA
SAMPLE NO: 8862+41+46+3

REACTOR LOADING, MLS :	450.0	T, C :	241.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	300	CO/H2:	0.50
TIME ON STREAM, HRS :	72.3	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H2 :	0.46	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	45.66	MOL SYNGAS/KG CAT/HR:	40.757
%CO CONV.	43.30	SPECIFIC ACTIVITY,	
%H2 CONV.	46.84	MOL CO/MOL METAL/MIN:	0.260

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	18.84	H2O:	22.24
OXYGENATES :	0.98	CO :	49.75
CO2 :	1.49	H2 :	6.70

HYDROCARBON SELECTIVITY, WT%:

C1 :	16.20	C4+ENE :	1.97
C2+ANE :	2.47	C5+C11 :	33.74
C2+ENE :	0.00	C12+C18:	20.32
C3+ANE :	3.61	C19+C23:	7.70
C3+ENE :	2.36	C24+34 :	6.30
C4 ISO+ANE:	4.64	C35+ :	0.71

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	33.74
DIESEL (C9+C25) :	43.27

% ELEMENTAL RECOVERY:	CARBON :	100.49
	HYDROGEN:	99.46
	OXYGEN :	99.08

TABLE 26

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 3

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	16.20	55.61	0.00	0.00	0.00	0.00
2	2.47	4.51	0.00	0.00	0.00	0.00
3	3.61	4.51	2.36	3.08	0.00	0.00
4	4.57	4.33	1.97	1.93	0.07	0.06
5	4.59	3.50	1.63	1.28	0.20	0.16
6	5.75	3.67	0.00	0.00	0.00	0.00
7	3.50	1.92	0.32	0.18	0.34	0.19
8	3.16	1.52	0.28	0.14	0.58	0.28
9	4.22	1.81	0.23	0.10	0.61	0.26
10	3.88	1.50	0.20	0.08	0.64	0.25
11	2.97	1.05	0.10	0.04	0.52	0.18
12	2.87	0.93	0.00	0.00	0.48	0.15
13	2.73	0.82	0.00	0.00	0.44	0.13
14	2.62	0.73	0.00	0.00	0.40	0.11
15	2.54	0.66	0.00	0.00	0.35	0.09
16	2.51	0.61	0.00	0.00	0.29	0.07
17	2.45	0.56	0.00	0.00	0.22	0.05
18	2.28	0.49	0.00	0.00	0.14	0.03
19	1.97	0.40	0.00	0.00	0.09	0.02
20	1.67	0.32	0.00	0.00	0.05	0.01
21	1.44	0.27	0.00	0.00	0.04	0.01
22	1.26	0.22	0.00	0.00	0.04	0.01

TABLE 26 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8852+41+46

SAMPLE NO. 3

CARBON NO.	N-ALKANES		1-ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.10	0.19	0.00	0.00	0.04	0.01
24	0.95	0.16	0.00	0.00	0.03	0.01
25	0.85	0.13	0.00	0.00	0.03	0.00
26	0.74	0.11	0.00	0.00	0.05	0.01
27	0.61	0.09	0.00	0.00	0.05	0.01
28	0.51	0.07	0.00	0.00	0.00	0.00
29	0.41	0.05	0.00	0.00	0.04	0.00
30	0.37	0.05	0.00	0.00	0.05	0.01
31	0.35	0.04	0.00	0.00	0.09	0.01
32	0.33	0.04	0.00	0.00	0.08	0.01
33	0.31	0.04	0.00	0.00	0.07	0.01
34	0.29	0.03	0.00	0.00	0.09	0.01
35	0.27	0.03	0.00	0.00	0.02	0.00
36	0.19	0.02	0.00	0.00	0.00	0.00
37	0.14	0.01	0.00	0.00	0.00	0.00
38	0.04	0.00	0.00	0.00	0.00	0.00
39	0.03	0.00	0.00	0.00	0.00	0.00
40	0.02	0.00	0.00	0.00	0.00	0.00

TABLE 27

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA
SAMPLE No: 8862+41+46+6

REACTOR LOADING, MLS :	450.0	T, C :	240.0	FEED RATIO,
CATALYST LOADING, WT%:	20.0	P, PSIG :	300	CO/H ₂ : 0.50
TIME ON STREAM, HRS :	144.5	SV, L/G/HR:	1.00	

+++++

USAGE RATIO, CO/H ₂ :	0.51	BULK ACTIVITY,
%OVERALL CONV-, CO+H ₂ :	46.19	MOL SYNGAS/KG CAT/HR: 20.601
%CO CONV- :	47.10	SPECIFIC ACTIVITY,
%H ₂ CONV- :	45.74	MOL CO/MOL METAL/MIN: 0.142

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	20.17	H ₂ O:	20.52
OXYGENATES :	0.65	CO :	47.93
CO ₂ :	3.70	H ₂ :	7.02

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	13.88	C4+ENE :	1.87
C2+ANE :	2.20	C5+C11 :	37.28
C2+ENE :	0.00	C12+C18:	18.15
C3+ANE :	2.68	C19+C23:	8.17
C3+ENE :	2.28	C24+34 :	6.71
C4 ISO+ANE:	6.03	C35+ :	0.75

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	37.28
DIESEL (C9+C25) :	41.54

+++++

% ELEMENTAL RECOVERY:	CARBON :	99.40
	HYDROGEN:	98.98
	OXYGEN :	93.83

+++++

TABLE 28

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 6

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	13.88	50.82	0.00	0.00	0.00	0.00
2	2.20	4.29	0.00	0.00	0.00	0.00
3	2.68	3.57	2.28	3.18	0.00	0.00
4	5.98	6.04	1.87	1.96	0.05	0.05
5	6.44	5.24	2.94	2.46	0.29	0.24
6	5.70	3.89	0.00	0.00	0.06	0.04
7	3.99	2.34	0.34	0.21	0.08	0.05
8	3.42	1.76	0.34	0.18	0.46	0.24
9	4.42	2.02	0.34	0.16	0.62	0.28
10	3.93	1.62	0.25	0.10	0.55	0.23
11	2.61	0.98	0.11	0.04	0.38	0.14
12	2.48	0.85	0.00	0.00	0.35	0.12
13	2.31	0.74	0.00	0.00	0.32	0.10
14	2.22	0.66	0.00	0.00	0.28	0.08
15	2.20	0.61	0.00	0.00	0.27	0.07
16	2.31	0.60	0.00	0.00	0.28	0.07
17	2.48	0.61	0.00	0.00	0.22	0.05
18	2.24	0.52	0.00	0.00	0.20	0.05
19	2.04	0.45	0.00	0.00	0.13	0.03
20	1.78	0.37	0.00	0.00	0.05	0.01
21	1.54	0.31	0.00	0.00	0.05	0.01
22	1.33	0.25	0.00	0.00	0.04	0.01

TABLE 28 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 6

CARBON NO.	NtALKANES		1tALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.16	0.21	0.00	0.00	0.04	0.01
24	1.01	0.18	0.00	0.00	0.07	0.01
25	0.90	0.15	0.00	0.00	0.03	0.01
26	0.83	0.13	0.00	0.00	0.00	0.00
27	0.73	0.11	0.00	0.00	0.00	0.00
28	0.66	0.10	0.00	0.00	0.00	0.00
29	0.49	0.07	0.00	0.00	0.03	0.00
30	0.45	0.06	0.00	0.00	0.04	0.01
31	0.40	0.05	0.00	0.00	0.06	0.01
32	0.31	0.04	0.00	0.00	0.04	0.01
33	0.28	0.04	0.00	0.00	0.04	0.01
34	0.27	0.03	0.00	0.00	0.05	0.01
35	0.26	0.03	0.00	0.00	0.00	0.00
36	0.20	0.02	0.00	0.00	0.00	0.00
37	0.14	0.02	0.00	0.00	0.00	0.00
38	0.06	0.01	0.00	0.00	0.00	0.00
39	0.05	0.01	0.00	0.00	0.00	0.00
40	0.04	0.00	0.00	0.00	0.00	0.00

TABLE 29

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA
SAMPLE NO: 8862+41+46+9

REACTOR LOADING, MLS :	450.0	T, C :	242.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	215.0	SV, L/G/HR:	1.00		

USAGE RATIO, CO/H ₂ :	0.50	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	35.50	MOL SYNGAS/KG CAT/HR:	15.859
%CO CONV. :	23.71	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	47.29	MOL CO/MOL METAL/MIN:	0.107

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	9.47	H ₂ O:	13.98
OXYGENATES :	0.37	CO :	71.67
CO ₂ :	0.98	H ₂ :	3.54

HYDROCARBON SELECTIVITY, WT%:

C1 :	9.80	C4+ENE :	2.43
C2+ANE :	1.53	C5+C11 :	31.32
C2+ENE :	0.00	C12+C18:	24.97
C3+ANE :	1.29	C19+C23:	12.64
C3+ENE :	2.92	C24+34 :	10.16
C4 ISO+ANE:	1.91	C35+ :	1.02

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	31.32
DIESEL (C9+C25) :	54.41

% ELEMENTAL RECOVERY:	CARBON :	97.10
	HYDROGEN:	99.53
	OXYGEN :	101.04

TABLE 30

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 9

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	9.80	46.11	0.00	0.00	0.00	0.00
2	1.53	3.84	0.00	0.00	0.00	0.00
3	1.29	2.20	2.92	5.24	0.00	0.00
4	1.87	2.43	2.43	3.27	0.04	0.05
5	2.24	2.34	2.53	2.72	0.13	0.14
6	5.04	4.41	0.00	0.00	0.00	0.00
7	3.19	2.40	0.76	0.58	0.00	0.00
8	2.64	1.74	0.77	0.52	0.36	0.24
9	3.56	2.09	0.80	0.48	0.44	0.26
10	3.69	1.96	0.75	0.40	0.60	0.32
11	2.90	1.40	0.41	0.20	0.52	0.25
12	2.84	1.26	0.26	0.12	0.52	0.23
13	2.98	1.22	0.00	0.00	0.50	0.21
14	2.92	1.11	0.00	0.00	0.45	0.17
15	2.93	1.04	0.00	0.00	0.42	0.15
16	3.12	1.04	0.00	0.00	0.41	0.14
17	3.53	1.11	0.00	0.00	0.33	0.10
18	3.55	1.05	0.00	0.00	0.21	0.06
19	3.20	0.90	0.00	0.00	0.17	0.05
20	2.74	0.73	0.00	0.00	0.08	0.02
21	2.39	0.61	0.00	0.00	0.07	0.02
22	2.06	0.50	0.00	0.00	0.06	0.02

TABLE 30 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 9

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.81	0.42	0.00	0.00	0.06	0.01
24	1.59	0.35	0.00	0.00	0.09	0.02
25	1.41	0.30	0.00	0.00	0.04	0.01
26	1.24	0.25	0.00	0.00	0.02	0.00
27	1.12	0.22	0.00	0.00	0.00	0.00
28	0.95	0.18	0.00	0.00	0.04	0.01
29	0.80	0.15	0.00	0.00	0.03	0.01
30	0.71	0.13	0.00	0.00	0.04	0.01
31	0.62	0.11	0.00	0.00	0.05	0.01
32	0.49	0.08	0.00	0.00	0.04	0.01
33	0.42	0.07	0.00	0.00	0.04	0.01
34	0.41	0.07	0.00	0.00	0.00	0.00
35	0.33	0.05	0.00	0.00	0.00	0.00
36	0.26	0.04	0.00	0.00	0.00	0.00
37	0.19	0.03	0.00	0.00	0.00	0.00
38	0.12	0.02	0.00	0.00	0.00	0.00
39	0.09	0.01	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 31

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA
SAMPLE No: 8862+41+46+12

REACTOR LOADING, MLS :	450.0	T, C :	241.0	FEED RATIO,
CATALYST LOADING, WT%:	20.0	P, PSIG :	305	CO/H ₂ :
TIME ON STREAM, HRS :	312.8	SV, L/G/HR:	2.00	1.04

USAGE RATIO, CO/H ₂ :	0.56	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ :	20.52	MOL SYNGAS/KG CAT/HR:
%CO CONV. :	14.50	SPECIFIC ACTIVITY,
%H ₂ CONV. :	26.78	MOL CO/MOL METAL/MIN:
		0.134

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	5.32	H ₂ O:	7.65
OXYGENATES :	0.22	CO :	81.76
CO ₂ :	0.26	H ₂ :	4.80

HYDROCARBON SELECTIVITY, WT%:

C ₁ :	13.28	C ₄ +ENE :	3.74
C ₂ +ANE :	1.90	C ₅ +C ₁₁ :	42.49
C ₂ +ENE :	0.00	C ₁₂ +C ₁₈ :	15.85
C ₃ +ANE :	1.52	C ₁₉ +C ₂₃ :	8.17
C ₃ +ENE :	3.63	C ₂₄ +34 :	6.12
C ₄ ISO+ANE:	2.41	C ₃₅ + :	0.89

FUEL FRACTIONS, WT%:

GASOLINE (C ₅ +C ₁₁):	42.49
DIESEL (C ₉ +C ₂₅) :	37.14

% ELEMENTAL RECOVERY:	CARBON :	96.72
	HYDROGEN:	100.16
	OXYGEN :	98.45

TABLE 32

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 12

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	13.28	49.46	0.00	0.00	0.00	0.00
2	1.90	3.78	0.00	0.00	0.00	0.00
3	1.52	2.06	3.63	5.15	0.00	0.00
4	2.33	2.39	3.74	3.98	0.08	0.09
5	3.02	2.50	3.74	3.18	0.15	0.13
6	10.69	7.41	0.21	0.15	0.00	0.00
7	5.62	3.35	1.28	0.78	0.82	0.49
8	4.09	2.14	1.06	0.57	0.48	0.25
9	3.50	1.63	0.81	0.38	0.21	0.10
10	3.25	1.36	0.68	0.29	0.35	0.15
11	1.87	0.71	0.33	0.13	0.32	0.12
12	1.90	0.67	0.25	0.09	0.36	0.13
13	2.01	0.65	0.00	0.00	0.35	0.11
14	1.89	0.57	0.00	0.00	0.32	0.10
15	1.81	0.51	0.00	0.00	0.29	0.08
16	1.79	0.47	0.00	0.00	0.26	0.07
17	1.90	0.47	0.00	0.00	0.23	0.06
18	2.27	0.53	0.00	0.00	0.22	0.05
19	2.30	0.51	0.00	0.00	0.19	0.04
20	1.80	0.38	0.00	0.00	0.09	0.02
21	1.42	0.29	0.00	0.00	0.05	0.01
22	1.20	0.23	0.00	0.00	0.04	0.01

TABLE 32 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 12

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.05	0.19	0.00	0.00	0.04	0.01
24	0.92	0.16	0.00	0.00	0.03	0.01
25	0.82	0.14	0.00	0.00	0.03	0.00
26	0.73	0.12	0.00	0.00	0.02	0.00
27	0.64	0.10	0.00	0.00	0.02	0.00
28	0.57	0.09	0.00	0.00	0.01	0.00
29	0.49	0.07	0.00	0.00	0.02	0.00
30	0.44	0.06	0.00	0.00	0.01	0.00
31	0.39	0.05	0.00	0.00	0.02	0.00
32	0.33	0.04	0.00	0.00	0.01	0.00
33	0.30	0.04	0.00	0.00	0.01	0.00
34	0.29	0.04	0.00	0.00	0.01	0.00
35	0.25	0.03	0.00	0.00	0.00	0.00
36	0.21	0.02	0.00	0.00	0.00	0.00
37	0.16	0.02	0.00	0.00	0.00	0.00
38	0.11	0.01	0.00	0.00	0.00	0.00
39	0.09	0.01	0.00	0.00	0.00	0.00
40	0.07	0.01	0.00	0.00	0.00	0.00

TABLE 33

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA
SAMPLE NO: 8862+41+46+15

REACTOR LOADING, MLS :	450.0	T, C :	262.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	295	CO/H2:	0.96
TIME ON STREAM, HRS :	384.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.45	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	39.76	MOL SYNGAS/KG CAT/HR:	35.503
%CO CONV-	25.18	SPECIFIC ACTIVITY,	
%H2 CONV-	53.72	MOL CO/MOL METAL/MIN:	0.223

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	12.40	H2O:	12.39
OXYGENATES :	0.43	CO :	69.91
CO2 :	1.65	H2 :	3.23

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	15.47	C4+ENE :	2.48
C2+ANE :	2.14	C5+C11 :	36.04
C2+ENE :	0.12	C12+C18:	19.50
C3+ANE :	1.76	C19+C23:	8.66
C3+ENE :	2.74	C24+34 :	7.80
C4 ISO+ANE:	2.41	C35+ :	0.89

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	36.04
DIESEL (C9+C25) :	43.11

+++++

% ELEMENTAL RECOVERY:	CARBON :	102.16
	HYDROGEN:	97.00
	OXYGEN :	98.02

+++++

TABLE 34

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 15

CARBON NO.	N-ALKANES		1-ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	15.47	55.69	0.00	0.00	0.00	0.00
2	2.14	4.10	0.12	0.25	0.00	0.00
3	1.76	2.30	2.74	3.75	0.00	0.00
4	2.38	2.36	2.48	2.55	0.03	0.03
5	2.85	2.28	2.46	2.03	0.19	0.15
6	8.28	5.55	0.00	0.00	0.20	0.14
7	4.36	2.51	0.70	0.41	0.22	0.13
8	3.18	1.60	0.57	0.29	0.36	0.18
9	3.63	1.63	0.55	0.25	0.55	0.25
10	3.33	1.35	0.46	0.19	0.63	0.25
11	2.63	0.97	0.29	0.11	0.58	0.22
12	2.76	0.94	0.00	0.00	0.61	0.21
13	2.59	0.81	0.00	0.00	0.60	0.19
14	2.43	0.71	0.00	0.00	0.56	0.16
15	2.26	0.62	0.02	0.01	0.49	0.13
16	2.13	0.54	0.00	0.00	0.46	0.12
17	2.03	0.49	0.00	0.00	0.40	0.10
18	1.94	0.44	0.00	0.00	0.21	0.05
19	1.98	0.43	0.00	0.00	0.16	0.03
20	1.82	0.37	0.00	0.00	0.10	0.02
21	1.63	0.32	0.00	0.00	0.09	0.02
22	1.45	0.27	0.00	0.00	0.08	0.02

TABLE 34 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+45

SAMPLE NO. 15

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.29	0.23	0.00	0.00	0.07	0.01
24	1.15	0.20	0.00	0.00	0.06	0.01
25	1.03	0.17	0.00	0.00	0.05	0.01
26	0.92	0.14	0.00	0.00	0.05	0.01
27	0.81	0.12	0.00	0.00	0.04	0.01
28	0.72	0.11	0.00	0.00	0.03	0.00
29	0.63	0.09	0.00	0.00	0.03	0.00
30	0.56	0.08	0.00	0.00	0.03	0.00
31	0.50	0.07	0.00	0.00	0.03	0.00
32	0.42	0.05	0.00	0.00	0.01	0.00
33	0.36	0.04	0.00	0.00	0.01	0.00
34	0.34	0.04	0.00	0.00	0.01	0.00
35	0.28	0.03	0.00	0.00	0.00	0.00
36	0.21	0.02	0.00	0.00	0.00	0.00
37	0.15	0.02	0.00	0.00	0.00	0.00
38	0.11	0.01	0.00	0.00	0.00	0.00
39	0.08	0.01	0.00	0.00	0.00	0.00
40	0.06	0.01	0.00	0.00	0.00	0.00

TABLE 35

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA
SAMPLE NO: 8862+41+46+18

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	300	CO/H2:	1.01
TIME ON STREAM, HRS :	482.0	SV, L/G/HR:	1.00		

+++++

USAGE RATIO, CO/H2 :	0.54	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	40.12	MOL SYNGAS/KG CAT/HR:	17.921
%CO CONV.	28.05	SPECIFIC ACTIVITY,	
%H2 CONV.	52.28	MOL CO/MOL METAL/MIN:	0.128

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	10.64	H2O:	13.15
OXYGENATES :	0.35	CO :	69.85
CO2 :	2.73	H2 :	3.28

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	15.26	C4+ENE :	2.98
C2+ANE :	2.44	C5+C11 :	35.60
C2+ENE :	0.14	C12+C18:	17.79
C3+ANE :	2.14	C19+C23:	8.76
C3+ENE :	3.24	C24+34 :	7.93
C4 ISO+ANE:	2.85	C35+ :	0.87

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	35.60
DIESEL (C9+C25) :	42.41

+++++

% ELEMENTAL RECOVERY:	CARBON :	95.38
	HYDROGEN:	95.88
	OXYGEN :	96.84

+++++

TABLE 36

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 18

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	15.26	54.21	0.00	0.00	0.00	0.00
2	2.44	4.63	0.14	0.29	0.00	0.00
3	2.14	2.76	3.24	4.39	0.00	0.00
4	2.81	2.76	2.98	3.02	0.04	0.04
5	3.52	2.78	2.98	2.42	0.22	0.17
6	6.46	4.27	0.13	0.08	0.00	0.00
7	3.80	2.16	0.64	0.37	0.22	0.12
8	3.22	1.61	0.59	0.30	0.41	0.20
9	3.99	1.77	0.55	0.25	0.64	0.28
10	3.62	1.45	0.44	0.18	0.68	0.27
11	2.68	0.98	0.26	0.10	0.57	0.21
12	2.63	0.88	0.00	0.00	0.53	0.18
13	2.35	0.73	0.00	0.00	0.47	0.15
14	2.14	0.62	0.00	0.00	0.41	0.12
15	2.03	0.54	0.01	0.00	0.34	0.09
16	2.14	0.54	0.00	0.00	0.37	0.09
17	2.07	0.49	0.00	0.00	0.36	0.08
18	1.82	0.41	0.00	0.00	0.13	0.03
19	1.83	0.39	0.00	0.00	0.13	0.03
20	1.81	0.36	0.00	0.00	0.11	0.02
21	1.68	0.32	0.00	0.00	0.11	0.02
22	1.53	0.28	0.00	0.00	0.10	0.02

TABLE 36 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 18

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.37	0.24	0.00	0.00	0.09	0.02
24	1.22	0.20	0.00	0.00	0.08	0.01
25	1.08	0.17	0.00	0.00	0.07	0.01
26	0.96	0.15	0.00	0.00	0.06	0.01
27	0.85	0.13	0.00	0.00	0.06	0.01
28	0.74	0.11	0.00	0.00	0.07	0.01
29	0.64	0.09	0.00	0.00	0.05	0.01
30	0.55	0.07	0.00	0.00	0.04	0.01
31	0.46	0.06	0.00	0.00	0.03	0.00
32	0.37	0.05	0.00	0.00	0.02	0.00
33	0.30	0.04	0.00	0.00	0.02	0.00
34	0.24	0.03	0.00	0.00	0.01	0.00
35	0.25	0.03	0.00	0.00	0.00	0.00
36	0.20	0.02	0.00	0.00	0.00	0.00
37	0.15	0.02	0.00	0.00	0.00	0.00
38	0.11	0.01	0.00	0.00	0.00	0.00
39	0.09	0.01	0.00	0.00	0.00	0.00
40	0.07	0.01	0.00	0.00	0.00	0.00

TABLE 37

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SiO₂(Co/Zr=2)
SAMPLE NO: 8862+41+46+21

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	295	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	552.8	SV, L/G/HR:	1.00		

USAGE RATIO, CO/H ₂ :	0.50	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	53.69	MOL SYNGAS/KG CAT/HR:	23.971
%CO CONV. :	54.00	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	53.54	MOL CO/MOL METAL/MIN:	0.161

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	24.04	H ₂ O:	15.29
OXYGENATES :	0.69	CO :	47.56
CO ₂ :	5.47	H ₂ :	6.96

HYDROCARBON SELECTIVITY, WT%:

C1 :	21.74	C4+ENE :	1.47
C2+ANE :	3.76	C5+C11 :	27.83
C2+ENE :	0.00	C12+C18:	16.99
C3+ANE :	4.64	C19+C23:	10.03
C3+ENE :	1.28	C24+34 :	6.75
C4 ISO+ANE:	4.67	C35+ :	0.83

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	27.83
DIESEL (C9+C25) :	38.90

% ELEMENTAL RECOVERY:	CARBON :	94.65
	HYDROGEN:	86.96
	OXYGEN :	76.21

TABLE 38

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 21

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	21.74	63.50	0.00	0.00	0.00	0.00
2	3.76	5.86	0.00	0.00	0.00	0.00
3	4.64	4.93	1.28	1.42	0.00	0.00
4	4.58	3.69	1.47	1.23	0.09	0.08
5	4.53	2.94	1.15	0.77	0.27	0.18
6	5.23	2.84	0.10	0.06	0.00	0.00
7	3.34	1.56	0.23	0.11	0.00	0.00
8	2.72	1.11	0.11	0.04	0.39	0.16
9	3.39	1.24	0.09	0.03	0.54	0.20
10	2.82	0.93	0.00	0.00	0.53	0.17
11	2.03	0.61	0.00	0.00	0.37	0.11
12	1.86	0.51	0.00	0.00	0.33	0.09
13	1.73	0.44	0.00	0.00	0.29	0.07
14	1.64	0.39	0.00	0.00	0.26	0.06
15	1.62	0.36	0.04	0.01	0.21	0.05
16	2.03	0.42	0.00	0.00	0.28	0.06
17	3.04	0.59	0.00	0.00	0.44	0.09
18	2.98	0.55	0.00	0.00	0.24	0.04
19	2.60	0.45	0.00	0.00	0.20	0.03
20	2.20	0.36	0.00	0.00	0.16	0.03
21	1.81	0.29	0.00	0.00	0.13	0.02
22	1.49	0.23	0.00	0.00	0.11	0.02

TABLE 38 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 21

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.24	0.18	0.00	0.00	0.09	0.01
24	1.05	0.15	0.00	0.00	0.08	0.01
25	0.91	0.12	0.00	0.00	0.07	0.01
26	0.78	0.10	0.00	0.00	0.06	0.01
27	0.68	0.08	0.00	0.00	0.05	0.01
28	0.59	0.07	0.00	0.00	0.06	0.01
29	0.51	0.06	0.00	0.00	0.05	0.01
30	0.45	0.05	0.00	0.00	0.04	0.00
31	0.39	0.04	0.00	0.00	0.03	0.00
32	0.34	0.04	0.00	0.00	0.02	0.00
33	0.30	0.03	0.00	0.00	0.01	0.00
34	0.29	0.03	0.00	0.00	0.01	0.00
35	0.25	0.02	0.00	0.00	0.00	0.00
36	0.20	0.02	0.00	0.00	0.00	0.00
37	0.15	0.01	0.00	0.00	0.00	0.00
38	0.11	0.01	0.00	0.00	0.00	0.00
39	0.07	0.01	0.00	0.00	0.00	0.00
40	0.05	0.00	0.00	0.00	0.00	0.00

TABLE 39

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SiO₂(Co/Zr=2)
SAMPLE NO: 8862+41+46+24

REACTOR LOADING, MLS :	450.0	T, C :	262.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	300	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	648.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H ₂ :	0.40	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	35.53	MOL SYNGAS/KG CAT/HR:	31.716
%CO CONV. :	30.81	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	37.86	MOL CO/MOL METAL/MIN:	0.184

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	12.48	H ₂ O:	16.25
OXYGENATES :	0.91	CO :	61.43
CO ₂ :	0.92	H ₂ :	8.00

HYDROCARBON SELECTIVITY, WT%:

C1 :	31.96	C4+ENE :	2.30
C2+ANE :	4.91	C5+C11 :	34.71
C2+ENE :	0.00	C12+C18:	8.48
C3+ANE :	6.47	C19+C23:	1.63
C3+ENE :	2.21	C24+34 :	0.23
C4 ISO+ANE:	7.07	C35+ :	0.02

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	34.71
DIESEL (C9+C25) :	18.19

% ELEMENTAL RECOVERY:	CARBON :	97.42
	HYDROGEN:	95.61
	OXYGEN :	99.77

TABLE 40

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 24

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	31.96	67.85	0.00	0.00	0.00	0.00
2	4.91	5.57	0.00	0.00	0.00	0.00
3	6.47	5.00	2.21	1.79	0.00	0.00
4	6.94	4.06	2.30	1.39	0.14	0.08
5	7.18	3.39	2.07	1.00	0.38	0.18
6	8.07	3.19	0.00	0.00	0.00	0.00
7	5.09	1.73	0.20	0.07	0.00	0.00
8	3.36	1.00	0.12	0.04	0.25	0.07
9	2.94	0.78	0.05	0.01	0.19	0.05
10	2.71	0.65	0.00	0.00	0.24	0.06
11	1.63	0.35	0.00	0.00	0.24	0.05
12	1.45	0.29	0.00	0.00	0.23	0.05
13	1.26	0.23	0.00	0.00	0.20	0.04
14	1.08	0.19	0.00	0.00	0.16	0.03
15	0.94	0.15	0.00	0.00	0.13	0.02
16	0.82	0.12	0.00	0.00	0.11	0.02
17	0.80	0.11	0.00	0.00	0.10	0.01
18	1.04	0.14	0.00	0.00	0.16	0.02
19	0.79	0.10	0.00	0.00	0.18	0.02
20	0.32	0.04	0.00	0.00	0.07	0.01
21	0.12	0.01	0.00	0.00	0.02	0.00
22	0.07	0.01	0.00	0.00	0.01	0.00

TABLE 40 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 24

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.05	0.01	0.00	0.00	0.00	0.00
24	0.04	0.00	0.00	0.00	0.00	0.00
25	0.03	0.00	0.00	0.00	0.00	0.00
26	0.03	0.00	0.00	0.00	0.00	0.00
27	0.02	0.00	0.00	0.00	0.00	0.00
28	0.02	0.00	0.00	0.00	0.00	0.00
29	0.02	0.00	0.00	0.00	0.00	0.00
30	0.01	0.00	0.00	0.00	0.00	0.00
31	0.01	0.00	0.00	0.00	0.00	0.00
32	0.01	0.00	0.00	0.00	0.00	0.00
33	0.01	0.00	0.00	0.00	0.00	0.00
34	0.01	0.00	0.00	0.00	0.00	0.00
35	0.01	0.00	0.00	0.00	0.00	0.00
36	0.01	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 41

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA
SAMPLE NO: 8862+41+46+27

REACTOR LOADING, MLS :	450.0	T, C :	242.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	290	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	719.5	SV, L/G/HR:	1.00		

USAGE RATIO, CO/H ₂ :	0.45	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	30.03	MOL SYNGAS/KG CAT/HR:	13.405
%CO CONV. :	28.25	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	30.90	MOL CO/MOL METAL/MIN:	0.084

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	9.49	H ₂ O:	14.91
OXYGENATES :	0.51	CO :	65.52
CO ₂ :	0.43	H ₂ :	9.15

HYDROCARBON SELECTIVITY, WT%:

C1 :	25.00	C4+ENE :	2.84
C2+ANE :	3.67	C5+C11 :	29.92
C2+ENE :	0.00	C12+C18:	14.33
C3+ANE :	5.83	C19+C23:	5.15
C3+ENE :	2.67	C24+34 :	3.71
C4 ISO+ANE:	6.33	C35+ :	0.55

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	29.92
DIESEL (C9+C25) :	30.42

% ELEMENTAL RECOVERY: CARBON : 92.43
HYDROGEN: 95.18
OXYGEN : 98.18

TABLE 42

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 27

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	25.00	63.79	0.00	0.00	0.00	0.00
2	3.67	4.99	0.00	0.00	0.00	0.00
3	5.83	5.41	2.67	2.60	0.00	0.00
4	6.33	4.45	2.84	2.07	0.00	0.00
5	6.16	3.49	1.84	1.07	0.19	0.11
6	5.71	2.71	0.00	0.00	0.00	0.00
7	3.47	1.42	0.07	0.03	0.00	0.00
8	2.45	0.88	0.10	0.04	0.14	0.05
9	2.89	0.92	0.08	0.03	0.13	0.04
10	3.33	0.96	0.00	0.00	0.32	0.09
11	2.73	0.72	0.00	0.00	0.32	0.08
12	2.46	0.59	0.00	0.00	0.28	0.07
13	2.24	0.50	0.00	0.00	0.24	0.05
14	2.07	0.43	0.00	0.00	0.20	0.04
15	1.86	0.36	0.00	0.00	0.16	0.03
16	1.63	0.29	0.00	0.00	0.13	0.02
17	1.38	0.23	0.00	0.00	0.13	0.02
18	1.44	0.23	0.00	0.00	0.11	0.02
19	1.46	0.22	0.00	0.00	0.16	0.02
20	1.04	0.15	0.00	0.00	0.09	0.01
21	0.85	0.12	0.00	0.00	0.06	0.01
22	0.73	0.10	0.00	0.00	0.05	0.01

TABLE 42 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 27

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.65	0.08	0.00	0.00	0.04	0.01
24	0.57	0.07	0.00	0.00	0.04	0.01
25	0.50	0.06	0.00	0.00	0.03	0.00
26	0.44	0.05	0.00	0.00	0.03	0.00
27	0.38	0.04	0.00	0.00	0.03	0.00
28	0.33	0.03	0.00	0.00	0.02	0.00
29	0.29	0.03	0.00	0.00	0.01	0.00
30	0.25	0.02	0.00	0.00	0.01	0.00
31	0.22	0.02	0.00	0.00	0.01	0.00
32	0.19	0.02	0.00	0.00	0.00	0.00
33	0.20	0.02	0.00	0.00	0.00	0.00
34	0.18	0.02	0.00	0.00	0.00	0.00
35	0.15	0.01	0.00	0.00	0.00	0.00
36	0.13	0.01	0.00	0.00	0.00	0.00
37	0.10	0.01	0.00	0.00	0.00	0.00
38	0.07	0.01	0.00	0.00	0.00	0.00
39	0.06	0.00	0.00	0.00	0.00	0.00
40	0.04	0.00	0.00	0.00	0.00	0.00

TABLE 43

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA
SAMPLE No: 8862+41+46+30

REACTOR LOADING, MLS :	450.0	T, C :	281.0	FEED RATIO,	
CATALYST LOADING, WT% :	20.0	P, PSIG :	295	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	816.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H ₂ :	0.41	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	46.14	MOL SYNGAS/KG CAT/HR:	41.183
%CO CONV. :	40.79	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	48.78	MOL CO/MOL METAL/MIN:	0.244

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	17.46	H ₂ O:	21.34
OXYGENATES :	1.05	CO :	50.75
CO ₂ :	3.05	H ₂ :	6.36

HYDROCARBON SELECTIVITY, WT%:

C1 :	41.42	C4+ENE :	1.87
C2+ANE :	6.75	C5+C11 :	25.23
C2+ENE :	0.00	C12+C18:	4.64
C3+ANE :	8.76	C19+C23:	2.17
C3+ENE :	1.28	C24+34 :	0.09
C4 ISO+ANE:	7.76	C35+ :	0.01

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	25.23
DIESEL (C9+C25) :	13.30

% ELEMENTAL RECOVERY: CARBON : 100.68
HYDROGEN: 99.70
OXYGEN : 103.37

TABLE 44

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 30

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	41.42	73.65	0.00	0.00	0.00	0.00
2	6.75	6.40	0.00	0.00	0.00	0.00
3	8.76	5.67	1.28	0.87	0.00	0.00
4	7.54	3.70	1.87	0.95	0.23	0.11
5	6.49	2.56	1.49	0.61	0.56	0.22
6	4.26	1.41	0.17	0.06	0.22	0.07
7	2.73	0.78	0.08	0.02	0.34	0.10
8	1.95	0.49	0.05	0.01	0.44	0.11
9	2.03	0.45	0.00	0.00	0.49	0.11
10	1.73	0.35	0.00	0.00	0.66	0.13
11	1.06	0.19	0.00	0.00	0.47	0.09
12	0.80	0.13	0.00	0.00	0.35	0.06
13	0.61	0.10	0.00	0.00	0.23	0.04
14	0.50	0.07	0.00	0.00	0.18	0.03
15	0.42	0.06	0.00	0.00	0.15	0.02
16	0.35	0.04	0.00	0.00	0.13	0.02
17	0.30	0.04	0.00	0.00	0.11	0.01
18	0.41	0.05	0.00	0.00	0.10	0.01
19	0.76	0.08	0.00	0.00	0.14	0.02
20	0.58	0.06	0.00	0.00	0.15	0.02
21	0.27	0.03	0.00	0.00	0.07	0.01
22	0.11	0.01	0.00	0.00	0.02	0.00

TABLE 44 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 30

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.05	0.00	0.00	0.00	0.01	0.00
24	0.03	0.00	0.00	0.00	0.00	0.00
25	0.02	0.00	0.00	0.00	0.00	0.00
26	0.01	0.00	0.00	0.00	0.00	0.00
27	0.01	0.00	0.00	0.00	0.00	0.00
28	0.01	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 45

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA
SAMPLE No: 8862+41+46+33

REACTOR LOADING, MLS :	450.0	T, C :	280.0	FEED RATIO,	
CATALYST LOADING, WT%:	20.0	P, PSIG :	295	CO/H2:	1.00
TIME ON STREAM, HRS :	887.8	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.44	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	30.31	MOL SYNGAS/KG CAT/HR:	27.060
%CO CONV.	18.50	SPECIFIC ACTIVITY,	
%H2 CONV.	42.12	MOL CO/MOL METAL/MIN:	0.168

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	9.31	H2O:	10.91
OXYGENATES :	0.45	CO :	74.60
CO2 :	0.95	H2 :	3.78

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	29.51	C4+ENE :	3.06
C2+ANE :	3.65	C5+C11 :	40.97
C2+ENE :	0.00	C12+C18:	8.89
C3+ANE :	3.98	C19+C23:	2.81
C3+ENE :	2.61	C24+34 :	0.19
C4 ISO+ANE:	4.31	C35+ :	0.01

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	40.97
DIESEL (C9+C25) :	21.49

+++++

% ELEMENTAL RECOVERY: CARBON : 101.98
HYDROGEN: 103.91
OXYGEN : 101.72

+++++

TABLE 46

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 33

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	29.51	67.50	0.00	0.00	0.00	0.00
2	3.65	4.46	0.00	0.00	0.00	0.00
3	3.98	3.31	2.61	2.28	0.00	0.00
4	4.24	2.68	3.06	2.00	0.07	0.04
5	5.08	2.58	3.19	1.67	0.34	0.17
6	10.29	4.38	0.26	0.11	0.25	0.11
7	6.30	2.30	0.31	0.11	0.45	0.17
8	4.12	1.32	0.23	0.08	0.48	0.15
9	3.49	1.00	0.00	0.00	0.53	0.15
10	2.93	0.75	0.00	0.00	0.64	0.17
11	1.58	0.37	0.00	0.00	0.51	0.12
12	1.32	0.28	0.08	0.02	0.49	0.11
13	1.20	0.24	0.00	0.00	0.45	0.09
14	1.03	0.19	0.00	0.00	0.40	0.07
15	0.87	0.15	0.00	0.00	0.35	0.06
16	0.74	0.12	0.00	0.00	0.30	0.05
17	0.64	0.10	0.00	0.00	0.25	0.04
18	0.56	0.08	0.00	0.00	0.21	0.03
19	0.71	0.10	0.00	0.00	0.19	0.03
20	0.79	0.10	0.00	0.00	0.19	0.02
21	0.46	0.06	0.00	0.00	0.10	0.01
22	0.21	0.02	0.00	0.00	0.05	0.01

TABLE 46 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+41+46

SAMPLE NO. 33

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.10	0.01	0.00	0.00	0.01	0.00
24	0.06	0.01	0.00	0.00	0.01	0.00
25	0.04	0.00	0.00	0.00	0.00	0.00
26	0.03	0.00	0.00	0.00	0.00	0.00
27	0.02	0.00	0.00	0.00	0.00	0.00
28	0.01	0.00	0.00	0.00	0.00	0.00
29	0.01	0.00	0.00	0.00	0.00	0.00
30	0.01	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 47
Extended Slurry Test Summary
8862-1-31
21.1 wt% (91.4g) $\text{Co}_2(\text{CO})_8/\text{Zr}(\text{OPr})_4/\text{SiO}_2$

Sample No.	Time on Stream h	P psig	T °C	SV, NL/g cat/hr	xCO+H ₂	xCO	xH ₂	Feed CO/H ₂	Usage ΔCO/ΔH ₂	Bulk Activity mol syngas/kg cat/h	Specific Activity mol CO/mol metal/min	Selectivity WLZ						
												C ₁	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ ⁺	C ₅ -C ₂₃
3	21	305	241	1.8	65.6	62.1	67.3	0.50	0.46	52.7	0.310	19.2	24.2	38.4	17.4	2.6	2.2	44.4
6	94	305	242	1.8	65.8	63.2	67.1	0.52	0.49	52.9	0.323	20.6	26.7	38.0	10.7	2.5	1.4	51.2
9	118	300	244	1.8	66.1	63.9	67.3	0.51	0.48	53.2	0.323	22.2	26.6	36.8	10.2	2.8	1.3	49.8
11	166	305	243	1.8	65.6	63.0	67.0	0.50	0.47	52.7	0.315	20.6	24.7	37.1	11.8	3.9	1.9	52.8
14	262	305	241	1.8	52.1	48.0	54.0	0.47	0.42	41.9	0.232	18.0	26.6	40.0	11.2	2.9	1.4	54.1
-	359	310	241	1.8	59.0	55.7	60.5	0.50	0.46	47.4	0.276	NO	MASS	BALANCE				
16	526	300	239	1.8	58.8	54.7	60.9	0.50	0.45	47.3	0.273	17.9	25.3	37.8	11.8	4.1	3.1	53.7
20	580	295	243	1.8	61.3	58.3	62.8	0.50	0.46	49.2	0.292	20.8	25.4	38.0	10.7	2.1	2.0	51.8
23	628	300	241	1.8	61.3	57.0	63.4	0.50	0.45	49.2	0.285	19.4	24.9	39.3	11.4	3.2	1.8	53.9
31	748	300	241	1.8	59.9	56.2	61.7	0.50	0.46	48.2	0.282	19.1	25.0	40.0	10.6	3.1	2.1	53.7
34	940	300	241	1.8	58.9	55.2	60.7	0.49	0.45	47.3	0.273	18.1	23.8	44.7	9.8	2.5	1.0	57.0
38	1012	300	240	1.8	58.4	53.9	60.6	0.49	0.44	46.9	0.267	18.6	25.9	40.5	11.1	2.6	1.3	54.2
41	1108	300	262	2.0	56.0	39.3	72.8	1.0	0.54	50.1	0.327	11.7	16.0	38.6	21.3	6.9	5.4	66.8
44	1180	300	260	2.0	55.0	38.4	71.5	1.0	0.54	49.1	0.321	12.5	16.4	39.1	20.4	6.5	5.0	66.0
47	1327	300	260	2.0	53.9	37.4	70.4	1.0	0.53	48.1	0.312	13.2	14.4	41.7	10.9	7.5	4.2	68.1
60	1444	300	260	2.0	53.4	36.7	70.2	1.0	0.52	47.7	0.306	14.5	15.8	41.8	18.5	5.4	3.6	71.0
53	1516	300	259	2.0	53.6	37.0	70.4	1.0	0.53	47.9	0.308	10.0	13.8	44.6	19.2	7.2	5.2	67.5
56	1613	300	260	2.0	53.3	36.8	70.0	1.0	0.53	47.6	0.307	11.3	15.6	39.7	20.1	7.7	5.7	68.4

TABLE 47 (CONTINUED)
Extended Slurry Test Summary
8862-1-31

Sample No.	Time on Stream h	P psig	T °C	SV, NL/g cat/hr	x%CO+H ₂	x%CO	x%H ₂	Feed CO/H ₂	Usage ΔCO/ΔH ₂	Bulk Activity mol syngas/kg cat/h	Specific Activity mol CO/mol metal/min	Selectivity Wt%						
												C ₁	C ₂ -C ₄	C ₅ -C ₁₁	C ₁₂ -C ₁₈	C ₁₉ -C ₂₃	C ₂₄ ⁺	C ₅ -C ₂₃
59	1684	300	260	2.0	51.8	35.6	68.1	1.0	0.52	46.3	0.297	10.6	15.5	39.8	20.9	7.7	5.6	68.4
62	1780	"	261	"	52.3	35.9	68.8	"	0.52	46.8	0.299	12.9	15.2	41.2	17.5	7.0	4.2	67.7
65	1828	"	261	"	52.1	35.7	68.5	"	0.52	46.5	0.298	13.8	16.1	43.9	16.6	6.1	3.6	66.6
68	1951	"	262	"	51.9	35.8	68.1	"	0.52	46.4	0.298	11.0	15.2	39.5	17.7	9.4	7.3	66.6
71	2020	"	260	"	49.8	33.6	66.0	"	0.51	44.5	0.280	11.0	15.3	45.6	17.5	6.5	4.1	69.6
74	2117	"	261	"	50.2	34.3	66.0	"	0.52	44.8	0.286	14.6	15.6	42.6	17.2	6.2	3.9	66.0
77	2188	"	260	"	49.4	33.3	65.6	"	0.51	44.2	0.278	15.4	14.3	46.2	15.2	5.3	3.6	66.7
80	2308	"	261	1.8	65.9	62.9	67.4	0.49	0.46	53.0	0.312	26.6	28.2	37.6	4.9	2.2	0.5	44.7
83	2356	"	262	"	63.7	60.2	65.5	0.49	0.45	51.2	0.298	25.1	30.1	35.9	5.9	2.4	0.6	44.2
85	2452	"	261	1.0	70.6	68.0	71.9	0.49	0.47	31.6	0.187	25.6	28.2	37.9	6.4	1.5	0.4	45.8
89	2475	295	260	"	70.2	68.0	71.3	0.49	0.47	31.4	0.187	27.1	28.4	35.2	6.2	2.0	1.1	43.4
91	2596	"	260	"	54.1	35.8	72.4	1.0	0.49	24.2	0.149	15.6	15.8	39.5	18.8	4.8	5.4	63.1

TABLE 48

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTEND-TEST
SAMPLE NO: 8862+1+31+16

REACTOR LOADING, MLS :	450.0	T, C :	239.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	0.50
TIME ON STREAM, HRS :	526.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H2 :	0.45	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	58.85	MOL SYNGAS/KG CAT/HR:	47.258
%CO CONV.	54.66	SPECIFIC ACTIVITY,	
%H2 CONV.	60.94	MOL CO/MOL METAL/MIN:	0.273

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	20.67	H2O:	30.16
OXYGENATES :	1.16	CO :	40.73
CO2 :	2.26	H2 :	5.01

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	17.91	C4+ENE :	2.31
C2+ANE :	4.44	C5+C11 :	37.80
C2+ENE :	0.00	C12+C18:	11.78
C3+ANE :	7.98	C19+C23:	4.14
C3+ENE :	2.21	C24+34 :	2.82
C4 ISO+ANE:	8.36	C35+ :	0.25

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	37.80
DIESEL (C9+C25) :	28.42

+++++

% ELEMENTAL RECOVERY:	CARBON :	92.47
	HYDROGEN:	94.90
	OXYGEN :	101.72

+++++

TABLE 49

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 16

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	17.91	51.86	0.00	0.00	0.00	0.00
2	4.44	6.86	0.00	0.00	0.00	0.00
3	7.98	8.40	2.21	2.44	0.00	0.00
4	8.22	6.57	2.31	1.91	0.14	0.11
5	7.83	5.04	1.59	1.05	0.52	0.34
6	6.84	3.68	0.12	0.07	0.00	0.00
7	4.74	2.19	0.00	0.00	0.29	0.13
8	3.68	1.49	0.17	0.07	0.48	0.19
9	3.93	1.42	0.12	0.04	0.55	0.20
10	3.55	1.16	0.00	0.00	0.52	0.17
11	2.43	0.72	0.00	0.00	0.43	0.13
12	2.11	0.58	0.00	0.00	0.38	0.10
13	1.81	0.46	0.00	0.00	0.32	0.08
14	1.57	0.37	0.00	0.00	0.25	0.06
15	1.38	0.30	0.00	0.00	0.20	0.04
16	1.22	0.25	0.00	0.00	0.16	0.03
17	1.10	0.21	0.00	0.00	0.13	0.02
18	1.02	0.19	0.00	0.00	0.11	0.02
19	0.94	0.16	0.00	0.00	0.09	0.02
20	0.86	0.14	0.00	0.00	0.08	0.01
21	0.78	0.12	0.00	0.00	0.06	0.01
22	0.67	0.10	0.00	0.00	0.05	0.01

TABLE 49 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 16

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.57	0.08	0.00	0.00	0.04	0.01
24	0.48	0.07	0.00	0.00	0.03	0.00
25	0.42	0.06	0.00	0.00	0.02	0.00
26	0.34	0.04	0.00	0.00	0.02	0.00
27	0.29	0.04	0.00	0.00	0.02	0.00
28	0.25	0.03	0.00	0.00	0.02	0.00
29	0.21	0.02	0.00	0.00	0.01	0.00
30	0.18	0.02	0.00	0.00	0.01	0.00
31	0.16	0.02	0.00	0.00	0.01	0.00
32	0.13	0.01	0.00	0.00	0.00	0.00
33	0.10	0.01	0.00	0.00	0.01	0.00
34	0.10	0.01	0.00	0.00	0.01	0.00
35	0.08	0.01	0.00	0.00	0.00	0.00
36	0.06	0.01	0.00	0.00	0.00	0.00
37	0.04	0.00	0.00	0.00	0.00	0.00
38	0.03	0.00	0.00	0.00	0.00	0.00
39	0.02	0.00	0.00	0.00	0.00	0.00
40	0.02	0.00	0.00	0.00	0.00	0.00

TABLE 50

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTEND-TEST
SAMPLE No: 8862+1+31+20

REACTOR LOADING, MLS :	450.0	T, C :	243.0	FEED RATIO,	
CATALYST LOADING, WT%:	18.0	P, PSIG :	295	CO/H2:	0.50
TIME ON STREAM, HRS :	580.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H2 :	0.46	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	61.32	MOL SYNGAS/KG CAT/HR:	49.243
%CO CONV.	58.33	SPECIFIC ACTIVITY,	
%H2 CONV.	62.81	MOL CO/MOL METAL/MIN:	0.292

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	23.58	H2O:	30.80
OXYGENATES :	1.27	CO :	36.39
CO2 :	3.32	H2 :	4.64

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	20.78	C4+ENE :	2.17
C2+ANE :	4.54	C5+C11 :	38.03
C2+ENE :	0.00	C12+C18:	10.68
C3+ANE :	8.08	C19+C23:	3.13
C3+ENE :	1.88	C24+34 :	1.86
C4 ISO+ANE:	8.70	C35+ :	0.15

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	38.03
DIESEL (C9+C25) :	25.25

+++++

% ELEMENTAL RECOVERY:	CARBON :	97.23
	HYDROGEN:	100.15
	OXYGEN :	102.42

+++++

TABLE 51

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 20

CARBON NO.	N ^o ALKANES		1 ^o ALKENE		BRANCHED	ISOMERS
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	20.78	55.65	0.00	0.00	0.00	0.00
2	4.54	6.49	0.00	0.00	0.00	0.00
3	8.08	7.87	1.88	1.91	0.00	0.00
4	8.55	6.32	2.17	1.66	0.15	0.11
5	7.88	4.69	1.57	0.96	0.57	0.34
6	7.67	3.82	0.17	0.09	0.00	0.00
7	4.80	2.05	0.00	0.00	0.38	0.16
8	3.54	1.33	0.00	0.00	0.66	0.25
9	3.70	1.24	0.00	0.00	0.67	0.22
10	3.21	0.97	0.00	0.00	0.51	0.15
11	2.28	0.63	0.00	0.00	0.41	0.11
12	1.97	0.50	0.00	0.00	0.36	0.09
13	1.68	0.39	0.00	0.00	0.29	0.07
14	1.45	0.31	0.00	0.00	0.23	0.05
15	1.26	0.25	0.00	0.00	0.18	0.04
16	1.10	0.21	0.00	0.00	0.14	0.03
17	0.96	0.17	0.00	0.00	0.11	0.02
18	0.85	0.14	0.00	0.00	0.09	0.01
19	0.76	0.12	0.00	0.00	0.08	0.01
20	0.67	0.10	0.00	0.00	0.06	0.01
21	0.57	0.08	0.00	0.00	0.05	0.01
22	0.48	0.07	0.00	0.00	0.04	0.01

TABLE 51 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 20

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.40	0.05	0.00	0.00	0.03	0.00
24	0.33	0.04	0.00	0.00	0.02	0.00
25	0.29	0.03	0.00	0.00	0.02	0.00
26	0.23	0.03	0.00	0.00	0.01	0.00
27	0.20	0.02	0.00	0.00	0.01	0.00
28	0.17	0.02	0.00	0.00	0.01	0.00
29	0.14	0.01	0.00	0.00	0.01	0.00
30	0.12	0.01	0.00	0.00	0.01	0.00
31	0.10	0.01	0.00	0.00	0.01	0.00
32	0.08	0.01	0.00	0.00	0.00	0.00
33	0.06	0.01	0.00	0.00	0.00	0.00
34	0.06	0.01	0.00	0.00	0.00	0.00
35	0.05	0.00	0.00	0.00	0.00	0.00
36	0.04	0.00	0.00	0.00	0.00	0.00
37	0.03	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.01	0.00	0.00	0.00	0.00	0.00

TABLE 52

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTEND-TEST
SAMPLE No: 8862+1+31+23

REACTOR LOADING, MLS : 450.0 T, C : 241.0 FEED RATIO,
CATALYST LOADING, WT%: 18.0 P, PSIG : 300 CO/H2: 0.50
TIME ON STREAM, HRS : 628.0 SV, L/G/HR: 1.80

+++++

USAGE RATIO, CO/H2 : 0.45 BULK ACTIVITY,
%OVERALL CONV-, CO+H2: 61.27 MOL SYNGAS/KG CAT/HR: 49.200
%CO CONV. : 57.05 SPECIFIC ACTIVITY,
%H2 CONV. : 63.37 MOL CO/MOL METAL/MIN: 0.285

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS: 22.90 H2O: 30.16
OXYGENATES : 1.24 CO : 38.18
CO2 : 2.86 H2 : 4.65

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 : 19.36 C4+ENE : 2.11
C2+ANE : 4.39 C5+C11 : 39.27
C2+ENE : 0.00 C12+C18: 11.39
C3+ANE : 8.00 C19+C23: 3.19
C3+ENE : 1.89 C24+34 : 1.72
C4 ISO+ANE: 8.54 C35+ : 0.13

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 39.27
DIESEL (C9+C25) : 26.22

+++++

% ELEMENTAL RECOVERY: CARBON : 95.80
HYDROGEN: 96.66
OXYGEN : 100.83

+++++

TABLE 53

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 23

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	19.36	53.74	0.00	0.00	0.00	0.00
2	4.39	6.50	0.00	0.00	0.00	0.00
3	8.00	8.08	1.89	2.00	0.00	0.00
4	8.38	6.42	2.11	1.68	0.15	0.12
5	7.89	4.87	1.57	0.99	0.57	0.35
6	8.79	4.54	0.00	0.00	0.00	0.00
7	4.94	2.20	0.32	0.14	0.00	0.00
8	3.59	1.40	0.14	0.06	0.44	0.17
9	3.78	1.31	0.11	0.04	0.53	0.18
10	3.26	1.02	0.00	0.00	0.49	0.15
11	2.45	0.70	0.00	0.00	0.41	0.12
12	2.11	0.55	0.00	0.00	0.36	0.09
13	1.81	0.44	0.00	0.00	0.30	0.07
14	1.56	0.35	0.00	0.00	0.24	0.05
15	1.35	0.28	0.00	0.00	0.19	0.04
16	1.16	0.23	0.00	0.00	0.16	0.03
17	1.01	0.19	0.00	0.00	0.16	0.03
18	0.87	0.15	0.00	0.00	0.10	0.02
19	0.79	0.13	0.00	0.00	0.16	0.03
20	0.66	0.10	0.00	0.00	0.06	0.01
21	0.55	0.08	0.00	0.00	0.05	0.01
22	0.46	0.07	0.00	0.00	0.05	0.01

TABLE 53 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 23

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.38	0.05	0.00	0.00	0.03	0.00
24	0.31	0.04	0.00	0.00	0.03	0.00
25	0.26	0.03	0.00	0.00	0.02	0.00
26	0.21	0.03	0.00	0.00	0.01	0.00
27	0.17	0.02	0.00	0.00	0.01	0.00
28	0.15	0.02	0.00	0.00	0.01	0.00
29	0.13	0.01	0.00	0.00	0.01	0.00
30	0.11	0.01	0.00	0.00	0.00	0.00
31	0.09	0.01	0.00	0.00	0.01	0.00
32	0.08	0.01	0.00	0.00	0.00	0.00
33	0.06	0.01	0.00	0.00	0.00	0.00
34	0.06	0.01	0.00	0.00	0.00	0.00
35	0.05	0.00	0.00	0.00	0.00	0.00
36	0.03	0.00	0.00	0.00	0.00	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.01	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.01	0.00	0.00	0.00	0.00	0.00

TABLE 54

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTEND-TEST
SAMPLE No: 8862+1+31+31

REACTOR LOADING, MLS :	450.0	T, C :	241.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	0.50
TIME ON STREAM, HRS :	748.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H ₂ :	0.46	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	59.90	MOL SYNGAS/KG CAT/HR:	48.150
%CO CONV-	56.25	SPECIFIC ACTIVITY,	
%H ₂ CONV-	61.73	MOL CO/MOL METAL/MIN:	0.282

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	21.98	H ₂ O:	30.52
OXYGENATES :	1.17	CO :	38.87
CO ₂ :	2.61	H ₂ :	4.84

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	19.12	C4+ENE :	2.21
C2+ANE :	4.50	C5+C11 :	40.03
C2+ENE :	0.00	C12+C18:	10.55
C3+ANE :	7.82	C19+C23:	3.10
C3+ENE :	1.94	C24+34 :	1.99
C4 ISO+ANE:	8.58	C35+ :	0.15

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	40.03
DIESEL (C9+C25) :	25.86

+++++

% ELEMENTAL RECOVERY:	CARBON :	94.41
	HYDROGEN:	97.45
	OXYGEN :	101.89

+++++

TABLE 55

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 31

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	19.12	53.32	0.00	0.00	0.00	0.00
2	4.50	6.70	0.00	0.00	0.00	0.00
3	7.82	7.93	1.94	2.06	0.00	0.00
4	8.44	6.49	2.21	1.76	0.14	0.11
5	8.00	4.96	1.63	1.04	0.56	0.35
6	8.00	4.15	0.00	0.00	0.00	0.00
7	5.34	2.38	0.00	0.00	0.31	0.14
8	4.00	1.56	0.00	0.00	0.66	0.26
9	4.08	1.42	0.00	0.00	0.69	0.24
10	3.54	1.11	0.00	0.00	0.54	0.17
11	2.28	0.65	0.00	0.00	0.41	0.12
12	1.97	0.52	0.00	0.00	0.36	0.09
13	1.68	0.41	0.00	0.00	0.29	0.07
14	1.44	0.32	0.00	0.00	0.23	0.05
15	1.23	0.26	0.00	0.00	0.18	0.04
16	1.06	0.21	0.00	0.00	0.14	0.03
17	0.93	0.17	0.00	0.00	0.12	0.02
18	0.82	0.14	0.00	0.00	0.09	0.02
19	0.73	0.12	0.00	0.00	0.08	0.01
20	0.65	0.10	0.00	0.00	0.06	0.01
21	0.57	0.09	0.00	0.00	0.05	0.01
22	0.48	0.07	0.00	0.00	0.04	0.01

TABLE 55 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 31

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.41	0.06	0.00	0.00	0.03	0.00
24	0.34	0.05	0.00	0.00	0.02	0.00
25	0.30	0.04	0.00	0.00	0.02	0.00
26	0.25	0.03	0.00	0.00	0.01	0.00
27	0.21	0.02	0.00	0.00	0.01	0.00
28	0.18	0.02	0.00	0.00	0.01	0.00
29	0.15	0.02	0.00	0.00	0.01	0.00
30	0.13	0.01	0.00	0.00	0.01	0.00
31	0.11	0.01	0.00	0.00	0.01	0.00
32	0.09	0.01	0.00	0.00	0.00	0.00
33	0.07	0.01	0.00	0.00	0.00	0.00
34	0.06	0.01	0.00	0.00	0.00	0.00
35	0.05	0.00	0.00	0.00	0.00	0.00
36	0.04	0.00	0.00	0.00	0.00	0.00
37	0.03	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.01	0.00	0.00	0.00	0.00	0.00

TABLE 56

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+34

REACTOR LOADING, MLS :	450.0	T, C :	240.7	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	940.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H ₂ :	0.45	BULK ACTIVITY,	
%OVERALL CONV-, CO+H ₂ :	58.89	MOL SYNGAS/KG CAT/HR:	47.341
%CO CONV-	55.21	SPECIFIC ACTIVITY,	
%H ₂ CONV-	60.71	MOL CO/MOL METAL/MIN:	0.273

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	23.34	H ₂ O:	29.66
OXYGENATES :	1.02	CO :	38.75
CO ₂ :	2.30	H ₂ :	4.93

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	18.10	C4+ENE :	2.12
C2+ANE :	4.02	C5+C11 :	44.71
C2+ENE :	0.00	C12+C18:	9.85
C3+ANE :	7.55	C19+C23:	2.50
C3+ENE :	1.97	C24+34 :	0.97
C4 ISO+ANE:	8.14	C35+ :	0.06

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 44.71
DIESEL (C9+C25) : 22.38

+++++

% ELEMENTAL RECOVERY: CARBON : 99.54
HYDROGEN: 99.61
OXYGEN : 102.34

+++++

TABLE 57

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO- 8862+1+31

SAMPLE NO- 34

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	18.10	50.94	0.00	0.00	0.00	0.00
2	4.02	6.03	0.00	0.00	0.00	0.00
3	7.55	7.73	1.97	2.12	0.00	0.00
4	8.00	6.22	2.12	1.71	0.14	0.11
5	7.46	4.66	8.44	5.43	0.52	0.33
6	9.18	4.81	0.17	0.09	0.00	0.00
7	4.84	2.18	0.21	0.10	0.36	0.16
8	3.25	1.28	0.16	0.06	0.47	0.19
9	3.26	1.15	0.10	0.04	0.50	0.18
10	2.82	0.90	0.00	0.00	0.48	0.15
11	2.08	0.60	0.00	0.00	0.41	0.12
12	1.81	0.48	0.00	0.00	0.37	0.10
13	1.56	0.38	0.00	0.00	0.31	0.08
14	1.34	0.30	0.00	0.00	0.25	0.06
15	1.14	0.24	0.00	0.00	0.19	0.04
16	0.97	0.19	0.00	0.00	0.15	0.03
17	0.83	0.16	0.00	0.00	0.12	0.02
18	0.74	0.13	0.00	0.00	0.09	0.02
19	0.65	0.11	0.00	0.00	0.08	0.01
20	0.55	0.09	0.00	0.00	0.06	0.01
21	0.45	0.07	0.00	0.00	0.05	0.01
22	0.34	0.05	0.00	0.00	0.03	0.01

TABLE 57 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO- 8862+1+31

SAMPLE NO. 34

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.26	0.04	0.00	0.00	0.02	0.00
24	0.19	0.03	0.00	0.00	0.02	0.00
25	0.16	0.02	0.00	0.00	0.01	0.00
26	0.12	0.02	0.00	0.00	0.01	0.00
27	0.10	0.01	0.00	0.00	0.01	0.00
28	0.08	0.01	0.00	0.00	0.00	0.00
29	0.07	0.01	0.00	0.00	0.00	0.00
30	0.06	0.01	0.00	0.00	0.00	0.00
31	0.05	0.00	0.00	0.00	0.00	0.00
32	0.04	0.00	0.00	0.00	0.00	0.00
33	0.03	0.00	0.00	0.00	0.00	0.00
34	0.02	0.00	0.00	0.00	0.00	0.00
35	0.02	0.00	0.00	0.00	0.00	0.00
36	0.02	0.00	0.00	0.00	0.00	0.00
37	0.01	0.00	0.00	0.00	0.00	0.00
38	0.01	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 58

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+38

REACTOR LOADING, MLS :	450.0	T, C :	240.2	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	0.49
TIME ON STREAM, HRS :	1012.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H2 :	0.44	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	58.40	MOL SYNGAS/KG CAT/HR:	46.943
%CO CONV.	53.90	SPECIFIC ACTIVITY,	
%H2 CONV.	60.61	MOL CO/MOL METAL/MIN:	0.267

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	21.88	H2O:	29.26
OXYGENATES :	0.98	CO :	40.77
CO2 :	2.05	H2 :	5.05

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	18.57	C4+ENE :	2.44
C2+ANE :	4.14	C5+C11 :	40.54
C2+ENE :	0.00	C12+C18:	11.09
C3+ANE :	8.02	C19+C23:	2.61
C3+ENE :	2.23	C24+34 :	1.24
C4 ISO+ANE:	9.03	C35+ :	0.10

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	40.54
DIESEL (C9+C25) :	24.99

+++++

% ELEMENTAL RECOVERY:	CARBON :	96.16
	HYDROGEN:	96.24
	OXYGEN :	101.32

+++++

TABLE 59

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 38

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	18.57	52.08	0.00	0.00	0.00	0.00
2	4.14	6.19	0.00	0.00	0.00	0.00
3	8.02	8.18	2.23	2.38	0.00	0.00
4	8.88	6.87	2.44	1.95	0.15	0.11
5	8.32	5.18	1.76	1.13	0.58	0.36
6	8.95	4.67	0.15	0.08	0.35	0.18
7	5.17	2.32	0.35	0.16	0.00	0.00
8	3.44	1.36	0.17	0.07	0.47	0.19
9	3.62	1.27	0.11	0.04	0.55	0.19
10	3.18	1.01	0.00	0.00	0.54	0.17
11	2.38	0.69	0.00	0.00	0.46	0.13
12	2.05	0.54	0.00	0.00	0.41	0.11
13	1.75	0.43	0.00	0.00	0.34	0.08
14	1.50	0.34	0.00	0.00	0.26	0.06
15	1.28	0.27	0.00	0.00	0.21	0.04
16	1.11	0.22	0.00	0.00	0.17	0.03
17	0.95	0.18	0.00	0.00	0.14	0.03
18	0.81	0.14	0.00	0.00	0.11	0.02
19	0.68	0.11	0.00	0.00	0.09	0.01
20	0.56	0.09	0.00	0.00	0.07	0.01
21	0.46	0.07	0.00	0.00	0.05	0.01
22	0.36	0.05	0.00	0.00	0.04	0.01

TABLE 59 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 38

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.29	0.04	0.00	0.00	0.03	0.00
24	0.23	0.03	0.00	0.00	0.02	0.00
25	0.19	0.02	0.00	0.00	0.01	0.00
26	0.15	0.02	0.00	0.00	0.01	0.00
27	0.13	0.01	0.00	0.00	0.01	0.00
28	0.11	0.01	0.00	0.00	0.00	0.00
29	0.09	0.01	0.00	0.00	0.00	0.00
30	0.08	0.01	0.00	0.00	0.00	0.00
31	0.07	0.01	0.00	0.00	0.00	0.00
32	0.06	0.01	0.00	0.00	0.00	0.00
33	0.05	0.00	0.00	0.00	0.00	0.00
34	0.04	0.00	0.00	0.00	0.00	0.00
35	0.03	0.00	0.00	0.00	0.00	0.00
36	0.03	0.00	0.00	0.00	0.00	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.01	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.01	0.00	0.00	0.00	0.00	0.00

TABLE 60

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+41

REACTOR LOADING, MLS :	450.0	T, C :	261.5	FEED RATIO,	
CATALYST LOADING, WT% :	21.1	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	1108.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H ₂ :	0.54	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	56.04	MOL SYNGAS/KG CAT/HR:	50.055
%CO CONV.	39.27	SPECIFIC ACTIVITY,	
%H ₂ CONV.	72.81	MOL CO/MOL METAL/MIN:	0.327

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	15.64	H ₂ O:	20.26
OXYGENATES :	0.31	CO :	57.82
CO ₂ :	4.12	H ₂ :	1.85

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	11.70	C4+ENE :	3.30
C2+ANE :	2.71	C5+C11 :	38.64
C2+ENE :	0.09	C12+C18:	21.31
C3+ANE :	2.91	C19+C23:	6.90
C3+ENE :	3.28	C24+34 :	5.08
C4 ISO+ANE:	3.77	C35+ :	0.31

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 38.64
DIESEL (C9+C25) : 43.55

+++++

% ELEMENTAL RECOVERY: CARBON : 95.77
HYDROGEN: 99.36
OXYGEN : 99.58

+++++

TABLE 61

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 41

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	11.70	45.01	0.00	0.00	0.00	0.00
2	2.71	5.57	0.09	0.20	0.00	0.00
3	2.91	4.07	3.28	4.80	0.00	0.00
4	3.71	3.94	3.30	3.63	0.06	0.06
5	4.46	3.81	3.30	2.90	0.42	0.36
6	7.42	5.31	0.32	0.24	0.00	0.00
7	4.04	2.49	0.58	0.36	0.45	0.28
8	3.17	1.71	0.44	0.24	0.52	0.28
9	3.57	1.72	0.37	0.18	0.71	0.34
10	3.51	1.52	0.37	0.16	0.81	0.35
11	2.97	1.17	0.30	0.12	0.90	0.35
12	3.03	1.10	0.00	0.00	0.96	0.35
13	2.77	0.93	0.00	0.00	0.96	0.32
14	2.49	0.78	0.00	0.00	0.90	0.28
15	2.23	0.65	0.00	0.00	0.85	0.25
16	1.98	0.54	0.00	0.00	0.77	0.21
17	1.74	0.45	0.00	0.00	0.67	0.17
18	1.50	0.36	0.00	0.00	0.45	0.11
19	1.35	0.31	0.00	0.00	0.34	0.08
20	1.23	0.27	0.00	0.00	0.26	0.06
21	1.15	0.24	0.00	0.00	0.20	0.04
22	1.08	0.21	0.00	0.00	0.17	0.03

TABLE 61 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 41

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.98	0.19	0.00	0.00	0.14	0.03
24	0.86	0.16	0.00	0.00	0.12	0.02
25	0.75	0.13	0.00	0.00	0.10	0.02
26	0.63	0.11	0.00	0.00	0.08	0.01
27	0.53	0.09	0.00	0.00	0.06	0.01
28	0.44	0.07	0.00	0.00	0.05	0.01
29	0.36	0.05	0.00	0.00	0.04	0.01
30	0.29	0.04	0.00	0.00	0.03	0.00
31	0.23	0.03	0.00	0.00	0.03	0.00
32	0.18	0.02	0.00	0.00	0.02	0.00
33	0.14	0.02	0.00	0.00	0.02	0.00
34	0.11	0.01	0.00	0.00	0.01	0.00
35	0.08	0.01	0.00	0.00	0.01	0.00
36	0.06	0.01	0.00	0.00	0.00	0.00
37	0.05	0.01	0.00	0.00	0.00	0.00
38	0.05	0.01	0.00	0.00	0.00	0.00
39	0.04	0.00	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 62

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+44

REACTOR LOADING, MLS :	450.0	T, C :	259.9	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	1.00
TIME ON STREAM, HRS :	1180.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.54	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	54.96	MOL SYNGAS/KG CAT/HR:	49.094
%CO CONV.	38.44	SPECIFIC ACTIVITY,	
%H2 CONV.	71.49	MOL CO/MOL METAL/MIN:	0.321

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	16.06	H2O:	19.71
OXYGENATES :	0.39	CO :	58.47
CO2 :	3.44	H2 :	1.93

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	12.52	C4+ENE :	3.43
C2+ANE :	2.42	C5+C11 :	39.07
C2+ENE :	0.10	C12+C18:	20.42
C3+ANE :	3.20	C19+C23:	6.54
C3+ENE :	3.36	C24+34 :	4.63
C4 ISO+ANE:	3.92	C35+ :	0.40

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	39.07
DIESEL (C9+C25) :	41.59

+++++

% ELEMENTAL RECOVERY: CARBON : 97.15
HYDROGEN: 101.33
OXYGEN : 98.74

+++++

TABLE 63

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 44

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	12.52	46.60	0.00	0.00	0.00	0.00
2	2.42	4.80	0.10	0.21	0.00	0.00
3	3.20	4.33	3.36	4.76	0.00	0.00
4	3.85	3.96	3.43	3.65	0.06	0.07
5	4.55	3.76	3.28	2.79	0.44	0.36
6	7.94	5.50	0.30	0.22	0.00	0.00
7	4.21	2.51	0.65	0.40	0.44	0.26
8	3.23	1.69	0.47	0.25	0.48	0.25
9	3.54	1.65	0.40	0.19	0.67	0.31
10	3.42	1.44	0.38	0.16	0.75	0.31
11	2.79	1.06	0.29	0.11	0.82	0.31
12	2.84	1.00	0.00	0.00	0.87	0.30
13	2.60	0.84	0.00	0.00	0.86	0.28
14	2.35	0.71	0.00	0.00	0.81	0.24
15	2.13	0.60	0.03	0.01	0.74	0.21
16	1.93	0.51	0.00	0.00	0.74	0.19
17	1.78	0.44	0.00	0.00	0.70	0.17
18	1.56	0.37	0.00	0.00	0.48	0.11
19	1.38	0.31	0.00	0.00	0.41	0.09
20	1.17	0.25	0.00	0.00	0.28	0.06
21	1.03	0.21	0.00	0.00	0.21	0.04
22	0.92	0.18	0.00	0.00	0.18	0.04

TABLE 63 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8852+1+31

SAMPLE NO. 44

CARBON NO.	N+ALKANES		I+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.81	0.15	0.00	0.00	0.15	0.03
24	0.71	0.13	0.00	0.00	0.13	0.02
25	0.62	0.10	0.00	0.00	0.10	0.02
26	0.53	0.09	0.00	0.00	0.09	0.01
27	0.45	0.07	0.00	0.00	0.07	0.01
28	0.38	0.06	0.00	0.00	0.06	0.01
29	0.32	0.05	0.00	0.00	0.05	0.01
30	0.27	0.04	0.00	0.00	0.04	0.01
31	0.23	0.03	0.00	0.00	0.04	0.00
32	0.19	0.03	0.00	0.00	0.03	0.00
33	0.16	0.02	0.00	0.00	0.02	0.00
34	0.13	0.02	0.00	0.00	0.01	0.00
35	0.10	0.01	0.00	0.00	0.00	0.00
36	0.08	0.01	0.00	0.00	0.00	0.00
37	0.08	0.01	0.00	0.00	0.00	0.00
38	0.06	0.01	0.00	0.00	0.00	0.00
39	0.04	0.00	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 64

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+47

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2: 1.00
TIME ON STREAM, HRS :	1327.0	SV, L/G/HR:	2.00	

USAGE RATIO, CO/H2 :	0.53	BULK ACTIVITY,
%OVERALL CONV., CO+H2:	53.86	MOL SYNGAS/KG CAT/HR: 48.112
%CO CONV. :	37.35	SPECIFIC ACTIVITY,
%H2 CONV. :	70.37	MOL CO/MOL METAL/MIN: 0.312

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	16.08	H2O:	19.22
OXYGENATES :	0.39	CO :	59.03
CO2 :	3.28	H2 :	1.99

HYDROCARBON SELECTIVITY, WT%:

C1 :	13.22	C4+ENE :	2.97
C2+ANE :	2.40	C5+C11 :	41.74
C2+ENE :	0.10	C12+C18:	18.92
C3+ANE :	2.59	C19+C23:	7.53
C3+ENE :	3.14	C24+34 :	4.01
C4 ISO+ANE:	3.22	C35+ :	0.16

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	41.74
DIESEL (C9+C25) :	41.63

% ELEMENTAL RECOVERY: CARBON : 98.44
HYDROGEN: 102.38
OXYGEN : 99.10

TABLE 65

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 47

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	13.22	48.64	0.00	0.00	0.00	0.00
2	2.40	4.71	0.10	0.22	0.00	0.00
3	2.59	3.47	3.14	4.40	0.00	0.00
4	3.16	3.21	2.97	3.12	0.06	0.06
5	3.95	3.23	2.92	2.46	0.34	0.28
6	8.66	5.93	0.47	0.33	0.00	0.00
7	4.66	2.74	0.97	0.58	0.74	0.44
8	3.71	1.92	0.77	0.40	0.90	0.47
9	3.81	1.75	0.53	0.25	0.94	0.43
10	3.30	1.37	0.44	0.18	0.96	0.40
11	2.55	0.96	0.29	0.11	0.83	0.31
12	2.57	0.89	0.00	0.00	0.81	0.28
13	2.33	0.75	0.00	0.00	0.77	0.25
14	2.13	0.63	0.00	0.00	0.70	0.21
15	1.95	0.54	0.01	0.00	0.65	0.18
16	1.82	0.47	0.00	0.00	0.64	0.17
17	1.73	0.42	0.00	0.00	0.64	0.16
18	1.64	0.38	0.00	0.00	0.54	0.13
19	1.52	0.33	0.00	0.00	0.50	0.11
20	1.35	0.28	0.00	0.00	0.42	0.09
21	1.15	0.23	0.00	0.00	0.34	0.07
22	0.97	0.18	0.00	0.00	0.27	0.05

TABLE 65 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 47

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.81	0.15	0.00	0.00	0.20	0.04
24	0.67	0.12	0.00	0.00	0.16	0.03
25	0.57	0.09	0.00	0.00	0.13	0.02
26	0.46	0.07	0.00	0.00	0.10	0.02
27	0.38	0.06	0.00	0.00	0.07	0.01
28	0.31	0.05	0.00	0.00	0.06	0.01
29	0.25	0.04	0.00	0.00	0.05	0.01
30	0.20	0.03	0.00	0.00	0.04	0.01
31	0.16	0.02	0.00	0.00	0.04	0.01
32	0.13	0.02	0.00	0.00	0.03	0.00
33	0.09	0.01	0.00	0.00	0.02	0.00
34	0.07	0.01	0.00	0.00	0.01	0.00
35	0.05	0.01	0.00	0.00	0.01	0.00
36	0.04	0.01	0.00	0.00	0.01	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.01	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 66

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+50

REACTOR LOADING, MLS :	450.0	T, C :	259.7	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CU/H2:	1.00
TIME ON STREAM, HRS :	1444.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H2 :	0.52	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	53.43	MOL SYNGAS/KG CAT/HR:	47.731
%CO CONV.	36.71	SPECIFIC ACTIVITY,	
%H2 CONV.	70.16	MOL CO/MOL METAL/MIN:	0.306

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	14.55	H2O:	19.05
OXYGENATES :	0.45	CO :	60.62
CO2 :	3.28	H2 :	2.04

HYDROCARBON SELECTIVITY, WT%:

C1 :	14.47	C4+ENE :	3.22
C2+ANE :	2.78	C5+C11 :	41.82
C2+ENE :	0.11	C12+C18:	18.47
C3+ANE :	2.81	C19+C23:	5.86
C3+ENE :	3.28	C24+34 :	3.43
C4 ISO+ANE:	3.57	C35+ :	0.18

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 41.82
DIESEL (C9+C25) : 38.03

% ELEMENTAL RECOVERY: CARBON : 95.40
HYDROGEN: 97.87
OXYGEN : 98.92

TABLE 67

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 50

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	14.47	49.96	0.00	0.00	0.00	0.00
2	2.78	5.12	0.11	0.23	0.00	0.00
3	2.81	3.53	3.28	4.31	0.00	0.00
4	3.51	3.34	3.22	3.18	0.06	0.06
5	4.51	3.46	3.28	2.59	0.39	0.30
6	9.81	6.30	0.40	0.27	0.00	0.00
7	5.13	2.84	0.74	0.42	0.51	0.28
8	3.57	1.73	0.51	0.25	0.52	0.25
9	3.47	1.50	0.37	0.16	0.64	0.27
10	3.30	1.28	0.35	0.14	0.70	0.27
11	2.57	0.91	0.27	0.10	0.77	0.27
12	2.64	0.86	0.00	0.00	0.86	0.28
13	2.37	0.71	0.00	0.00	0.86	0.26
14	2.12	0.59	0.00	0.00	0.82	0.23
15	1.87	0.49	0.02	0.01	0.75	0.20
16	1.65	0.40	0.00	0.00	0.71	0.17
17	1.46	0.34	0.00	0.00	0.62	0.14
18	1.30	0.28	0.00	0.00	0.43	0.09
19	1.21	0.25	0.00	0.00	0.34	0.07
20	1.08	0.21	0.00	0.00	0.26	0.05
21	0.94	0.18	0.00	0.00	0.21	0.04
22	0.80	0.14	0.00	0.00	0.18	0.03

TABLE 67 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 50

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.68	0.12	0.00	0.00	0.15	0.02
24	0.57	0.09	0.00	0.00	0.12	0.02
25	0.48	0.08	0.00	0.00	0.10	0.02
26	0.40	0.06	0.00	0.00	0.08	0.01
27	0.32	0.05	0.00	0.00	0.07	0.01
28	0.27	0.04	0.00	0.00	0.05	0.01
29	0.22	0.03	0.00	0.00	0.04	0.01
30	0.18	0.02	0.00	0.00	0.03	0.00
31	0.14	0.02	0.00	0.00	0.03	0.00
32	0.11	0.01	0.00	0.00	0.02	0.00
33	0.09	0.01	0.00	0.00	0.02	0.00
34	0.06	0.01	0.00	0.00	0.01	0.00
35	0.05	0.01	0.00	0.00	0.01	0.00
36	0.03	0.00	0.00	0.00	0.00	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.02	0.00	0.00	0.00	0.00	0.00
40	0.02	0.00	0.00	0.00	0.00	0.00

TABLE 68

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+53

REACTOR LOADING, MLS :	450.0	T, C :	259.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	1516.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H ₂ :	0.53	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	53.65	MOL SYNGAS/KG CAT/HR:	47.923
%CO CONV. :	36.95	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	70.35	MOL CO/MOL METAL/MIN:	0.308

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	15.99	H ₂ O:	19.31
OXYGENATES :	0.43	CO :	59.73
CO ₂ :	2.53	H ₂ :	2.01

HYDROCARBON SELECTIVITY, WT%:

C1 :	10.04	C4+ENE :	2.80
C2+ANE :	2.30	C5+C11 :	44.61
C2+ENE :	0.00	C12+C18:	19.24
C3+ANE :	2.47	C19+C23:	7.17
C3+ENE :	3.01	C24+34 :	4.77
C4 ISO+ANE:	3.20	C35+ :	0.38

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 44.61
DIESEL (C9+C25) : 41.68

% ELEMENTAL RECOVERY: CARBON : 98.12
HYDROGEN: 101.36
OXYGEN : 98.48

TABLE 69

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 53

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	10.04	41.34	0.00	0.00	0.00	0.00
2	2.30	5.05	0.00	0.00	0.00	0.00
3	2.47	3.70	3.01	4.72	0.00	0.00
4	3.20	3.64	2.80	3.30	0.00	0.00
5	3.94	3.61	2.65	2.49	0.26	0.24
6	10.92	8.36	0.41	0.32	0.33	0.25
7	5.92	3.90	0.81	0.55	0.54	0.36
8	4.05	2.34	0.60	0.35	0.60	0.35
9	3.73	1.92	0.46	0.24	0.75	0.39
10	3.54	1.64	0.40	0.19	0.98	0.45
11	2.67	1.13	0.28	0.12	0.76	0.32
12	2.72	1.06	0.00	0.00	0.81	0.31
13	2.46	0.88	0.00	0.00	0.78	0.28
14	2.23	0.74	0.00	0.00	0.72	0.24
15	2.03	0.63	0.03	0.01	0.63	0.20
16	1.87	0.54	0.00	0.00	0.62	0.18
17	1.74	0.48	0.00	0.00	0.60	0.17
18	1.57	0.41	0.00	0.00	0.42	0.11
19	1.47	0.36	0.00	0.00	0.35	0.09
20	1.31	0.31	0.00	0.00	0.31	0.07
21	1.18	0.26	0.00	0.00	0.24	0.05
22	1.02	0.22	0.00	0.00	0.23	0.05

TABLE 69 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 53

CARBON NO.	N ⁺ ALKANES		1 ⁺ ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.88	0.18	0.00	0.00	0.19	0.04
24	0.76	0.15	0.00	0.00	0.16	0.03
25	0.64	0.12	0.00	0.00	0.13	0.02
26	0.54	0.10	0.00	0.00	0.11	0.02
27	0.45	0.08	0.00	0.00	0.09	0.02
28	0.38	0.06	0.00	0.00	0.07	0.01
29	0.31	0.05	0.00	0.00	0.06	0.01
30	0.26	0.04	0.00	0.00	0.05	0.01
31	0.21	0.03	0.00	0.00	0.04	0.01
32	0.18	0.03	0.00	0.00	0.03	0.00
33	0.14	0.02	0.00	0.00	0.03	0.00
34	0.12	0.02	0.00	0.00	0.02	0.00
35	0.09	0.01	0.00	0.00	0.01	0.00
36	0.07	0.01	0.00	0.00	0.00	0.00
37	0.05	0.01	0.00	0.00	0.00	0.00
38	0.06	0.01	0.00	0.00	0.00	0.00
39	0.05	0.01	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 70

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+56

REACTOR LOADING, MLS : 450.0	T, C : 260.0	FEED RATIO,
CATALYST LOADING, WT%: 21.1	P, PSIG : 300	CO/H ₂ : 1.00
TIME ON STREAM, HRS : 1613.0	SV, L/G/HR: 2.00	

USAGE RATIO, CO/H ₂ : 0.53	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ : 53.34	MOL SYNGAS/KG CAT/HR: 47.646
%CO CONV. : 36.78	SPECIFIC ACTIVITY,
%H ₂ CONV. : 69.90	MOL CO/MOL METAL/MIN: 0.307

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS: 14.81	H ₂ O: 19.41
OXYGENATES : 0.43	CO : 60.39
CO ₂ : 2.90	H ₂ : 2.05

HYDROCARBON SELECTIVITY, WT%:

C1 : 11.28	C4+ENE : 3.29
C2+ANE : 2.56	C5+C11 : 39.72
C2+ENE : 0.00	C12+C18: 20.10
C3+ANE : 2.77	C19+C23: 7.67
C3+ENE : 3.34	C24+34 : 5.31
C4 ISO+ANE: 3.62	C35+ : 0.35

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11): 39.72
DIESEL (C9+C25) : 42.61

% ELEMENTAL RECOVERY: CARBON : 95.81
HYDROGEN: 98.74
OXYGEN : 99.01

TABLE 71

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 56

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	11.28	44.24	0.00	0.00	0.00	0.00
2	2.56	5.34	0.00	0.00	0.00	0.00
3	2.77	3.94	3.34	4.99	0.00	0.00
4	3.59	3.88	3.29	3.69	0.03	0.03
5	4.28	3.73	2.80	2.51	0.37	0.33
6	8.58	6.26	0.31	0.23	0.26	0.19
7	4.75	2.98	0.62	0.40	0.43	0.27
8	3.38	1.86	0.51	0.28	0.50	0.28
9	3.52	1.73	0.42	0.21	0.65	0.32
10	3.39	1.50	0.43	0.19	0.72	0.32
11	2.71	1.09	0.33	0.13	0.77	0.31
12	2.56	0.95	0.27	0.10	0.81	0.30
13	2.64	0.90	0.00	0.00	0.80	0.27
14	2.45	0.78	0.00	0.00	0.75	0.24
15	2.21	0.65	0.02	0.01	0.69	0.20
16	1.96	0.54	0.00	0.00	0.64	0.18
17	1.76	0.46	0.00	0.00	0.56	0.15
18	1.60	0.39	0.00	0.00	0.40	0.10
19	1.53	0.36	0.00	0.00	0.35	0.08
20	1.41	0.31	0.00	0.00	0.29	0.06
21	1.28	0.27	0.00	0.00	0.25	0.05
22	1.14	0.23	0.00	0.00	0.23	0.05

TABLE 71 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 56

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.00	0.19	0.00	0.00	0.20	0.04
24	0.86	0.16	0.00	0.00	0.17	0.03
25	0.73	0.13	0.00	0.00	0.14	0.03
26	0.61	0.11	0.00	0.00	0.12	0.02
27	0.51	0.08	0.00	0.00	0.10	0.02
28	0.42	0.07	0.00	0.00	0.08	0.01
29	0.35	0.05	0.00	0.00	0.07	0.01
30	0.29	0.04	0.00	0.00	0.05	0.01
31	0.24	0.03	0.00	0.00	0.04	0.01
32	0.19	0.03	0.00	0.00	0.03	0.00
33	0.15	0.02	0.00	0.00	0.02	0.00
34	0.12	0.02	0.00	0.00	0.02	0.00
35	0.09	0.01	0.00	0.00	0.01	0.00
36	0.07	0.01	0.00	0.00	0.01	0.00
37	0.05	0.01	0.00	0.00	0.00	0.00
38	0.06	0.01	0.00	0.00	0.00	0.00
39	0.04	0.00	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 72

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE NO: 8862+1+31+59

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	1.00
TIME ON STREAM, HRS :	1684.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.52	BULK ACTIVITY,	
%OVERALL CONV-, CO+H2:	51.83	MOL SYNGAS/KG CAT/HR:	46.299
%CO CONV-	35.56	SPECIFIC ACTIVITY,	
%H2 CONV-	68.11	MOL CO/MOL METAL/MIN:	0.297

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	13.67	H2O:	22.76
OXYGENATES :	0.51	CO :	58.52
CO2 :	2.46	H2 :	2.07

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	10.57	C4+ENE :	3.25
C2+ANE :	2.62	C5+C11 :	39.75
C2+ENE :	0.00	C12+C18:	20.90
C3+ANE :	2.83	C19+C23:	7.70
C3+ENE :	3.19	C24+34 :	5.34
C4 ISO+ANE:	3.62	C35+ :	0.22

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	39.75
DIESEL (C9+C25) :	43.13

+++++

% ELEMENTAL RECOVERY:	CARBON :	96.09
	HYDROGEN:	106.96
	OXYGEN :	107.27

+++++

TABLE 73
HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 59

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	10.57	42.51	0.00	0.00	0.00	0.00
2	2.62	5.61	0.00	0.00	0.00	0.00
3	2.83	4.15	3.19	4.89	0.00	0.00
4	3.57	3.96	3.25	3.73	0.06	0.06
5	4.49	4.01	2.67	2.45	0.38	0.34
6	9.05	6.77	0.34	0.26	0.00	0.00
7	4.75	3.05	0.66	0.43	0.45	0.29
8	3.43	1.94	0.44	0.25	0.45	0.26
9	3.44	1.73	0.35	0.18	0.59	0.30
10	3.37	1.53	0.37	0.17	0.70	0.32
11	2.73	1.13	0.30	0.12	0.79	0.33
12	2.59	0.98	0.25	0.09	0.88	0.33
13	2.62	0.92	0.00	0.00	0.89	0.31
14	2.39	0.78	0.00	0.00	0.86	0.28
15	2.15	0.65	0.03	0.01	0.81	0.24
16	1.94	0.55	0.00	0.00	0.80	0.23
17	1.78	0.48	0.00	0.00	0.77	0.21
18	1.61	0.41	0.00	0.00	0.54	0.14
19	1.55	0.37	0.00	0.00	0.44	0.10
20	1.37	0.31	0.00	0.00	0.34	0.08
21	1.23	0.27	0.00	0.00	0.28	0.06
22	1.09	0.23	0.00	0.00	0.24	0.05

TABLE 73 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 59

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.96	0.19	0.00	0.00	0.20	0.04
24	0.83	0.16	0.00	0.00	0.18	0.03
25	0.72	0.13	0.00	0.00	0.15	0.03
26	0.61	0.11	0.00	0.00	0.13	0.02
27	0.51	0.09	0.00	0.00	0.11	0.02
28	0.44	0.07	0.00	0.00	0.09	0.01
29	0.36	0.06	0.00	0.00	0.07	0.01
30	0.29	0.04	0.00	0.00	0.06	0.01
31	0.24	0.03	0.00	0.00	0.05	0.01
32	0.18	0.03	0.00	0.00	0.04	0.01
33	0.14	0.02	0.00	0.00	0.03	0.00
34	0.10	0.01	0.00	0.00	0.02	0.00
35	0.07	0.01	0.00	0.00	0.02	0.00
36	0.05	0.01	0.00	0.00	0.01	0.00
37	0.03	0.00	0.00	0.00	0.01	0.00
38	0.02	0.00	0.00	0.00	0.01	0.00
39	0.01	0.00	0.00	0.00	0.01	0.00
40	0.00	0.00	0.00	0.00	0.01	0.00

TABLE 74

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE NO: 8862+1+31+62

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	1780.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H ₂ :	0.52	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	52.34	MOL SYNGAS/KG CAT/HR:	46.755
%CO CONV. :	35.86	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	68.83	MOL CO/MOL METAL/MIN:	0.299

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	15.75	H ₂ O:	18.39
OXYGENATES :	0.45	CO :	60.36
CO ₂ :	2.95	H ₂ :	2.09

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	12.89	C4+ENE :	3.09
C2+ANE :	2.56	C5+C11 :	43.25
C2+ENE :	0.10	C12+C18:	17.48
C3+ANE :	2.79	C19+C23:	6.96
C3+ENE :	3.13	C24+34 :	4.06
C4 ISO+ANE:	3.49	C35+ :	0.19

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	43.25
DIESEL (C9+C25) :	39.17

+++++

% ELEMENTAL RECOVERY:	CARBON :	99.14
	HYDROGEN:	101.99
	OXYGEN :	98.85

+++++

TABLE 75

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 52

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	12.89	47.25	0.00	0.00	0.00	0.00
2	2.56	5.01	0.10	0.21	0.00	0.00
3	2.79	3.72	3.13	4.37	0.00	0.00
4	3.43	3.47	3.09	3.23	0.06	0.06
5	4.11	3.35	3.04	2.54	0.36	0.29
6	9.76	6.65	0.44	0.30	0.00	0.00
7	5.61	3.29	0.78	0.47	0.59	0.34
8	4.14	2.13	0.57	0.30	0.66	0.34
9	3.96	1.82	0.41	0.19	0.77	0.35
10	3.54	1.46	0.37	0.16	0.78	0.32
11	2.39	0.90	0.24	0.09	0.71	0.27
12	2.43	0.84	0.00	0.00	0.75	0.26
13	2.21	0.71	0.00	0.00	0.75	0.24
14	2.00	0.59	0.00	0.00	0.70	0.21
15	1.81	0.50	0.03	0.01	0.64	0.18
16	1.64	0.43	0.00	0.00	0.61	0.16
17	1.54	0.38	0.00	0.00	0.53	0.13
18	1.46	0.34	0.00	0.00	0.39	0.09
19	1.42	0.31	0.00	0.00	0.35	0.08
20	1.30	0.27	0.00	0.00	0.29	0.06
21	1.15	0.23	0.00	0.00	0.24	0.05
22	0.99	0.19	0.00	0.00	0.21	0.04

TABLE 75 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 62

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.84	0.15	0.00	0.00	0.17	0.03
24	0.70	0.12	0.00	0.00	0.15	0.03
25	0.58	0.10	0.00	0.00	0.12	0.02
26	0.47	0.08	0.00	0.00	0.10	0.02
27	0.38	0.06	0.00	0.00	0.08	0.01
28	0.32	0.05	0.00	0.00	0.06	0.01
29	0.25	0.04	0.00	0.00	0.05	0.01
30	0.20	0.03	0.00	0.00	0.04	0.01
31	0.16	0.02	0.00	0.00	0.03	0.00
32	0.12	0.02	0.00	0.00	0.03	0.00
33	0.10	0.01	0.00	0.00	0.02	0.00
34	0.07	0.01	0.00	0.00	0.01	0.00
35	0.05	0.01	0.00	0.00	0.01	0.00
36	0.04	0.00	0.00	0.00	0.01	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.03	0.00	0.00	0.00	0.00	0.00
40	0.02	0.00	0.00	0.00	0.00	0.00

TABLE 76

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+65

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	1.00
TIME ON STREAM, HRS :	1828.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H2 :	0.52	BULK ACTIVITY,	
%OVERALL CONV-, CO+H2:	52.09	MOL SYNGAS/KG CAT/HR:	46.527
%CO CONV-	35.68	SPECIFIC ACTIVITY,	
%H2 CONV-	68.49	MOL CO/MOL METAL/MIN:	0.298

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	15.40	H2O:	18.97
OXYGENATES :	0.45	CO :	59.89
CO2 :	3.21	H2 :	2.09

HYDROCARBON SELECTIVITY, WT%:

C1 :	13.78	C4+ENE :	3.24
C2+ANE :	2.63	C5+C11 :	43.92
C2+ENE :	0.11	C12+C18:	16.60
C3+ANE :	3.05	C19+C23:	6.06
C3+ENE :	3.36	C24+34 :	3.43
C4 ISO+ANE:	3.71	C35+ :	0.13

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	43.92
DIESEL (C9+C25) :	37.08

% ELEMENTAL RECOVERY:	CARBON :	99.09
	HYDROGEN:	103.40
	OXYGEN :	100.72

TABLE 77

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 65

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	13.78	48.41	0.00	0.00	0.00	0.00
2	2.63	4.92	0.11	0.21	0.00	0.00
3	3.05	3.89	3.36	4.49	0.00	0.00
4	3.64	3.53	3.24	3.25	0.06	0.06
5	4.21	3.29	3.06	2.45	0.39	0.31
6	10.07	6.58	0.37	0.25	0.00	0.00
7	5.91	3.32	0.67	0.38	0.58	0.33
8	4.28	2.11	0.57	0.29	0.67	0.33
9	4.03	1.77	0.41	0.18	0.79	0.35
10	3.54	1.40	0.37	0.15	0.77	0.31
11	2.35	0.85	0.25	0.09	0.63	0.23
12	2.39	0.79	0.00	0.00	0.67	0.22
13	2.15	0.66	0.00	0.00	0.65	0.20
14	1.93	0.55	0.00	0.00	0.61	0.17
15	1.74	0.46	0.02	0.00	0.55	0.15
16	1.59	0.40	0.00	0.00	0.55	0.14
17	1.47	0.34	0.00	0.00	0.53	0.12
18	1.33	0.30	0.00	0.00	0.42	0.09
19	1.24	0.26	0.00	0.00	0.35	0.07
20	1.11	0.22	0.00	0.00	0.30	0.06
21	0.96	0.18	0.00	0.00	0.24	0.05
22	0.81	0.15	0.00	0.00	0.20	0.04

TABLE 77 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 65

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.68	0.12	0.00	0.00	0.16	0.03
24	0.57	0.09	0.00	0.00	0.13	0.02
25	0.48	0.08	0.00	0.00	0.11	0.02
26	0.39	0.06	0.00	0.00	0.09	0.01
27	0.32	0.05	0.00	0.00	0.07	0.01
28	0.27	0.04	0.00	0.00	0.06	0.01
29	0.22	0.03	0.00	0.00	0.05	0.01
30	0.17	0.02	0.00	0.00	0.04	0.01
31	0.14	0.02	0.00	0.00	0.03	0.00
32	0.10	0.01	0.00	0.00	0.02	0.00
33	0.08	0.01	0.00	0.00	0.02	0.00
34	0.06	0.01	0.00	0.00	0.01	0.00
35	0.04	0.00	0.00	0.00	0.01	0.00
36	0.03	0.00	0.00	0.00	0.01	0.00
37	0.02	0.00	0.00	0.00	0.01	0.00
38	0.01	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 78

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE NO: 8862+1+31+68

REACTOR LOADING, MLS :	450.0	T, C :	262.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	1.00
TIME ON STREAM, HRS :	1951.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H2 :	0.52	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	51.89	MOL SYNGAS/KG CAT/HR:	46.354
%CO CONV.	35.68	SPECIFIC ACTIVITY,	
%H2 CONV.	68.11	MOL CO/MOL METAL/MIN:	0.298

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	13.79	H2O:	18.98
OXYGENATES :	0.43	CO :	61.74
CO2 :	2.88	H2 :	2.19

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	10.96	C4+ENE :	3.13
C2+ANE :	2.86	C5+C11 :	39.49
C2+ENE :	0.12	C12+C18:	17.66
C3+ANE :	2.67	C19+C23:	9.38
C3+ENE :	3.07	C24+34 :	6.92
C4 ISO+ANE:	3.35	C35+ :	0.38

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	39.49
DIESEL (C9+C25) :	42.12

+++++

% ELEMENTAL RECOVERY:	CARBON :	94.68
	HYDROGEN:	96.95
	OXYGEN :	99.21

+++++

TABLE 79

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 68

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	10.96	43.63	0.00	0.00	0.00	0.00
2	2.86	6.08	0.12	0.26	0.00	0.00
3	2.67	3.87	3.07	4.66	0.00	0.00
4	3.30	3.62	3.13	3.56	0.05	0.05
5	4.32	3.82	3.28	2.98	0.38	0.34
6	7.86	5.83	0.28	0.22	0.26	0.19
7	4.83	3.07	0.57	0.37	0.44	0.28
8	3.61	2.02	0.49	0.28	0.61	0.34
9	3.61	1.80	0.39	0.20	0.73	0.36
10	3.34	1.50	0.37	0.17	0.74	0.33
11	2.41	0.99	0.25	0.10	0.70	0.29
12	2.49	0.93	0.00	0.00	0.74	0.28
13	2.28	0.79	0.00	0.00	0.74	0.26
14	2.06	0.66	0.00	0.00	0.68	0.22
15	1.83	0.55	0.01	0.00	0.56	0.17
16	1.67	0.47	0.00	0.00	0.55	0.15
17	1.61	0.43	0.00	0.00	0.49	0.13
18	1.59	0.40	0.00	0.00	0.36	0.09
19	1.69	0.40	0.00	0.00	0.36	0.09
20	1.70	0.38	0.00	0.00	0.32	0.07
21	1.63	0.35	0.00	0.00	0.30	0.07
22	1.50	0.31	0.00	0.00	0.29	0.06

TABLE 79 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 68

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	1.33	0.26	0.00	0.00	0.26	0.05
24	1.14	0.22	0.00	0.00	0.22	0.04
25	0.97	0.18	0.00	0.00	0.19	0.03
26	0.81	0.14	0.00	0.00	0.17	0.03
27	0.66	0.11	0.00	0.00	0.14	0.02
28	0.55	0.09	0.00	0.00	0.11	0.02
29	0.44	0.07	0.00	0.00	0.09	0.01
30	0.36	0.05	0.00	0.00	0.10	0.02
31	0.28	0.04	0.00	0.00	0.07	0.01
32	0.22	0.03	0.00	0.00	0.05	0.01
33	0.17	0.02	0.00	0.00	0.04	0.00
34	0.12	0.02	0.00	0.00	0.02	0.00
35	0.09	0.01	0.00	0.00	0.02	0.00
36	0.07	0.01	0.00	0.00	0.01	0.00
37	0.04	0.01	0.00	0.00	0.01	0.00
38	0.06	0.01	0.00	0.00	0.00	0.00
39	0.05	0.01	0.00	0.00	0.00	0.00
40	0.04	0.00	0.00	0.00	0.00	0.00

TABLE 80

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SILICA/EXTENDED TES
SAMPLE No: 8862+1+31+71

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT% :	21.1	P, PSIG :	305	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	2020.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H ₂ :	0.51	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	49.78	MOL SYNGAS/KG CAT/HR:	44.469
%CO CONV. :	33.55	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	66.02	MOL CO/MOL METAL/MIN:	0.280

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	14.73	H ₂ O:	18.03
OXYGENATES :	0.42	CO :	62.14
CO ₂ :	2.41	H ₂ :	2.27

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	11.05	C4+ENE :	3.15
C2+ANE :	2.54	C5+C11 :	45.56
C2+ENE :	0.11	C12+C18:	17.47
C3+ANE :	2.84	C19+C23:	6.49
C3+ENE :	3.18	C24+34 :	3.95
C4 ISO+ANE:	3.49	C35+ :	0.18

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	45.56
DIESEL (C9+C25) :	39.29

+++++

% ELEMENTAL RECOVERY: CARBON : 99.21
HYDROGEN: 101.64
OXYGEN : 100.03

+++++

TABLE 81

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 71

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	11.05	42.78	0.00	0.00	0.00	0.00
2	2.54	5.25	0.11	0.24	0.00	0.00
3	2.84	4.00	3.18	4.69	0.00	0.00
4	3.43	3.66	3.15	3.48	0.06	0.06
5	4.24	3.65	3.23	2.86	0.36	0.31
6	10.23	7.37	0.20	0.15	0.44	0.31
7	6.26	3.88	0.61	0.39	0.49	0.30
8	4.43	2.41	0.54	0.30	0.65	0.35
9	4.19	2.03	0.41	0.20	0.76	0.37
10	3.79	1.65	0.38	0.17	0.80	0.35
11	2.58	1.02	0.24	0.10	0.74	0.29
12	2.56	0.93	0.00	0.00	0.78	0.28
13	2.27	0.76	0.00	0.00	0.74	0.25
14	2.01	0.63	0.00	0.00	0.67	0.21
15	1.79	0.52	0.02	0.00	0.60	0.18
16	1.62	0.44	0.00	0.00	0.58	0.16
17	1.51	0.39	0.00	0.00	0.56	0.15
18	1.36	0.33	0.00	0.00	0.42	0.10
19	1.31	0.30	0.00	0.00	0.34	0.08
20	1.19	0.26	0.00	0.00	0.29	0.06
21	1.06	0.22	0.00	0.00	0.24	0.05
22	0.90	0.18	0.00	0.00	0.21	0.04

TABLE 81 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 71

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.77	0.15	0.00	0.00	0.17	0.03
24	0.65	0.12	0.00	0.00	0.14	0.03
25	0.54	0.10	0.00	0.00	0.12	0.02
26	0.45	0.08	0.00	0.00	0.09	0.02
27	0.37	0.06	0.00	0.00	0.08	0.01
28	0.31	0.05	0.00	0.00	0.06	0.01
29	0.25	0.04	0.00	0.00	0.05	0.01
30	0.21	0.03	0.00	0.00	0.04	0.01
31	0.17	0.02	0.00	0.00	0.03	0.00
32	0.14	0.02	0.00	0.00	0.03	0.00
33	0.11	0.01	0.00	0.00	0.02	0.00
34	0.08	0.01	0.00	0.00	0.01	0.00
35	0.06	0.01	0.00	0.00	0.01	0.00
36	0.04	0.01	0.00	0.00	0.00	0.00
37	0.03	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 82

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SILICA+EXT- TEST
SAMPLE NO: 8862+1+31+74

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H2:	1.00
TIME ON STREAM, HRS :	2117.0	SV, L/G/HR:	2.00		

USAGE RATIO, CO/H2 :	0.52	BULK ACTIVITY,	
%OVERALL CONV., CO+H2:	50.15	MOL SYNGAS/KG CAT/HR:	44.797
%CO CONV. :	34.31	SPECIFIC ACTIVITY,	
%H2 CONV. :	65.99	MOL CO/MOL METAL/MIN:	0.285

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	14.99	H2O:	17.82
OXYGENATES :	0.40	CO :	61.92
CO2 :	2.58	H2 :	2.29

HYDROCARBON SELECTIVITY, WT%:

C1 :	14.61	C4+ENE :	3.46
C2+ANE :	2.61	C5+C11 :	42.60
C2+ENE :	0.11	C12+C18:	17.18
C3+ANE :	2.76	C19+C23:	6.17
C3+ENE :	3.15	C24+34 :	3.71
C4 ISO+ANE:	3.48	C35+ :	0.16

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	42.60
DIESEL (C9+C25) :	37.82

% ELEMENTAL RECOVERY:	CARBON :	98.70
	HYDROGEN:	102.15
	OXYGEN :	98.89

TABLE 83

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 74

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	14.61	50.44	0.00	0.00	0.00	0.00
2	2.61	4.81	0.11	0.22	0.00	0.00
3	2.76	3.46	3.15	4.14	0.00	0.00
4	3.42	3.26	3.46	3.42	0.06	0.05
5	4.17	3.20	3.21	2.54	0.34	0.26
6	9.92	6.37	0.00	0.00	0.00	0.00
7	5.63	3.11	0.62	0.35	0.49	0.27
8	3.99	1.93	0.53	0.26	0.61	0.30
9	3.84	1.66	0.41	0.18	0.71	0.31
10	3.53	1.37	0.37	0.15	0.79	0.31
11	2.68	0.95	0.00	0.00	0.75	0.27
12	2.49	0.81	0.00	0.00	0.80	0.26
13	2.26	0.68	0.00	0.00	0.76	0.23
14	1.89	0.53	0.12	0.04	0.68	0.19
15	1.79	0.47	0.02	0.00	0.60	0.16
16	1.59	0.39	0.00	0.00	0.54	0.13
17	1.45	0.33	0.00	0.00	0.48	0.11
18	1.34	0.29	0.00	0.00	0.36	0.08
19	1.25	0.26	0.00	0.00	0.32	0.07
20	1.14	0.22	0.00	0.00	0.26	0.05
21	1.01	0.19	0.00	0.00	0.22	0.04
22	0.87	0.16	0.00	0.00	0.19	0.03

TABLE 83 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 74

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.74	0.13	0.00	0.00	0.16	0.03
24	0.62	0.10	0.00	0.00	0.13	0.02
25	0.53	0.08	0.00	0.00	0.11	0.02
26	0.43	0.07	0.00	0.00	0.09	0.01
27	0.36	0.05	0.00	0.00	0.07	0.01
28	0.29	0.04	0.00	0.00	0.06	0.01
29	0.24	0.03	0.00	0.00	0.05	0.01
30	0.19	0.03	0.00	0.00	0.04	0.00
31	0.15	0.02	0.00	0.00	0.03	0.00
32	0.12	0.01	0.00	0.00	0.02	0.00
33	0.09	0.01	0.00	0.00	0.02	0.00
34	0.07	0.01	0.00	0.00	0.01	0.00
35	0.05	0.01	0.00	0.00	0.01	0.00
36	0.03	0.00	0.00	0.00	0.00	0.00
37	0.02	0.00	0.00	0.00	0.00	0.00
38	0.02	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.00	0.00	0.00	0.00
40	0.01	0.00	0.00	0.00	0.00	0.00

TABLE 84

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SiO₂+EXT. TEST
SAMPLE NO: 8862+1+31+77

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	1.00
TIME ON STREAM, HRS :	2188.0	SV, L/G/HR:	2.00		

+++++

USAGE RATIO, CO/H ₂ :	0.51	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	49.45	MOL SYNGAS/KG CAT/HR:	44.174
%CO CONV.	33.33	SPECIFIC ACTIVITY,	
%H ₂ CONV.	65.57	MOL CU/MOL METAL/MIN:	0.278

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	16.51	H ₂ O:	17.42
OXYGENATES :	0.41	CO :	60.94
CO ₂ :	2.47	H ₂ :	2.25

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	15.37	C4+ENE :	2.99
C2+ANE :	2.35	C5+C11 :	46.17
C2+ENE :	0.10	C12+C18:	15.23
C3+ANE :	2.75	C19+C23:	5.26
C3+ENE :	3.04	C24+34 :	3.30
C4 ISO+ANE:	3.18	C35+ :	0.26

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	46.17
DIESEL (C9+C25) :	35.26

+++++

% ELEMENTAL RECOVERY: CARBON : 103.81
HYDROGEN: 108.21
OXYGEN : 100.06

+++++

TABLE 85

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 77

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	15.37	51.83	0.00	0.00	0.00	0.00
2	2.35	4.22	0.10	0.19	0.00	0.00
3	2.75	3.37	3.04	3.90	0.00	0.00
4	3.13	2.91	2.99	2.88	0.05	0.05
5	4.13	3.10	3.18	2.45	0.35	0.26
6	10.60	6.65	0.32	0.21	0.00	0.00
7	6.56	3.54	0.77	0.42	0.58	0.31
8	4.85	2.30	0.61	0.29	0.67	0.32
9	4.35	1.83	0.43	0.18	0.77	0.32
10	3.83	1.46	0.40	0.15	0.80	0.30
11	2.14	0.74	0.22	0.08	0.62	0.22
12	2.18	0.69	0.00	0.00	0.68	0.22
13	1.98	0.58	0.00	0.00	0.67	0.20
14	1.77	0.48	0.00	0.00	0.62	0.17
15	1.57	0.40	0.02	0.00	0.56	0.14
16	1.40	0.34	0.00	0.00	0.53	0.13
17	1.27	0.29	0.00	0.00	0.49	0.11
18	1.13	0.24	0.00	0.00	0.36	0.08
19	1.05	0.21	0.00	0.00	0.28	0.06
20	0.95	0.18	0.00	0.00	0.23	0.04
21	0.86	0.16	0.00	0.00	0.20	0.04
22	0.74	0.13	0.00	0.00	0.17	0.03

TABLE 85 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 77

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.64	0.11	0.00	0.00	0.14	0.02
24	0.54	0.09	0.00	0.00	0.12	0.02
25	0.45	0.07	0.00	0.00	0.09	0.01
26	0.37	0.05	0.00	0.00	0.08	0.01
27	0.31	0.04	0.00	0.00	0.06	0.01
28	0.26	0.04	0.00	0.00	0.05	0.01
29	0.21	0.03	0.00	0.00	0.04	0.01
30	0.18	0.02	0.00	0.00	0.03	0.00
31	0.14	0.02	0.00	0.00	0.03	0.00
32	0.12	0.01	0.00	0.00	0.02	0.00
33	0.10	0.01	0.00	0.00	0.02	0.00
34	0.08	0.01	0.00	0.00	0.01	0.00
35	0.06	0.01	0.00	0.00	0.01	0.00
36	0.05	0.01	0.00	0.00	0.00	0.00
37	0.04	0.00	0.00	0.00	0.00	0.00
38	0.05	0.00	0.00	0.00	0.00	0.00
39	0.03	0.00	0.00	0.00	0.00	0.00
40	0.03	0.00	0.00	0.00	0.00	0.00

TABLE 86

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

CATALYST : Co/Zr/SiO₂+EXT. TEST
SAMPLE No: 8862+1+31+80

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	2308.0	SV, L/G/HR:	1.80		

USAGE RATIO, CO/H ₂ :	0.46	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	65.92	MOL SYNGAS/KG CAT/HR:	52.972
%CO CONV.	62.94	SPECIFIC ACTIVITY,	
%H ₂ CONV.	67.39	MOL CO/MOL METAL/MIN:	0.312

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	28.11	H ₂ O:	29.69
OXYGENATES :	0.88	CO :	30.99
CO ₂ :	6.38	H ₂ :	3.95

HYDROCARBON SELECTIVITY, WT%:

C1 :	26.62	C4+ENE :	2.31
C2+ANE :	5.52	C5+C11 :	37.65
C2+ENE :	0.00	C12+C18:	4.87
C3+ANE :	9.77	C19+C23:	2.22
C3+ENE :	1.36	C24+34 :	0.46
C4 ISO+ANE:	9.22	C35+ :	0.01

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	37.65
DIESEL (C9+C25) :	16.47

% ELEMENTAL RECOVERY:	CARBON :	106.78
	HYDROGEN:	104.35
	OXYGEN :	102.77

TABLE 87

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 80

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	26.62	60.81	0.00	0.00	0.00	0.00
2	5.52	6.72	0.00	0.00	0.00	0.00
3	9.77	8.11	1.36	1.18	0.00	0.00
4	8.96	5.65	2.31	1.51	0.26	0.16
5	7.76	3.94	1.78	0.93	0.79	0.40
6	7.64	3.25	0.22	0.10	0.00	0.00
7	4.97	1.82	0.16	0.06	0.65	0.24
8	3.67	1.18	0.12	0.04	0.84	0.27
9	3.34	0.95	0.07	0.02	0.85	0.24
10	2.54	0.65	0.00	0.00	0.81	0.21
11	1.09	0.26	0.00	0.00	0.38	0.09
12	0.89	0.19	0.00	0.00	0.32	0.07
13	0.72	0.14	0.00	0.00	0.26	0.05
14	0.58	0.11	0.00	0.00	0.20	0.04
15	0.47	0.08	0.00	0.00	0.15	0.03
16	0.38	0.06	0.00	0.00	0.13	0.02
17	0.31	0.05	0.00	0.00	0.11	0.02
18	0.27	0.04	0.00	0.00	0.09	0.01
19	0.32	0.04	0.00	0.00	0.09	0.01
20	0.38	0.05	0.00	0.00	0.12	0.02
21	0.39	0.05	0.00	0.00	0.14	0.02
22	0.32	0.04	0.00	0.00	0.13	0.02

TABLE 87 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 80

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.22	0.03	0.00	0.00	0.09	0.01
24	0.14	0.01	0.00	0.00	0.06	0.01
25	0.08	0.01	0.00	0.00	0.03	0.00
26	0.05	0.00	0.00	0.00	0.02	0.00
27	0.03	0.00	0.00	0.00	0.01	0.00
28	0.02	0.00	0.00	0.00	0.00	0.00
29	0.01	0.00	0.00	0.00	0.00	0.00
30	0.01	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 88

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SiO₂ EXT. TEST
SAMPLE No: 8862+1+31+83

REACTOR LOADING, MLS :	450.0	T, C :	262.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	2356.0	SV, L/G/HR:	1.80		

+++++

USAGE RATIO, CO/H ₂ :	0.45	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	63.74	MOL SYNGAS/KG CAT/HR:	51.221
%CO CONV-	60.23	SPECIFIC ACTIVITY,	
%H ₂ CONV-	65.47	MOL CO/MOL METAL/MIN:	0.298

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	24.06	H ₂ O:	30.46
OXYGENATES :	1.10	CO :	34.80
CO ₂ :	5.21	H ₂ :	4.38

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	25.11	C4+ENE :	2.47
C2+ANE :	6.02	C5+C11 :	35.90
C2+ENE :	0.00	C12+C18:	5.87
C3+ANE :	10.13	C19+C23:	2.41
C3+ENE :	1.50	C24+34 :	0.63
C4 ISO+ANE:	9.96	C35+ :	0.00

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	35.90
DIESEL (C9+C25) :	17.49

+++++

% ELEMENTAL RECOVERY:	CARBON :	97.12
	HYDROGEN:	97.76
	OXYGEN :	102.38

+++++

TABLE 89

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 83

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	25.11	58.59	0.00	0.00	0.00	0.00
2	6.02	7.49	0.00	0.00	0.00	0.00
3	10.13	8.59	1.50	1.33	0.00	0.00
4	9.68	6.23	2.47	1.65	0.29	0.18
5	8.58	4.45	1.99	1.06	0.85	0.44
6	6.13	2.66	0.26	0.12	0.78	0.34
7	3.69	1.38	0.14	0.05	0.95	0.35
8	2.96	0.97	0.08	0.03	0.72	0.24
9	2.99	0.87	0.06	0.02	0.78	0.23
10	2.28	0.60	0.02	0.01	0.71	0.19
11	1.43	0.34	0.00	0.00	0.49	0.12
12	1.14	0.25	0.00	0.00	0.41	0.09
13	0.90	0.18	0.00	0.00	0.31	0.06
14	0.71	0.13	0.00	0.00	0.24	0.04
15	0.55	0.10	0.00	0.00	0.18	0.03
16	0.44	0.07	0.00	0.00	0.15	0.02
17	0.35	0.05	0.00	0.00	0.12	0.02
18	0.29	0.04	0.00	0.00	0.09	0.01
19	0.30	0.04	0.00	0.00	0.10	0.01
20	0.38	0.05	0.00	0.00	0.10	0.01
21	0.44	0.06	0.00	0.00	0.13	0.02
22	0.41	0.05	0.00	0.00	0.15	0.02

TABLE 89 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 83

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERCS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.30	0.03	0.00	0.00	0.12	0.01
24	0.19	0.02	0.00	0.00	0.08	0.01
25	0.11	0.01	0.00	0.00	0.04	0.00
26	0.06	0.01	0.00	0.00	0.02	0.00
27	0.04	0.00	0.00	0.00	0.01	0.00
28	0.02	0.00	0.00	0.00	0.01	0.00
29	0.01	0.00	0.00	0.00	0.00	0.00
30	0.01	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 90

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SiO₂+EXT. TEST
SAMPLE No: 8862+1+31+85

REACTOR LOADING, MLS :	450.0	T, C :	261.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	300	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	2452.0	SV, L/G/HR:	1.00		

+++++

USAGE RATIO, CO/H ₂ :	0.47	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	70.61	MOL SYNGAS/KG CAT/HR:	31.556
%CO CONV. :	68.00	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	71.89	MOL CO/MOL METAL/MIN:	0.187

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	27.00	H ₂ O:	32.86
OXYGENATES :	0.97	CO :	26.74
CO ₂ :	9.03	H ₂ :	3.40

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	25.62	C4+ENE :	1.86
C2+ANE :	6.22	C5+C11 :	37.90
C2+ENE :	0.00	C12+C18:	6.38
C3+ANE :	9.95	C19+C23:	1.46
C3+ENE :	1.00	C24+34 :	0.44
C4 ISO+ANE:	9.18	C35+ :	0.00

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	37.90
DIESEL (C9+C25) :	19.85

+++++

% ELEMENTAL RECOVERY:	CARBON :	101.47
	HYDROGEN:	100.97
	OXYGEN :	107.70

+++++

TABLE 91

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 85

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	25.62	59.71	0.00	0.00	0.00	0.00
2	6.22	7.73	0.00	0.00	0.00	0.00
3	9.95	8.43	1.00	0.89	0.00	0.00
4	8.88	5.71	1.86	1.24	0.30	0.20
5	7.88	4.08	1.60	0.85	0.79	0.41
6	6.44	2.79	0.00	0.00	0.00	0.00
7	3.78	1.41	0.89	0.34	0.00	0.00
8	3.54	1.16	1.28	0.43	0.00	0.00
9	3.80	1.11	0.06	0.02	1.35	0.39
10	2.70	0.71	0.05	0.01	1.13	0.30
11	1.79	0.43	0.02	0.01	0.79	0.19
12	1.34	0.29	0.00	0.00	0.60	0.13
13	0.99	0.20	0.00	0.00	0.38	0.08
14	0.76	0.14	0.00	0.00	0.29	0.06
15	0.57	0.10	0.00	0.00	0.23	0.04
16	0.40	0.07	0.00	0.00	0.17	0.03
17	0.27	0.04	0.00	0.00	0.12	0.02
18	0.18	0.03	0.00	0.00	0.08	0.01
19	0.15	0.02	0.00	0.00	0.05	0.01
20	0.18	0.02	0.00	0.00	0.05	0.01
21	0.26	0.03	0.00	0.00	0.08	0.01
22	0.28	0.03	0.00	0.00	0.10	0.01

TABLE 91 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 85

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	%	MOLE %
23	0.22	0.02	0.00	0.00	0.09	0.01
24	0.14	0.01	0.00	0.00	0.06	0.01
25	0.08	0.01	0.00	0.00	0.03	0.00
26	0.04	0.00	0.00	0.00	0.02	0.00
27	0.02	0.00	0.00	0.00	0.01	0.00
28	0.01	0.00	0.00	0.00	0.00	0.00
29	0.01	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 92

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SiO₂++EXT. TEST
SAMPLE No: 8862+1+31+89

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,	
CATALYST LOADING, WT%:	21.1	P, PSIG :	295	CO/H ₂ :	0.49
TIME ON STREAM, HRS :	2475.0	SV, L/G/HR:	1.00		

+++++

USAGE RATIO, CO/H ₂ :	0.47	BULK ACTIVITY,	
%OVERALL CONV., CO+H ₂ :	70.18	MOL SYNGAS/KG CAT/HR:	31.366
%CO CONV. :	68.00	SPECIFIC ACTIVITY,	
%H ₂ CONV. :	71.26	MOL CO/MOL METAL/MIN:	0.187

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	27.97	H ₂ O:	31.78
OXYGENATES :	0.92	CO :	25.74
CO ₂ :	10.23	H ₂ :	3.35

+++++

HYDROCARBON SELECTIVITY, WT%:

C ₁ :	27.06	C ₄ +ENE :	1.83
C ₂ +ANE :	6.37	C ₅ +C ₁₁ :	35.21
C ₂ +ENE :	0.00	C ₁₂ +C ₁₈ :	6.22
C ₃ +ANE :	10.09	C ₁₉ +C ₂₃ :	2.04
C ₃ +ENE :	0.90	C ₂₄ + ₃₄ :	1.09
C ₄ ISO+ANE:	9.19	C ₃₅ +	0.00

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C₅+C₁₁): 35.21
DIESEL (C₉+C₂₅) : 19.21

+++++

% ELEMENTAL RECOVERY: CARBON : 107.23
HYDROGEN: 105.25
OXYGEN : 110.41

+++++

TABLE 93

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 89

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	27.06	61.35	0.00	0.00	0.00	0.00
2	6.37	7.70	0.00	0.00	0.00	0.00
3	10.09	8.32	0.90	0.78	0.00	0.00
4	8.87	5.55	1.83	1.18	0.32	0.20
5	7.65	3.86	1.58	0.82	0.80	0.40
6	6.52	2.75	0.00	0.00	0.00	0.00
7	3.43	1.24	0.78	0.29	0.01	0.00
8	3.09	0.98	1.07	0.35	0.00	0.00
9	3.28	0.93	0.06	0.02	1.17	0.33
10	2.35	0.60	0.05	0.01	1.00	0.26
11	1.63	0.38	0.03	0.01	0.71	0.17
12	1.29	0.28	0.00	0.00	0.54	0.12
13	0.92	0.18	0.00	0.00	0.41	0.08
14	0.73	0.13	0.00	0.00	0.27	0.05
15	0.56	0.10	0.01	0.00	0.20	0.03
16	0.42	0.07	0.00	0.00	0.16	0.03
17	0.31	0.05	0.00	0.00	0.12	0.02
18	0.21	0.03	0.00	0.00	0.08	0.01
19	0.18	0.02	0.00	0.00	0.06	0.01
20	0.22	0.03	0.00	0.00	0.05	0.01
21	0.36	0.04	0.00	0.00	0.07	0.01
22	0.46	0.05	0.00	0.00	0.11	0.01

TABLE 93 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 89

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.42	0.05	0.00	0.00	0.12	0.01
24	0.32	0.03	0.00	0.00	0.10	0.01
25	0.21	0.02	0.00	0.00	0.06	0.01
26	0.13	0.01	0.00	0.00	0.04	0.00
27	0.07	0.01	0.00	0.00	0.02	0.00
28	0.04	0.00	0.00	0.00	0.02	0.00
29	0.02	0.00	0.00	0.00	0.01	0.00
30	0.01	0.00	0.00	0.00	0.01	0.00
31	0.01	0.00	0.00	0.00	0.00	0.00
32	0.01	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00
39	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 94

MASS BALANCE
PROCESS CONDITIONS AND PRODUCT SUMMARY

+++++

CATALYST : Co/Zr/SiO₂+Ext. TEST
SAMPLE No: 8862+1+31+91

REACTOR LOADING, MLS :	450.0	T, C :	260.0	FEED RATIO,
CATALYST LOADING, WT%:	21.1	P, PSIG :	295	CU/H ₂ :
TIME ON STREAM, HRS :	2596.0	SV, L/G/HR:	1.00	1.00

+++++

USAGE RATIO, CO/H ₂ :	0.49	BULK ACTIVITY,
%OVERALL CONV., CO+H ₂ :	54.11	MOL SYNGAS/KG CAT/HR:
%CO CONV. :	35.77	SPECIFIC ACTIVITY,
%H ₂ CONV. :	72.45	MOL CO/MOL METAL/MIN:

+++++

WEIGHT % PRODUCT DISTRIBUTION:

HYDROCARBONS:	15.69	H ₂ O:	22.40
OXYGENATES :	0.37	CO :	55.84
CO ₂ :	3.99	H ₂ :	1.71

+++++

HYDROCARBON SELECTIVITY, WT%:

C1 :	15.58	C4+ENE :	3.24
C2+ANE :	2.58	C5+C11 :	39.52
C2+ENE :	0.09	C12+C18:	18.85
C3+ANE :	3.27	C19+C23:	4.82
C3+ENE :	3.01	C24+34 :	5.07
C4 ISO+ANE:	3.62	C35+ :	0.35

+++++

FUEL FRACTIONS, WT%:

GASOLINE (C5+C11):	39.52
DIESEL (C9+C25) :	39.96

+++++

% ELEMENTAL RECOVERY: CARBON : 102.55
HYDROGEN: 111.73
OXYGEN : 110.45

+++++

TABLE 95

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 91

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
1	15.58	52.74	0.00	0.00	0.00	0.00
2	2.58	4.66	0.09	0.17	0.00	0.00
3	3.27	4.02	3.01	3.88	0.00	0.00
4	3.56	3.33	3.24	3.14	0.06	0.05
5	4.38	3.30	3.29	2.55	0.36	0.27
6	7.57	4.77	0.00	0.00	0.00	0.00
7	4.36	2.36	0.42	0.23	0.00	0.00
8	3.33	1.58	0.38	0.18	0.76	0.36
9	4.55	1.93	0.00	0.00	1.13	0.48
10	3.86	1.47	0.00	0.00	1.04	0.40
11	3.10	1.08	0.00	0.00	0.98	0.34
12	2.74	0.87	0.00	0.00	0.95	0.30
13	2.42	0.71	0.00	0.00	0.87	0.26
14	2.16	0.59	0.00	0.00	0.79	0.22
15	1.94	0.50	0.04	0.01	0.69	0.18
16	1.75	0.42	0.00	0.00	0.67	0.16
17	1.56	0.35	0.00	0.00	0.59	0.13
18	1.29	0.27	0.00	0.00	0.38	0.08
19	1.02	0.21	0.00	0.00	0.28	0.06
20	0.81	0.16	0.00	0.00	0.20	0.04
21	0.70	0.13	0.00	0.00	0.16	0.03
22	0.68	0.12	0.00	0.00	0.14	0.02

TABLE 95 (CONTINUED)

HYDROCARBON PRODUCT DISTRIBUTION

RUN NO. 8862+1+31

SAMPLE NO. 91

CARBON NO.	N+ALKANES		1+ALKENE		BRANCHED ISOMERS	
	WT %	MOLE %	WT %	MOLE %	WT %	MOLE %
23	0.70	0.12	0.00	0.00	0.14	0.02
24	0.70	0.11	0.00	0.00	0.14	0.02
25	0.65	0.10	0.00	0.00	0.13	0.02
26	0.58	0.09	0.00	0.00	0.12	0.02
27	0.50	0.07	0.00	0.00	0.11	0.02
28	0.43	0.06	0.00	0.00	0.09	0.01
29	0.35	0.05	0.00	0.00	0.07	0.01
30	0.29	0.04	0.00	0.00	0.06	0.01
31	0.24	0.03	0.00	0.00	0.05	0.01
32	0.19	0.02	0.00	0.00	0.04	0.01
33	0.15	0.02	0.00	0.00	0.03	0.00
34	0.12	0.01	0.00	0.00	0.02	0.00
35	0.09	0.01	0.00	0.00	0.01	0.00
36	0.07	0.01	0.00	0.00	0.01	0.00
37	0.05	0.01	0.00	0.00	0.00	0.00
38	0.04	0.00	0.00	0.00	0.00	0.00
39	0.05	0.00	0.00	0.00	0.00	0.00
40	0.04	0.00	0.00	0.00	0.00	0.00

TABLE 96

Analysis of Slurry-Phase Fischer-Tropsch Synthetic Diesel Fuel

		Slurry-Phase FT Diesel Fuel Oil Sample HW8466-54	ASTM Spec. for No. 1-D Diesel Fuel Oil
Flash Point, PMCC	ASTM D93	178 ⁰ F	100 ⁰ F (min.)
Visc/@100 ⁰ F SUS	ASTM D88	35.7 sec	34.4 sec (max.)
Water & Sediment	ASTM D2709	trace	0.05 vol-% (max.)
Sulfur Content	ASTM D1552	0.04%	0.5% (max.)
Cloud Point	ASTM D2500	14 ⁰ F	14 ⁰ F (max.)
Ash	ASTM D482	0.002%	0.01% (max.)
Car. Res. Con on 10%	ASTM D189	.020%	0.15% (max.)
Corrosion 3 Hrs @ 212 ⁰ F	ASTM D130	1A	3 (max.)
Distillation:	ASTM D86		
Int. B. P.		400 ⁰ F	
10% @		418 ⁰ F	
50% @		461 ⁰ F	
90% @		550 ⁰ F	550 ⁰ F (max.)
End Point		576 ⁰ F	
Recovery		99%	
Cetane Index	ASTM D976	75.2	40 (min.)
Density @ 15 ⁰ C	ASTM D1298	0.7654	

TABLE 97

Detailed Requirements for Diesel Fuel Oils ^{A,H}

Grade of Diesel Fuel Oil	Flash Point, °C (°F)	Cloud Point, °C	Water and Sediment, vol %	Carbon Residue on 10 % Residue, %	Ash, weight %	Distillation Temperatures, °C (°F)		Viscosity				Sulfur, weight %	Copper Strip Corrosion	Cetane Number ¹
	Min	Max	Max	Max	Max	90 % Point		Kinematic, cSt ² at 40°C		Saybolt, SUS at 100°F		Max	Max	Min
						Min	Max	Min	Max	Min	Max			
No. 1-D A volatile distillate fuel oil for engines in service requiring frequent speed and load changes	38 (100)	"	0.05	0.15	0.01	...	283 (550)	1.3	2.4	...	34.4	0.50	No. 3	40 ³
No. 2-D A distillate fuel oil of lower volatility for engines in industrial and heavy mobile service	52 (125)	"	0.05	0.35	0.01	282 ⁴ (540)	338 (640)	1.9	4.1	32.6	40.1	0.50	No. 3	40 ³
No. 4-D A fuel oil for low and medium speed engines	55 (130)	"	0.50	...	0.10	...	...	5.5	24.0	45.0	125.0	2.0	...	30 ³

^A To meet special operating conditions, modifications of individual limiting requirements may be agreed upon between purchaser, seller, and manufacturer.

^H It is unrealistic to specify low-temperature properties that will ensure satisfactory operation on a broad basis. Satisfactory operation should be achieved in most cases if the cloud point (or wax appearance point) is specified at 6°C above the tenth percentile minimum ambient temperature for the area in which the fuel will be used. The tenth percentile minimum ambient temperatures for the United States are shown in Appendix X2. This guidance is of a general nature; some equipment designs, use flow improver additives, fuel properties, or operations, or a combination thereof, may allow higher or require lower cloud point fuels. Appropriate low temperature operability properties should be agreed upon between the fuel supplier and purchaser for the intended use and expected ambient temperatures.

¹ When cloud point less than -12°C (10°F) is specified, the minimum viscosity shall be 1.7 cSt (or mm²/s) and the 90 % point shall be waived.

² In countries outside the United States, other sulfur limits may apply.

³ Where cetane number by Method D613 is not available, Method D976 may be used as an approximation. Where there is disagreement, Method D613 shall be the reference method.

⁴ Low-atmospheric temperatures as well as engine operation at high altitudes may require use of fuels with higher cetane ratings.

⁵ 1 cSt = 1 mm²/s.

⁶ The values stated in SI units are to be regarded as the standard. The values in inch-pound units are for information only.

TABLE 98

ASTM Copper Strip Classifications

Classification	Designation	Description ^a
Freshly polished strip	...	"
1	slight tarnish	a. Light orange, almost the same as freshly polished strip b. Dark orange
2	moderate tarnish	a. Claret red b. Lavender c. Multicolored with lavender blue or silver, or both, overlaid on claret red d. Silvery e. Brassy or gold
3	dark tarnish	a. Magenta overcast on brassy strip b. Multicolored with red and green showing (peacock), but no gray
4	corrosion	a. Transparent black, dark gray or brown with peacock green barely showing b. Graphitic or lustrous black c. Glossy or jet black

^a The ASTM Copper Strip Corrosion Standard is a colored reproduction of strips characteristic of these descriptions.

^b The freshly polished strip is included in the series only as an indication of the appearance of a properly polished strip before a test run. It is not possible to duplicate this appearance after a test even with a completely noncorrosive sample.