

Table A1

RESULT OF SYNGAS OPERATION

RUN NO.	11723-17				
CATALYST	Co/Th/X4-U103 11864-31C 250 CC 102.1G(138.5 @END +36. G)				
FEED	H2:CO:ARGON OF 50:50:0 @ 1260 CC/MN OR 302 GHSV				
RUN & SAMPLE NO.	11723-17-01	723-17-03	723-17-05	723-17-07	723-17-09
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	17.2	43.0	68.0	92.0	116.0
PRESSURE, PSIG	295	295	292	297	293
TEMP. C	260	260	269	261	261
FEED CC/MIN	1260	1260	1260	1260	1260
HOURS FEEDING	15.17	25.83	24.00	24.00	24.00
EFFLNT GAS LITER	758.58	1173.10	1114.10	1101.32	1126.00
GM AQUEOUS LAYER	122.22	174.86	157.08	161.55	152.52
GM OIL	37.02	65.82	63.62	67.17	65.47
MATERIAL BALANCE					
GM ATOM CARBON %	100.90	91.93	102.77	95.17	95.90
GM ATOM HYDROGEN %	105.15	95.99	95.93	99.13	98.69
GM ATOM OXYGEN %	110.67	97.36	104.06	97.87	97.85
RATIO CHX/(H2O+CO2)	0.7005	0.8026	0.9538	0.9019	0.9252
RATIO X IN CHX	2.4576	2.4243	2.5040	2.4060	2.4200
USAGE H2/CO PRDCT	2.4531	2.2972	2.0402	2.1690	2.1461
FEED H2/CO FRM EFFLNT	1.0422	1.0442	0.9335	1.0416	1.0291
RESIDUAL H2/CO RATIO	0.5971	0.6222	0.4992	0.6208	0.6286
RATIO CO2/(H2O+CO2)	0.0412	0.0392	0.0816	0.0406	0.0426
K SHIFT IN EFFLNT	0.0257	0.0254	0.0444	0.0263	0.0280
SPECIFIC ACTIVITY SA	0.7876	0.7875	0.7905	0.8149	0.7863
CONVERSION					
ON CO %	23.98	25.20	28.19	27.18	26.39
ON H2 %	56.44	55.43	61.60	56.60	55.04
ON CO+H2 %	40.54	40.64	44.32	42.19	40.92
PRDCT SELECTIVITY, WT %					
CH4	18.40	16.48	20.07	15.12	15.77
C2 HC'S	2.39	2.22	3.10	2.10	2.31
C3H8	2.01	1.89	2.74	2.32	2.38
C3H6=	2.45	2.23	2.67	2.63	2.77
C4H10	2.30	2.19	2.81	2.49	2.55
C4H8=	3.36	3.07	3.60	3.27	3.06
C5H12	2.52	2.50	3.16	3.05	3.09
C5H10=	3.23	2.60	3.32	2.41	2.89
C6H14	2.98	2.96	3.44	3.49	3.19
C6H12= & CYCLO'S	2.43	2.17	2.32	2.03	1.76
C7+ IN GAS	10.53	10.38	8.83	10.74	10.07
LIQ HC'S	47.41	51.32	43.94	50.36	50.16
TOTAL	100.00	100.00	100.00	100.00	100.00

Table A1 (continued)

SUB-GROUPING					
C1 -C4	30.91	28.08	34.98	27.92	28.84
C5 -420 F	38.12	37.89	36.45	39.10	38.55
420-700 F	27.51	29.23	22.85	25.93	25.04
700-END PT	3.46	4.80	5.71	7.05	7.56
C5+-END PT	69.09	71.92	65.02	72.08	71.16
ISO/NORMAL MOLE RATIO					
C4	0.0296	0.0306	0.0228	0.0153	0.0238
C5	0.0374	0.0288	0.0352	0.0357	0.0341
C6	0.0745	0.0795	0.0879	0.2061	0.0747
C4=	0.0733	0.0722	0.0765	0.0799	0.0796
PARAFFIN/OLEFIN RATIO					
C3	0.7802	0.8100	0.9785	0.8408	0.8201
C4	0.6623	0.6873	0.7533	0.7360	0.8054
C5	0.7590	0.9347	0.9232	1.2276	1.0376
SCHULZ-FLORY DISTRBTN					
ALPHA (EXP(SLOPE))	0.8159	0.8328	0.8330	0.8410	0.8390
RATIO CH4/(1-A)**2	5.4276	5.8945	7.1980	5.9804	6.0828
ALPHA FRM CORRELATION					
ALPHA (EXPTL/CORR)	0.9760	0.9987	0.9868	1.0084	1.0068
W%CH4 FRM CORRELATION					
W%CH4 (EXPTL/CORR)	18.7177	19.3385	18.0222	19.5314	19.7210
LIQ HC COLLECTION					
PHYS. APPEARANCE	CLDY	CLDY	CLDY WAXY	CLDY WAXY	CLDY WAXY
DENSITY	0.760	0.762	0.761	0.758	0.754
N, REFRACTIVE INDEX	1.4264	1.4268	1.4296	1.4298	1.4302
SIMULT'D DISTILATN					
10 WT % @ DEG F	308	308	310	309	306
16	345	345	344	343	343
50	468	485	484	485	485
84	627	648	676	680	688
90	673	691	721	735	753
RANGE(16-84 %)	282	303	332	337	345
WT % @ 420 F	34.67	33.67	35.00	34.50	35.00
WT % @ 700 F	92.71	90.64	87.00	86.00	84.92

REMARKS:

HIGH TEMP

NEW FORMAT JAN 25,85

Table A2

RESULT OF SYNGAS OPERATION

RUN NO. 11723-17
 CATALYST Co/Th/X4-U103 11864-31C 250 CC 102.1G(138.5 @END +38. G)
 FEED H2:CO:ARGON OF 50:50:0 @ 1260 CC/MN OR 302 GHSV

RUN & SAMPLE NO.	11723-17-11	723-17-13	723-17-15	723-17-17	723-17-19
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	140.	163.0	189.3	213.2	235.5
PRESSURE, PSIG	296	297	298	294	296
TEMP. C	262	262	262	262	262
FEED CC/MIN	1260	1260	1260	1260	1260
HOURS FEEDING	24.00	23.00	26.32	23.88	22.30
EFFLNT GAS LITER	1117.30	1067.70	1255.65	1141.15	1067.55
GM AQUEOUS LAYER	156.52	146.60	165.57	147.65	137.23
GM OIL	64.61	62.62	68.38	61.32	58.02
MATERIAL BALANCE					
GM ATOM CARBON %	94.87	95.54	97.00	96.24	96.85
GM ATOM HYDROGEN %	98.57	99.28	100.27	100.45	100.27
GM ATOM OXYGEN %	97.78	96.78	98.30	97.32	97.72
RATIO CHX/(H2O+CO2)	0.8914	0.9528	0.9500	0.9579	0.9660
RATIO X IN CHX	2.4228	2.4215	2.4340	2.4309	2.4360
USAGE H2/CO PRODT	2.1865	2.1211	2.1246	2.1230	2.1132
FEED H2/CO FRM EFFLNT	1.0390	1.0391	1.0337	1.0437	1.0353
RESIDUAL H2/CO RATIO	0.6305	0.6331	0.6376	0.6541	0.6457
RATIO CO2/(H2O+CO2)	0.0411	0.0425	0.0441	0.0418	0.0435
K SHIFT IN EFFLNT	0.0270	0.0281	0.0294	0.0286	0.0293
SPECIFIC ACTIVITY SA	0.7295	0.7564	0.7256	0.7065	0.7167
CONVERSION					
ON CO %	26.25	27.28	26.64	26.52	26.55
ON H2 %	55.24	55.70	54.75	53.95	54.19
ON CO+H2 %	41.02	41.76	40.93	40.53	40.61
PRDT SELECTIVITY, WT %					
CH4	16.02	15.68	16.48	16.31	16.57
C2 HC'S	2.01	2.03	2.27	2.09	2.26
C3H8	2.36	2.73	2.62	2.63	2.66
C3H6=	2.62	2.59	2.77	2.64	2.60
C4H10	2.55	3.03	2.75	2.83	2.67
C4H8=	3.07	3.26	3.20	3.03	3.05
C5H12	3.10	3.42	3.34	3.37	3.48
C5H10=	2.88	3.00	2.89	3.04	2.88
C6H14	3.15	3.57	3.74	3.98	3.57
C6H12= & CYCLO'S	1.89	1.98	2.03	2.10	2.02
C7+ IN GAS	10.04	10.19	11.14	11.31	11.25
LIQ HC'S	50.30	48.53	46.76	46.67	46.99
TOTAL	100.00	100.00	100.00	100.00	100.00

Table A2 (continued)

SUB-GROUPING					
C1 -C4	28.64	29.52	30.10	29.53	29.80
C5 -420 F	38.67	39.62	40.21	40.83	40.59
420-700 F	26.15	23.64	23.61	22.82	23.21
700-END PT	6.54	7.42	6.08	6.81	6.39
C5+-END PT	71.36	70.68	69.90	70.47	70.20
ISO/NORMAL MOLE RATIO					
C4	0.0233	0.0716	0.0174	0.0226	0.0215
C5	0.0325	0.0301	0.0371	0.0366	0.0402
C6	0.0610	0.0569	0.0513	0.0705	0.0605
C4=	0.0839	0.1048	0.0956	0.0928	0.0874
PARAFFIN/OLEFIN RATIO					
C3	0.8615	1.0077	0.9036	0.9531	0.9762
C4	0.8010	0.8970	0.8304	0.9019	0.8445
C5	1.0477	1.1090	1.1251	1.0795	1.1747
SCHULZ-FLORY DISTRBTN					
ALPHA (EXP(SLOPE))	0.8368	0.8352	0.8264	0.8307	0.8274
RATIO CH4/(1-A)**2	6.0183	5.7729	5.4683	5.6898	5.5601
ALPHA FRM CORRELATION					
ALPHA (EXPTL/CORR)	0.8331	0.8329	0.8526	0.8314	0.8320
	1.0044	1.0027	0.9926	0.9992	0.9945
W%CH4 FRM CORRELATION					
W%CH4 (EXPTL/CORR)	19.9929	20.0548	20.1619	20.5480	20.3514
	0.8015	0.7820	0.8173	0.7937	0.8140
LIQ HC COLLECTION					
PHYS. APPEARANCE					
DENSITY	0.754	0.751	0.754	0.751	0.752
N, REFRACTIVE INDEX	1.4302	1.4300	1.4296	1.4275	1.4295
SIMULT'D DISTILATN					
10 WT % @ DEG F	311	304	303	304	304
16	343	342	342	342	342
50	483	484	482	483	481
84	675	695	675	684	678
90	724	756	727	745	737
RANGE(16-84 %)	332	353	333	342	336
WT % @ 420 F	35.00	36.00	36.50	36.50	37.00
WT % @ 700 F	87.00	84.71	87.00	85.40	86.40

NEW FORMAT JAN 25, 85

Table A3

RESULT OF SYNGAS OPERATION

RUN NO. 11723-17
 CATALYST Co/Th/X4-U103 11864-31C 250 CC 102.1G(138.5 @END +36. G)
 FEED H2:CO:ARGON OF 50:50:0 @ 1260 CC/MN OR 302 GHSV

RUN & SAMPLE NO.	11723-17-21	723-17-23	723-17-25	723-17-27	723-17-29
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	259.5	283.5	308.1	335.1	356.5
PRESSURE, PSIG	301	298	505	500	300
TEMP. C	262	262	261	261	261
FEED CC/MIN	1260	1260	1260	1260	1260
HOURS FEEDING	24.00	24.00	24.00	27.00	21.43
EFFLNT GAS LITER	1166.00	1161.20	1009.92	1276.32	1118.58
GM AQUEOUS LAYER	147.05	144.79	169.91	146.63	109.22
GM OIL	56.24	58.15	61.72	58.00	46.17
MATERIAL BALANCE					
GM ATOM CARBON %	96.93	96.73	85.56	88.51	96.21
GM ATOM HYDROGEN %	100.57	100.74	94.03	94.57	101.29
GM ATOM OXYGEN %	98.29	97.41	92.44	91.92	97.19
RATIO CHX/(H2O+CO2)	0.9462	0.9729	0.7597	0.8515	0.9552
RATIO X IN CHX	2.4396	2.4460	2.4107	2.4615	2.4897
USAGE H2/CO PRDNT	2.1361	2.1138	2.3341	2.2069	2.1311
FEED H2/CO FRM EFFLNT	1.0376	1.0414	1.0989	1.0686	1.0528
RESIDUAL H2/CO RATIO	0.6539	0.6590	0.6462	0.7196	0.7337
RATIO CO2/(H2O+CO2)	0.0424	0.0428	0.0427	0.0526	0.0490
K SHIFT IN EFFLNT	0.0289	0.0295	0.0289	0.0400	0.0378
SPECIFIC ACTIVITY SA	0.6704	0.6832	0.4095	0.3068	0.5214
CONVERSION					
ON CO %	25.89	26.29	26.82	23.46	22.84
ON H2 %	53.30	53.35	56.97	48.45	46.23
ON CO+H2 %	39.85	40.09	42.61	36.37	34.83
PRDNT SELECTIVITY, WT %					
CH4	16.79	16.64	15.20	17.34	18.91
C2 HC'S	2.21	2.26	3.34	2.42	2.61
C3H8	2.84	3.22	2.48	3.15	3.13
C3H6=	2.91	2.95	0.89	1.97	1.86
C4H10	2.81	3.23	2.65	3.05	3.15
C4H8=	4.76	3.28	2.80	2.67	2.88
C5H12	3.57	3.98	3.12	3.72	3.52
C5H10=	2.88	2.72	1.53	1.23	1.30
C6H14	4.02	4.64	3.74	4.07	4.55
C6H12= & CYCLO'S	2.02	0.86	0.82	0.84	0.93
C7+ IN GAS	11.83	12.05	10.75	10.80	11.54
LIQ HC'S	43.35	44.18	52.69	48.73	45.63
TOTAL	100.00	100.00	100.00	100.00	100.00

Table A3 (continued)

SUB-GROUPING					
C1 -C4	32.33	31.57	27.35	30.60	32.53
C5 -420 F	40.15	41.03	39.45	37.72	36.66
420-700 F	22.27	21.98	28.66	27.18	23.73
700-END PT	5.25	5.41	4.53	4.50	7.07
C5+-END PT	67.67	68.43	72.65	69.40	67.47
ISO/NORMAL MOLE RATIO					
C4	0.0203	0.0422	0.0222	0.0266	0.0212
C5	0.0396	0.0326	0.0399	0.0388	0.0235
C6	0.0570	0.2342	0.2061	0.1947	0.2182
C4=	0.6767	0.1013	0.0770	0.0892	0.0844
PARAFFIN/OLEFIN RATIO					
C3	0.9289	1.0441	2.6429	1.5215	1.6098
C4	0.5707	0.9509	0.9122	1.1021	1.0551
C5	1.2065	1.4232	1.9870	2.9450	2.6383
SCHULZ-FLORY DISTRBTN					
ALPHA (EXP(SLOPE))	0.8227	0.8238	0.8272	0.8279	0.8243
RATIO CH4/(1-A)**2	5.3400	5.3609	5.0880	5.8536	6.1253
ALPHA FRM CORRELATION					
ALPHA (EXPTL/CORR)	0.8314	0.8310	0.8320	0.8268	0.8258
ALPHA (EXPTL/CORR)	0.9895	0.9914	0.9942	1.0014	0.9982
W%CH4 FRM CORRELATION					
W%CH4 (EXPTL/CORR)	20.5421	20.6610	20.1373	21.7651	22.0572
W%CH4 (EXPTL/CORR)	0.8174	0.8052	0.7546	0.7967	0.8573
LIQ HC COLLECTION					
PHYS. APPEARANCE	WH WAXY	WH WAXY	WH WAXY	WH CLDY	WH WAXY
DENSITY	0.753	0.754	0.759	0.762	0.757
N, REFRACTIVE INDEX	1.4281	1.4272	1.4267	1.4263	1.4285
SIMULT'D DISTILATN					
10 WT % @ DEG F	310	303	305	308	308
16	343	341	341	344	344
50	481	480	461	483	483
84	663	663	638	645	645
90	721	721	684	690	690
RANGE(16-84 %)	320	322	297	301	301
WT % @ 420 F	36.50	38.00	37.00	35.00	32.50
WT % @ 700 F	87.88	87.75	91.40	90.77	84.50

REMARKS:

HIGHER PRESSURE

NEW FORMAT JAN 25,85

Table A4

RESULT OF SYNGAS OPERATION

RUN NO. 11723-17
 CATALYST Co/Th/X4-U105 11864-31C 250 CC 102.1G(138.5 @END +36. G)
 FEED H2:CO:ARGON OF 50:50:0 @ 1260 CC/MN OR 302 GHSV

RUN & SAMPLE NO.	11723-17-31	723-17-33	723-17-35	723-17-37	723-17-39
FEED H2:CO:AR	50:50:0	50:50:0	50:50:0	50:50:0	50:50:0
HRS ON STREAM	381.5	404.5	428.5	476.5	500.5
PRESSURE, PSIG	296	298	505	503	295
TEMP. C	261	261	271	271	273
FEED CC/MIN	1260	1260	1260	1260	1260
HOURS FEEDING	25.00	23.00	24.00	48.00	24.00
EFFLNT GAS LITER	1277.84	1167.61	1038.70	2198.43	1146.37
GM AQUEOUS LAYER	133.14	123.50	166.35	303.02	146.03
GM OIL	50.76	45.88	63.38	115.45	51.57
MATERIAL BALANCE					
GM ATOM CARBON %	95.07	93.86	91.51	93.33	95.99
GM ATOM HYDROGEN %	100.09	99.33	98.58	99.22	100.50
GM ATOM OXYGEN %	96.86	96.40	95.16	95.53	97.26
RATIO CHX/(H2O+CO2)	0.9210	0.8880	0.8756	0.9183	0.9510
RATIO X IN CHX	2.4899	2.4965	2.4979	2.5234	2.5736
USAGE H2/CO PRDCT	2.1771	2.2173	2.1009	2.0879	2.1215
FEED H2/CO FRM EFFLNT	1.0528	1.0583	1.0772	1.0631	1.0469
RESIDUAL H2/CO RATIO	0.7182	0.7214	0.6243	0.6494	0.6422
RATIO CO2/(H2O+CO2)	0.0446	0.0433	0.0819	0.0781	0.0661
K SHIFT IN EFFLNT	0.0335	0.0327	0.0557	0.0550	0.0454
SPECIFIC ACTIVITY SA	0.5456	0.5275	0.3011	0.2649	0.4202
CONVERSION					
ON CO %	22.93	22.52	30.67	28.76	27.36
ON H2 %	47.42	47.19	59.82	56.48	55.44
ON CO+H2 %	35.49	35.21	45.78	43.04	41.72
PRDCT SELECTIVITY, WT %					
CH4	18.99	19.26	19.03	20.42	22.77
C2 HC'S	2.62	2.63	2.60	3.18	3.30
C3H8	3.16	3.20	3.43	3.65	3.98
C3H6=	1.99	1.97	1.58	1.66	2.01
C4H10	3.27	3.12	3.47	3.47	3.60
C4H8=	5.03	2.92	2.66	2.55	2.95
C5H12	3.54	3.64	3.65	4.02	4.37
C5H10=	2.19	1.27	1.92	0.94	0.99
C6H14	4.67	5.02	4.72	4.58	5.12
C6H12= & CYCLO'S	1.08	1.00	0.90	0.97	1.11
C7+ IN GAS	12.25	12.18	10.51	11.59	11.28
LIQ HC'S	43.23	43.80	45.53	42.95	38.52
TOTAL	100.00	100.00	100.00	100.00	100.00

Table A4 (continued)

SUB-GROUPING					
C1 -C4	33.04	33.10	32.77	34.94	38.61
C5 -420 F	39.29	39.09	39.91	39.07	37.50
420-700 F	21.55	22.07	22.77	21.56	17.94
700-END PT	6.11	5.74	4.55	4.42	5.94
C5+-END PT	66.96	66.90	67.23	65.06	61.39
ISO/NORMAL MOLE RATIO					
C4	0.0227	0.0216	0.0208	0.0205	0.0200
C5	0.0232	0.0258	0.0246	0.0321	0.0300
C6	0.1984	0.1878	0.2064	0.2009	0.2200
C4=	0.0976	0.0863	0.1007	0.0972	0.0950
PARAFFIN/OLEFIN RATIO					
C3	1.5160	1.5523	2.0670	2.0961	1.8890
C4	1.0403	1.0340	1.2572	1.3126	1.1776
C5	1.5749	2.7870	1.8522	4.1464	4.2948
SCHULZ-FLORY DISTRIBTN					
ALPHA (EXP(SLOPE))	0.8328	0.8304	0.8187	0.8196	0.8251
RATIO CH4/(1-A)**2	6.7932	6.6964	5.7902	6.2710	7.4412
ALPHA FRM CORRELATION	0.8269	0.8266	0.8331	0.8312	0.8317
ALPHA (EXPTL/CORR)	1.0072	1.0046	0.9827	0.9860	0.9921
W%CH4 FRM CORRELATION	21.7349	21.8012	21.8426	22.4367	22.7051
W%CH4 (EXPTL/CORR)	0.8735	0.8834	0.8712	0.9100	1.0029
LIQ HC COLLECTION					
PHYS. APPEARANCE	WH WAXY	WH WAXY	WH WAXY	WH WAXY	WH WAXY
DENSITY	0.757	0.758	0.756	0.758	0.754
N, REFRACTIVE INDEX	1.4291	1.4283	1.4262	1.4264	1.4268
SIMULT'D DISTILLATN					
10 WT % @ DEG F	306	304	301	302	299
16	343	343	329	336	338
50	482	480	455	457	479
84	684	676	640	645	692
90	737	732	700	703	750
RANGE(16-84 %)	341	333	311	309	354
WT % @ 420 F	36.00	36.50	40.00	39.50	38.00
WT % @ 700 F	85.86	86.90	90.00	89.70	84.57

REMARKS:

HIGH P & T HIGH P & T HIGH T

NEW FORMAT JAN 25,85

Table A5

RESULT OF SYNGAS OPERATION

RUN NO. 11723-17
 CATALYST Co/Th/X4-U103 11864-31C 250 CC 102.1G(138.5 @END +36. G)
 FEED H₂:CO:ARGON OF 50:50:0 @ 1260 CC/MN OR 302 GHSV

RUN & SAMPLE NO.	11723-17-41	723-17-43	723-17-45	723-17-47
FEED H ₂ :CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	525.5	549.0	572.5	596.5
PRESSURE, PSIG	294	496	504	501
TEMP. C	273	284	283	283
FEED CC/MIN	1260	1260	1260	1260
HOURS FEEDING	25.00	23.50	23.50	24.00
EFFLNT GAS LITER	1170.75	849.85	872.10	911.65
GM AQUEOUS LAYER	155.50	193.40	191.38	193.77
GM OIL	50.46	75.57	74.33	73.70
MATERIAL BALANCE				
GM ATOM CARBON %	96.84	91.07	94.01	93.29
GM ATOM HYDROGEN %	100.19	97.39	97.62	97.89
GM ATOM OXYGEN %	97.20	94.23	96.24	96.17
RATIO CH _x /(H ₂ O+CO ₂)	0.9862	0.9098	0.9358	0.9155
RATIO X IN CH _x	2.5711	2.5359	2.5500	2.5538
USAGE H ₂ /CO PRDCT	2.0912	1.9981	1.9963	2.0432
FEED H ₂ /CO FRM EFFLNT	1.0346	1.0695	1.0384	1.0493
RESIDUAL H ₂ /CO RATIO	0.6117	0.4656	0.4378	0.4654
RATIO CO ₂ /(H ₂ O+CO ₂)	0.0665	0.1120	0.1085	0.0981
K SHIFT IN EFFLNT	0.0435	0.0587	0.0533	0.0506
SPECIFIC ACTIVITY SA	0.4789	0.3369	0.3698	0.3217
CONVERSION				
ON CO %	28.59	39.41	38.54	37.01
ON H ₂ %	57.78	73.62	74.08	72.06
ON CO+H ₂ %	43.43	57.09	56.64	54.96
PRDCT SELECTIVITY, WT %				
CH ₄	22.34	20.82	21.51	21.89
C ₂ HC'S	3.17	2.95	3.12	3.03
C ₃ H ₈	4.59	4.01	3.93	3.74
C ₃ H ₆ =	2.57	2.16	2.12	1.92
C ₄ H ₁₀	4.52	3.39	3.40	3.33
C ₄ H ₈ =	3.73	2.72	2.66	2.71
C ₅ H ₁₂	4.70	3.73	3.91	3.69
C ₅ H ₁₀ =	1.23	0.94	0.95	1.06
C ₆ H ₁₄	5.45	4.56	4.91	4.70
C ₆ H ₁₂ = & CYCLO'S	1.66	1.37	1.37	1.34
C ₇ + IN GAS	11.78	8.92	9.17	9.18
LIQ HC'S	34.26	44.42	42.96	43.41
TOTAL	100.00	100.00	100.00	100.00

Table A5 (continued)

SUB-GROUPING				
C1 -C4	40.91	36.06	36.73	36.63
C5 -420 F	38.87	39.06	38.78	39.06
420-700 F	15.59	19.99	19.27	19.50
700-END PT	4.63	4.89	5.21	4.81
C5+-END PT	59.09	63.94	63.27	63.37
ISO/NORMAL MOLE RATIO				
C4	0.0544	0.0416	0.0254	0.0226
C5	0.0420	0.0309	0.0303	0.0310
C6	0.2466	0.2460	0.2516	0.2326
C4=	0.1269	0.0935	0.0870	0.0879
PARAFFIN/OLEFIN RATIO				
C3	1.7049	1.7717	1.7706	1.8558
C4	1.1684	1.2027	1.2325	1.1894
C5	3.7154	3.8775	4.0031	3.3879
SCHULZ-FLORY DISTRBTN				
ALPHA (EXP(SLOPE))	0.8073	0.8129	0.8135	0.8143
RATIO CH4/(1-A)**2	6.0174	5.9454	6.1867	6.3475
ALPHA FRM CORRELATION				
ALPHA (EXPTL/CORR)	0.8340	0.8468	0.8498	0.8468
	0.9680	0.9600	0.9573	0.9616
W%CH4 FRM CORRELATION				
W%CH4 (EXPTL/CORR)	21.9674	20.1799	19.0429	19.9663
	1.0171	1.0319	1.1295	1.0964
LIQ HC COLLECTION				
PHYS. APPEARANCE	WH WAXY	WH WAXY	WH WAXY	WH WAXY
DENSITY	0.753	0.751	0.748	0.753
N, REFRACTIVE INDEX	1.4254	1.4236	1.4248	1.4165
SIMULT'D DISTILATN				
10 WT % @ DEG F	298	282	282	280
16	331	302	302	302
50	456	450	452	450
84	670	643	659	646
90	745	712	726	709
RANGE(16-84 %)	339	341	357	344
WT % @ 420 F	41.00	44.00	43.00	44.00
WT % @ 700 F	86.50	89.00	87.86	88.93

REMARKS:

HIGH P &T HIGH P &T HIGH P &T

NEW FORMAT JAN 25,85

III. Run 2 (11723-15) with Catalyst 2
(Co/Th/X₈/UCC-103+UCC-101)

X₈ is a new additive, chemically similar to X₆. X₆ was useful in a physically mixed catalyst (Catalyst 5, 11th Quarterly Report, Run 11677-03), but not in an intimately mixed one (Catalyst 5, 3rd Annual Report, Run 11723-04). X₈ was prepared for greater compatibility with an intimately mixed formulation.

The catalyst contained approximately 9 percent cobalt, 4 percent as much X₈ as cobalt, and 15 percent as much thorium as cobalt. The cobalt, thorium and X₈ were intimately mixed with the UCC-103, and physically mixed with the UCC-101.

Conversion, product selectivity, isomerization of the pentane, and percent olefins of the C₄'s are plotted against time on stream in Figs. A41-44. Simulated distillations of the C₅⁺ product are plotted in Figs. A45-48. Carbon number product distributions are plotted in Figs. A49-60. Chromatograms from simulated distillations are reproduced in Figs. A61-64. Detailed material balances appear in Tables A6-8.

The catalyst's activity decreased steadily during the first 120 hours on stream, nearly leveled off during the next 120 hours, and decreased again during the last 50 hours. Between 120 and 290 hours on stream (the last 170 hours) the mean rate of deactivation was one percentage point every 50 hours. Ordinari-

ly, the conversion of H_2 deactivates more rapidly than does that of CO, which raises the $H_2:CO$ usage ratio; in this case, both deactivated at the same rate.

The use of X_8 affected the catalyst's activity much less than X_6 . Previously X_6 lowered the overall conversion rate and significantly lowered the water gas shift activity. X_8 did not lower the catalyst's activity below the level of other intimately mixed catalysts on a per gram cobalt basis, but may have lowered the $H_2:CO$ usage ratio. That is, it may have increased the catalyst's water gas shift activity. The X_8 contributed much less to the catalyst's stability than had X_6 .

The X_6 -containing catalyst of Run 11677-3 deactivated one-fourth as rapidly as a similar catalyst, without X_6 , in Run 10112-15. With X_8 , however, the deactivation rate was reduced only by half when compared with a similar catalyst without X_8 . Some of this difference may be due to the fact that the catalyst to which X_8 was added was more stable without additives than was the catalyst to which the X_6 was added. X_4 is still clearly better than X_8 at stabilizing catalysts since it is more effective on these stable intimately mixed catalysts than was X_8 .

In a physically-mixed catalyst, X_6 lowers the water gas shift activity, resulting in lower $H_2:CO$ ratios in the reactor and lower methane production. The methane production of this catalyst was about 13 percent, exactly as predicted by the model calculations based on the $H_2:CO$ ratio in the reactor. This was inferior to the X_4 -containing catalyst of Run 11677-11, whose methane pro-

duction of about 14 percent was 10 percentage points less than predicted by the model.

The methane production of this catalyst increased at a rate of one percentage point every 54 hours, nearly balancing the overall deactivation rate. Since the ratio of actual to predicted methane production was nearly constant, the increase in methane production was due to the increasing ratio of $H_2:CO$ in the reactor with decreasing conversion and not due to real changes in catalyst selectivity.

The production of C_5^+ , from a high of 76 percent, decreased at a rate similar to that of the increase of methane, one percentage point every 48 hours. Most of this loss was in the heavies, which decreased one percentage point every 60 hours. The selectivity for diesel fuel was steady. The production of total motor fuels decreased at a rate of about one percentage point every 200 hours, due mostly to decreasing production of gasoline. Although the total product grew generally lighter with time on stream, the diesel content of the motor fuels fraction actually increased, at the expense of gasoline.

There was very little isomerization, and the ratio of olefins to paraffins was typical of cobalt catalysts generally.

In this trial the I_8 additive, at a level equal to 4 percent of the cobalt content (twice the level of I_6 in the catalyst of Run 11677-3), had some effect on the catalyst's stability. But these effects were different from those of the additive I_6 ; and unlike I_6 , I_8 is compatible with an intimately mixed catalyst.

RUN 11723-15

111 F₂CO
300 PSIG
480°C

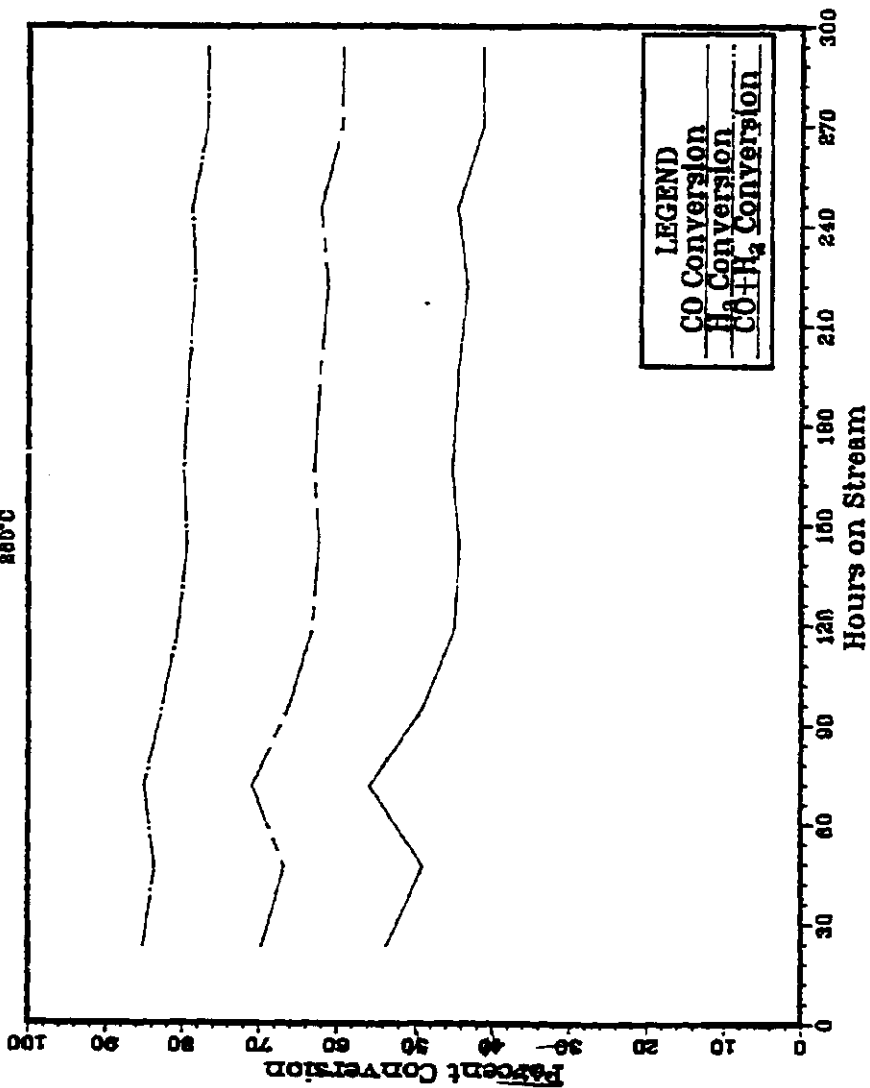


Fig. A41

RUN 11723-15

111 H₂CO
300 PSIG
880°C

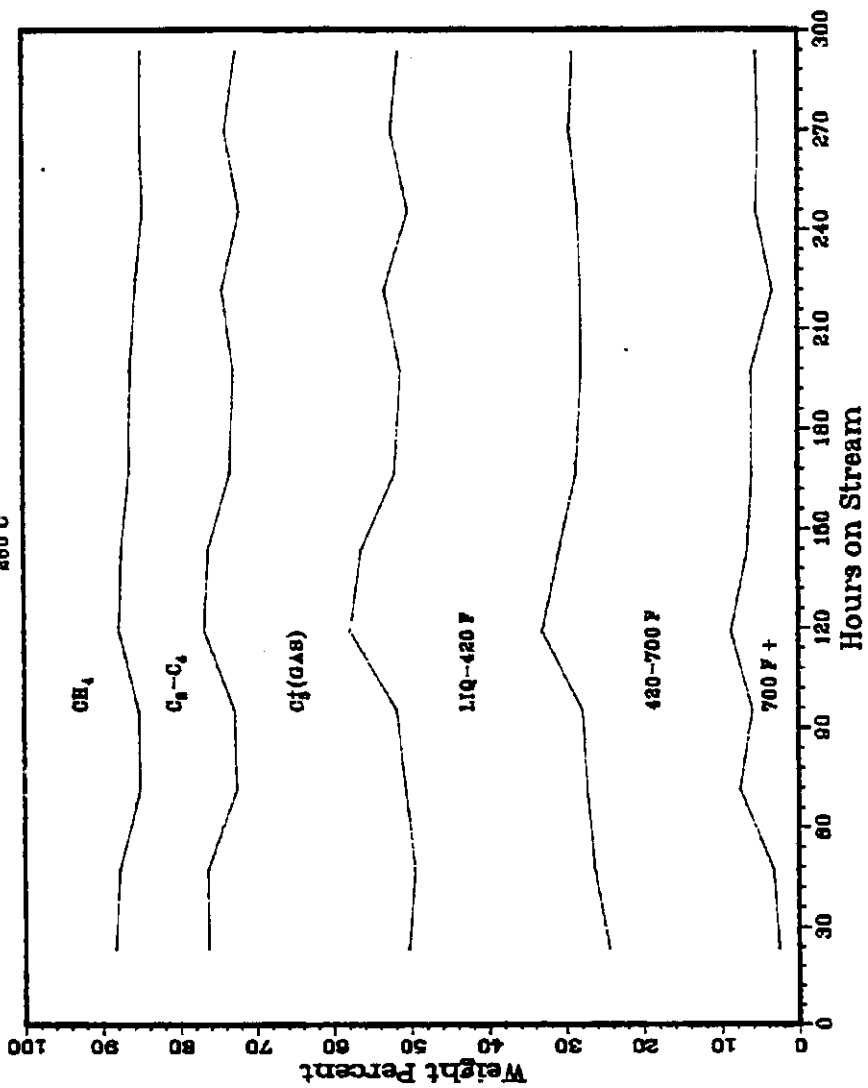


Fig. A42

RUN 11723-15

111 H₂O
300 PSIG
260°C

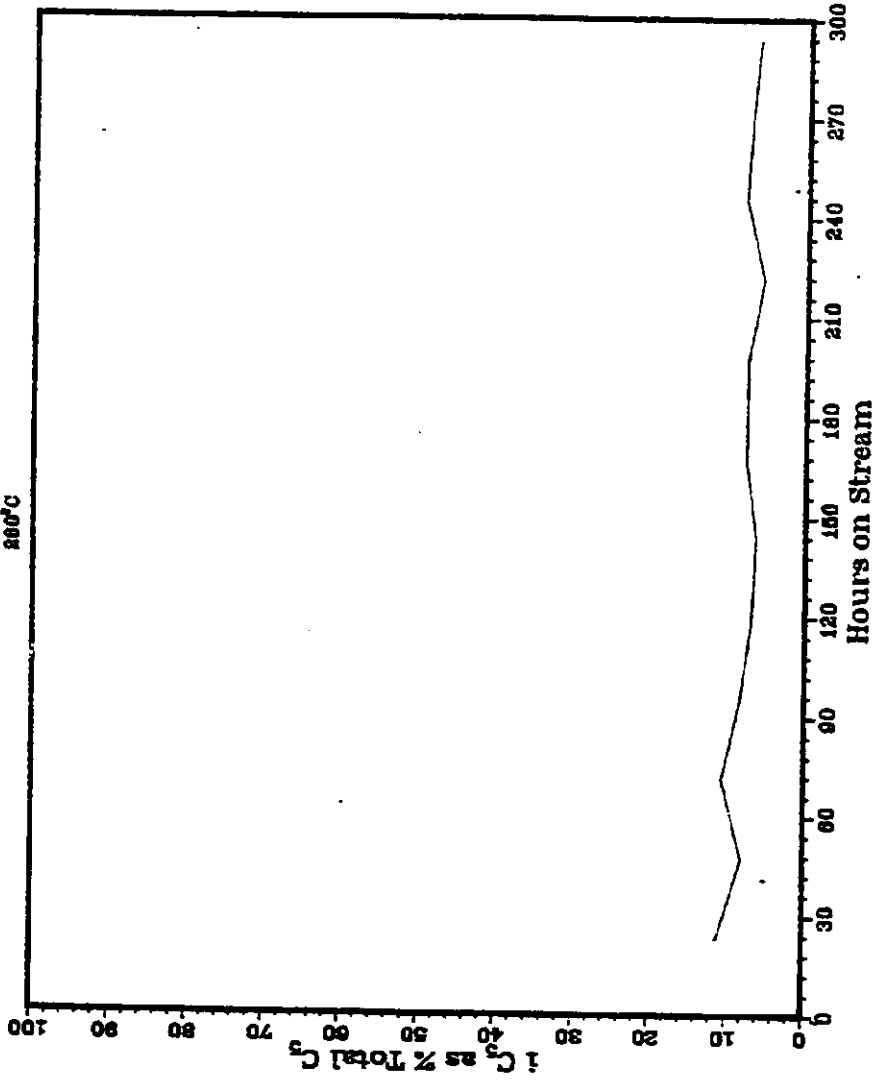


Fig. A43

RUN 11723-15

11H₂CO
300 PSIG
880°C

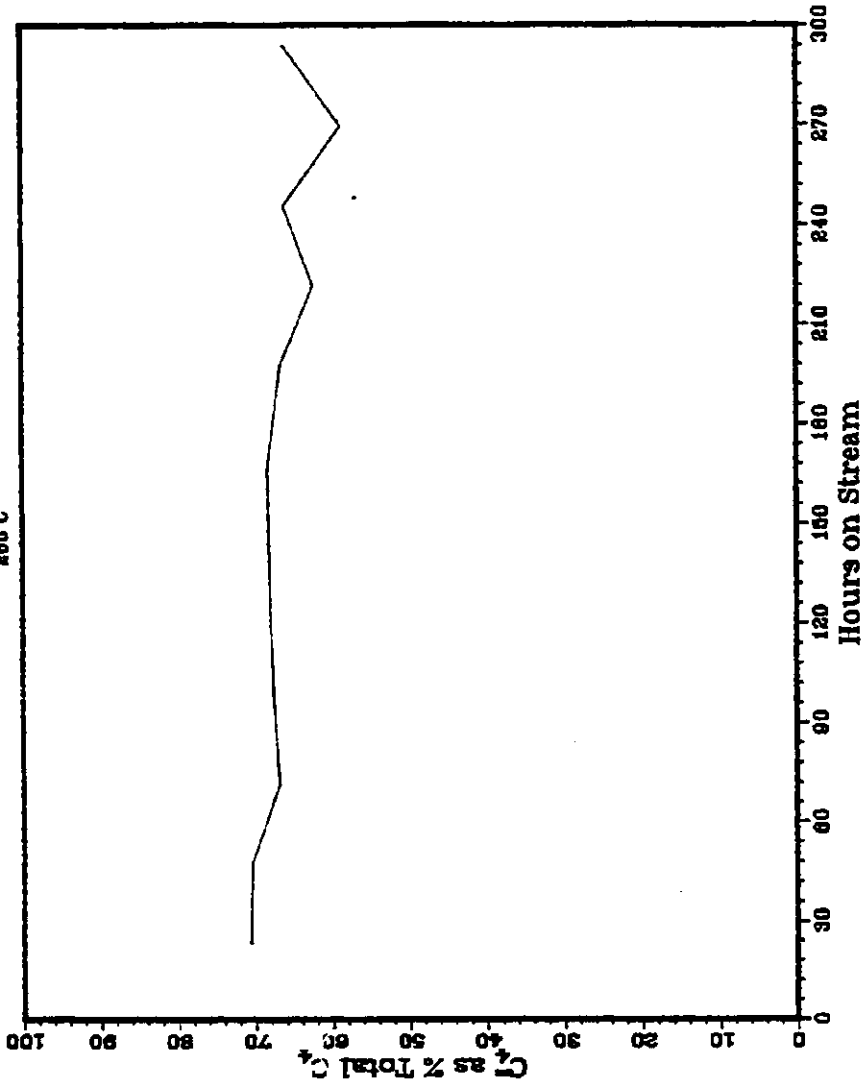


Fig. A44

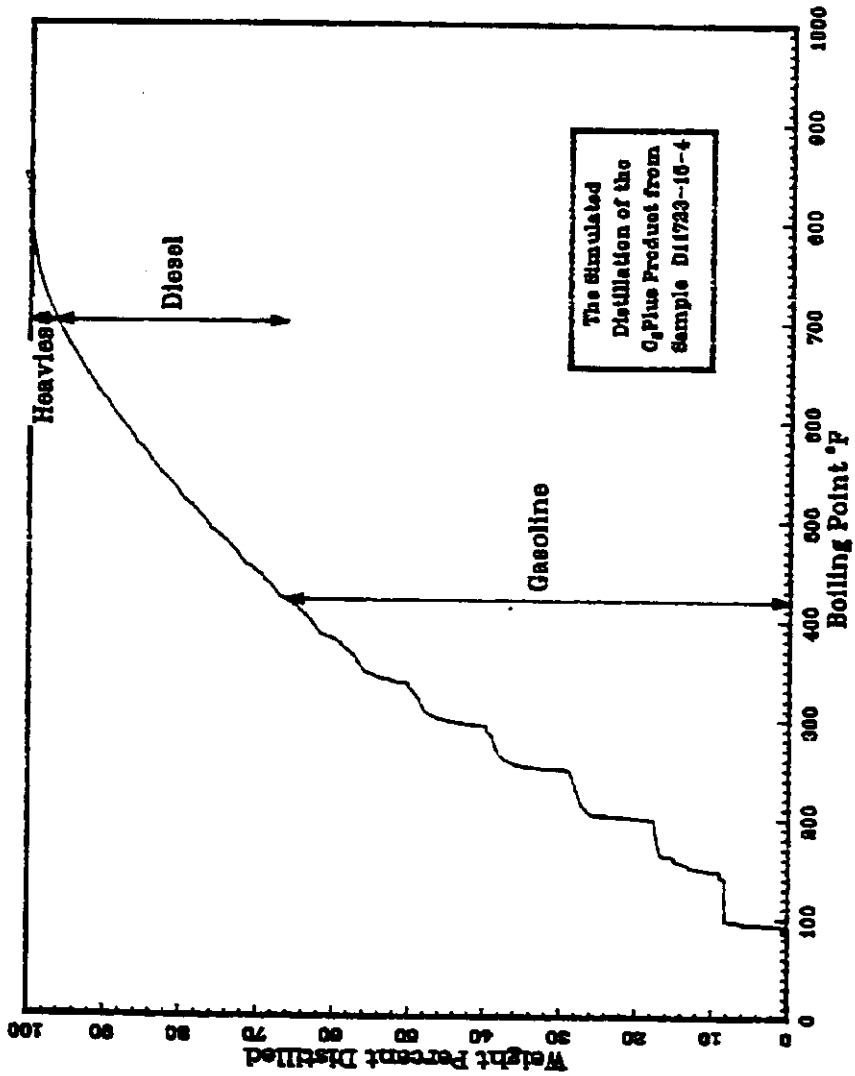


Fig. A45

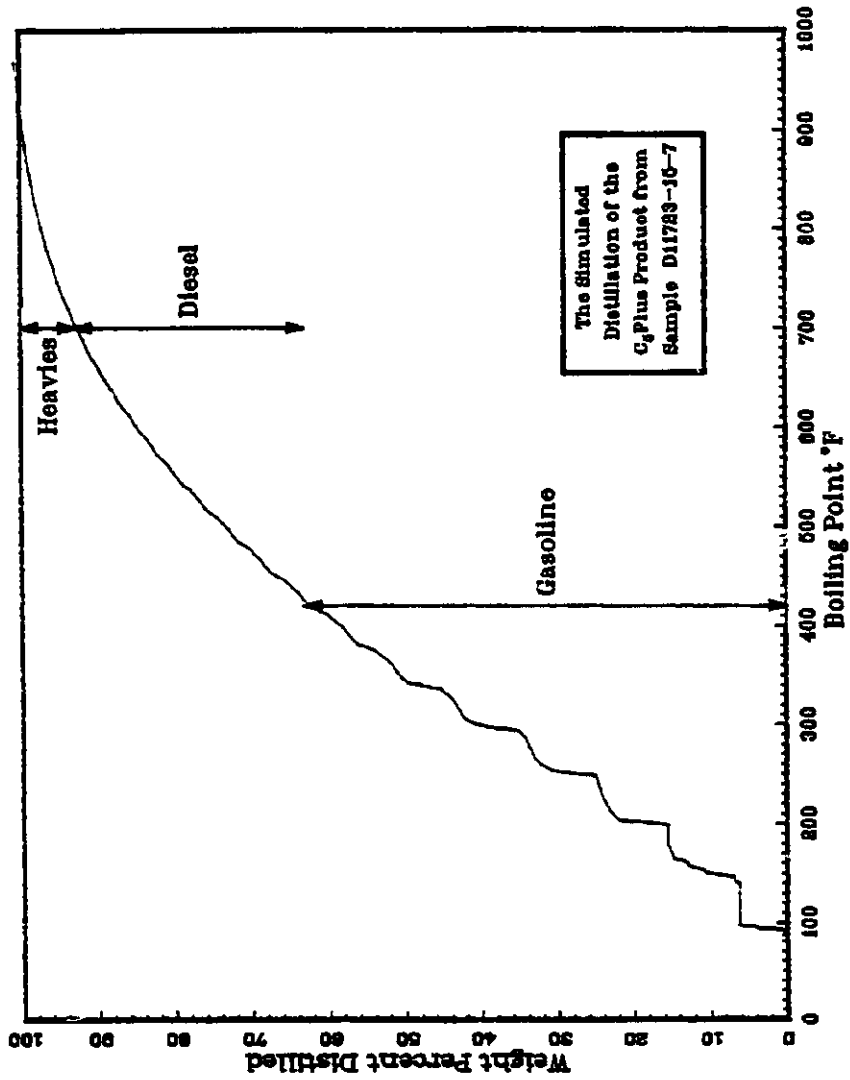


Fig. A46

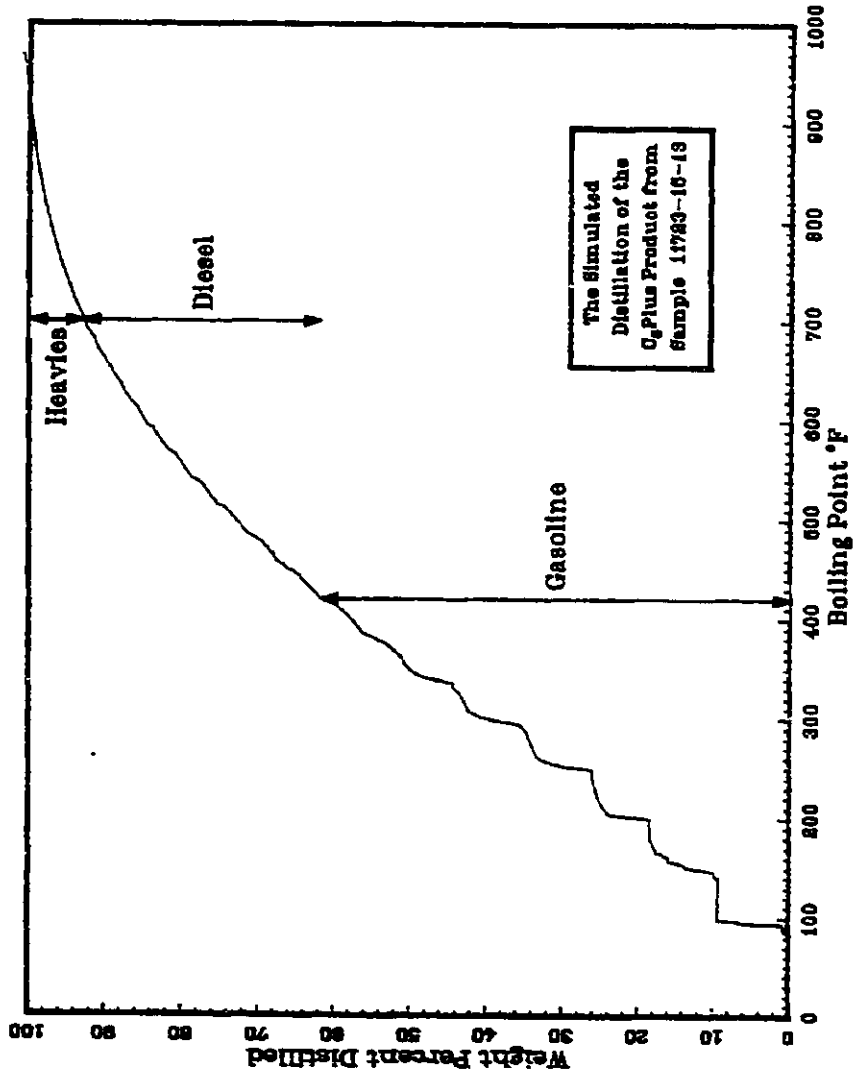


Fig. A47

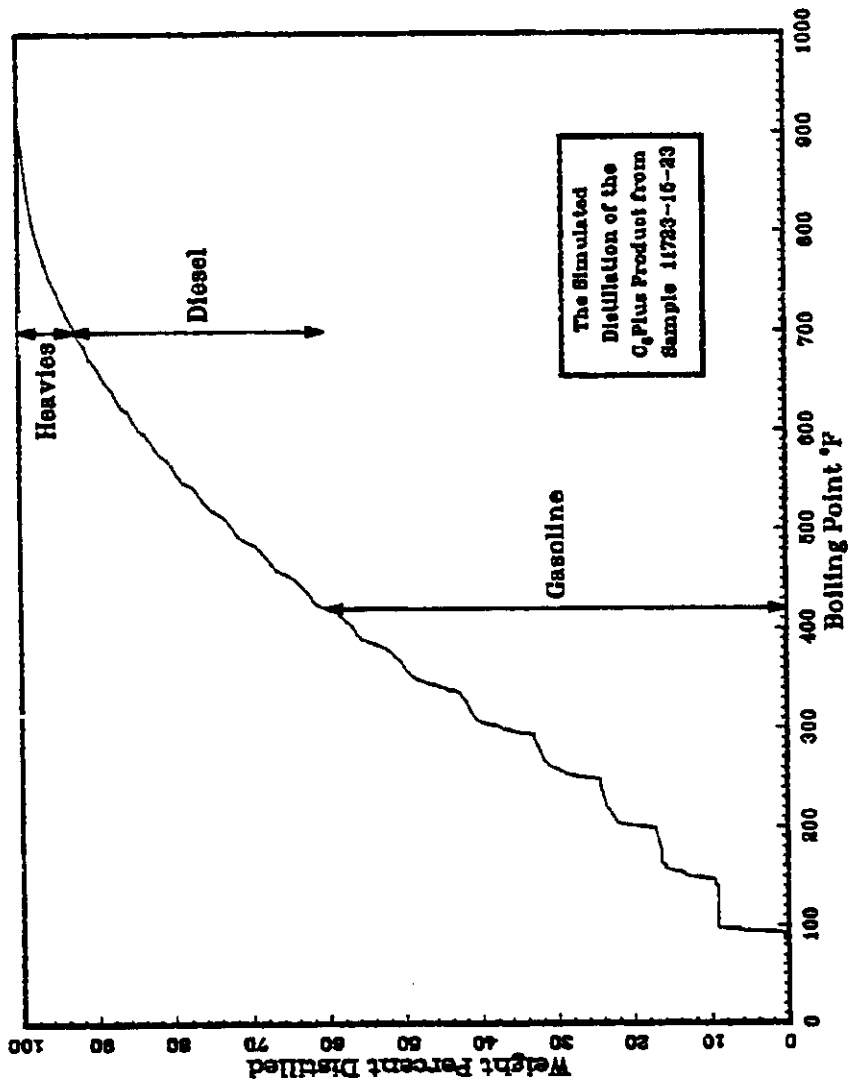


Fig. A48

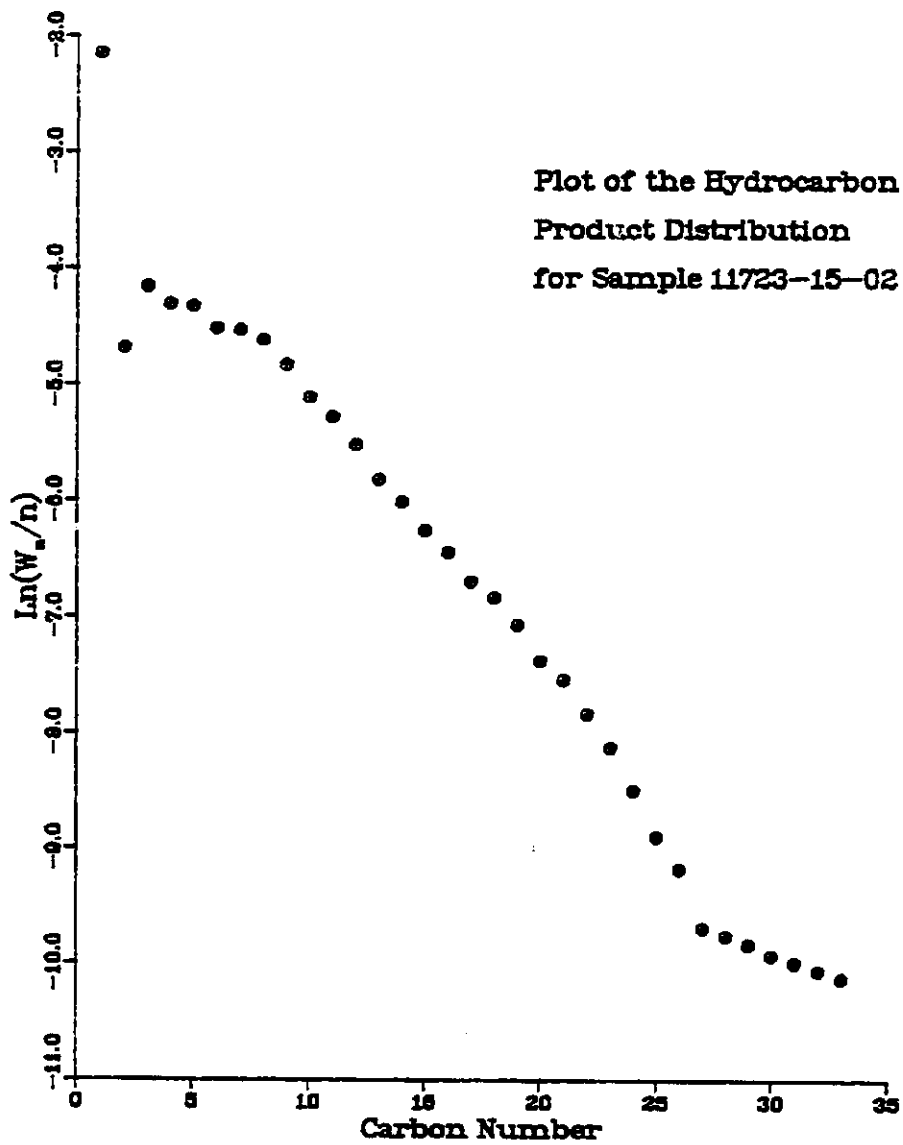


Fig. A49

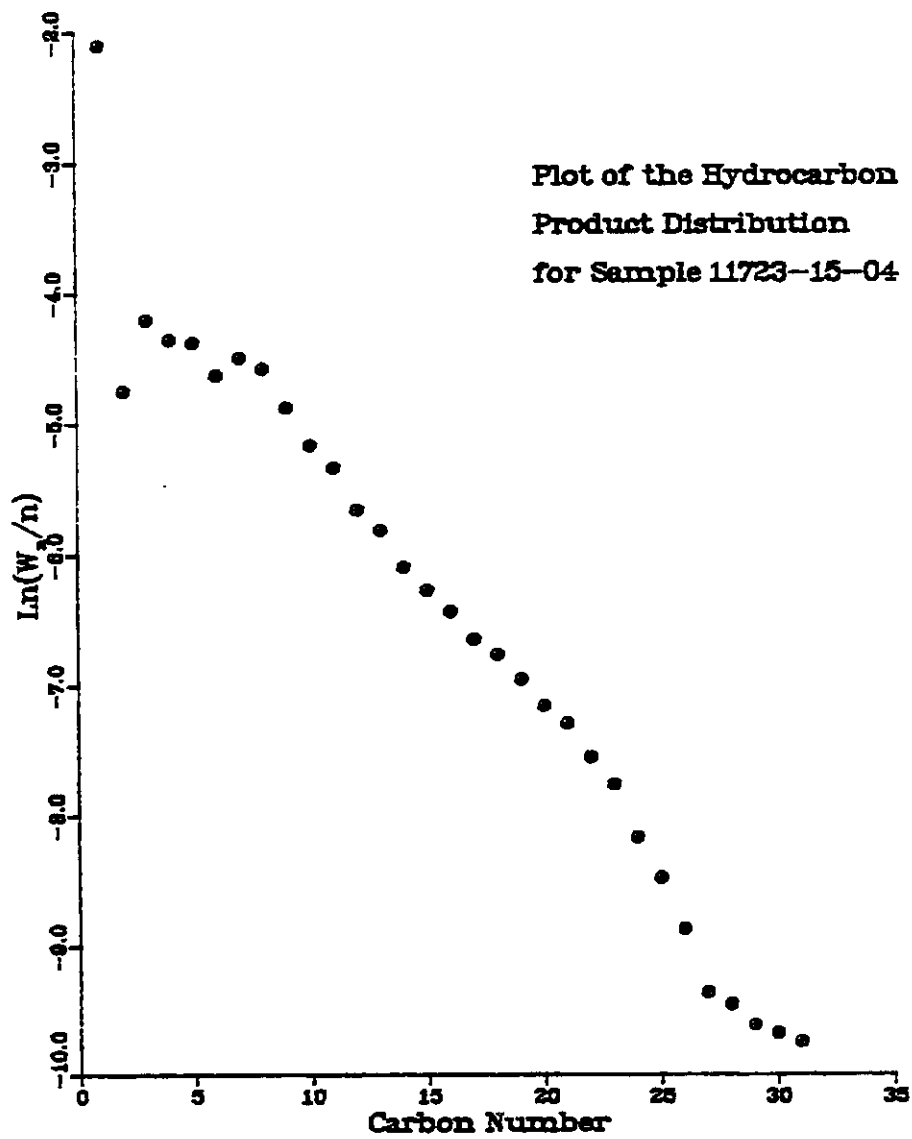


Fig. A50

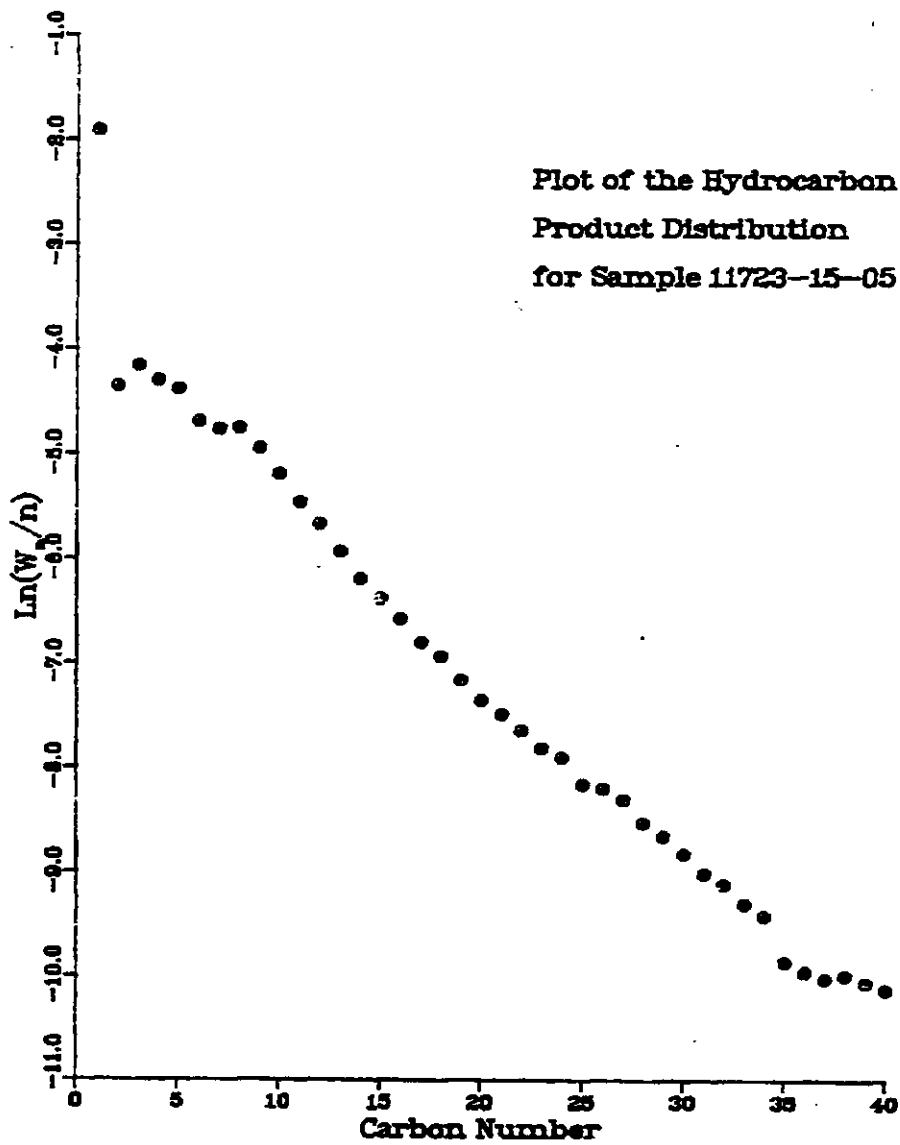


Fig. A51

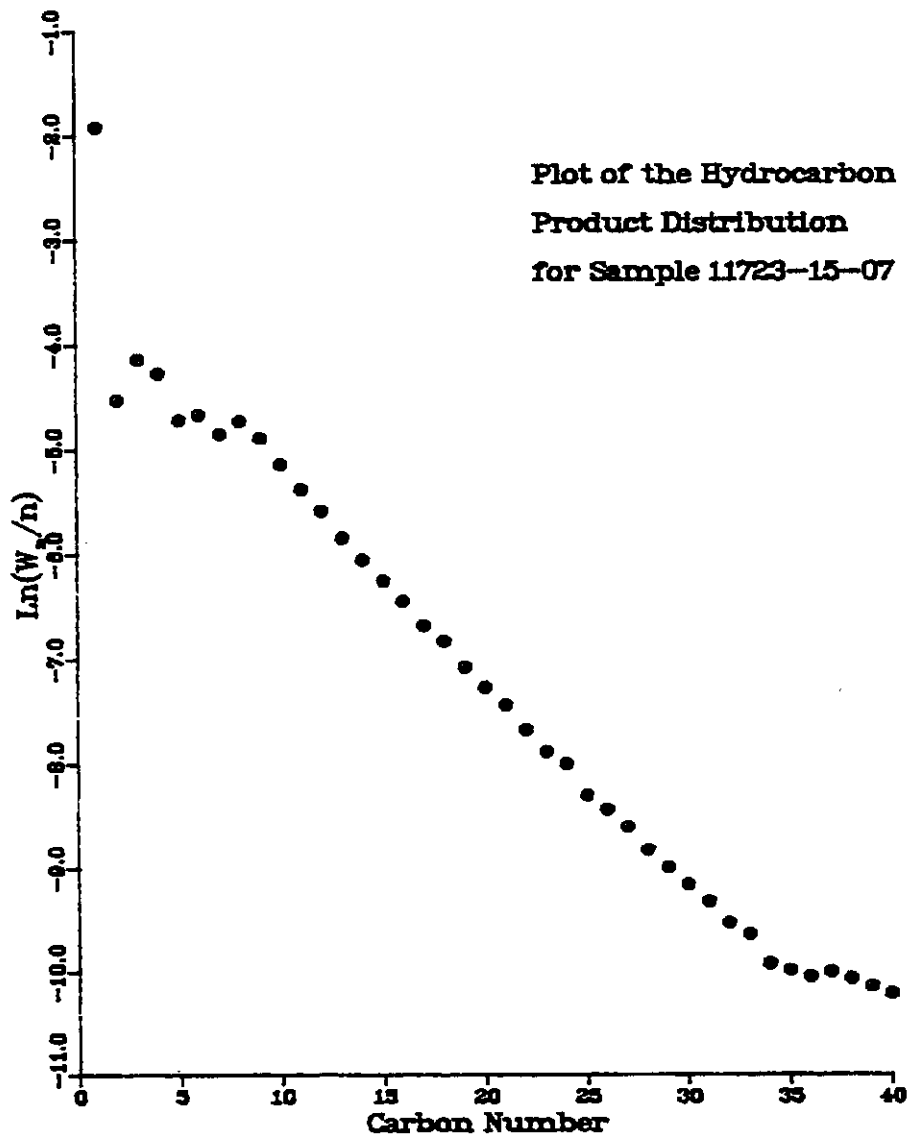


Fig. A52