FIGURE 26

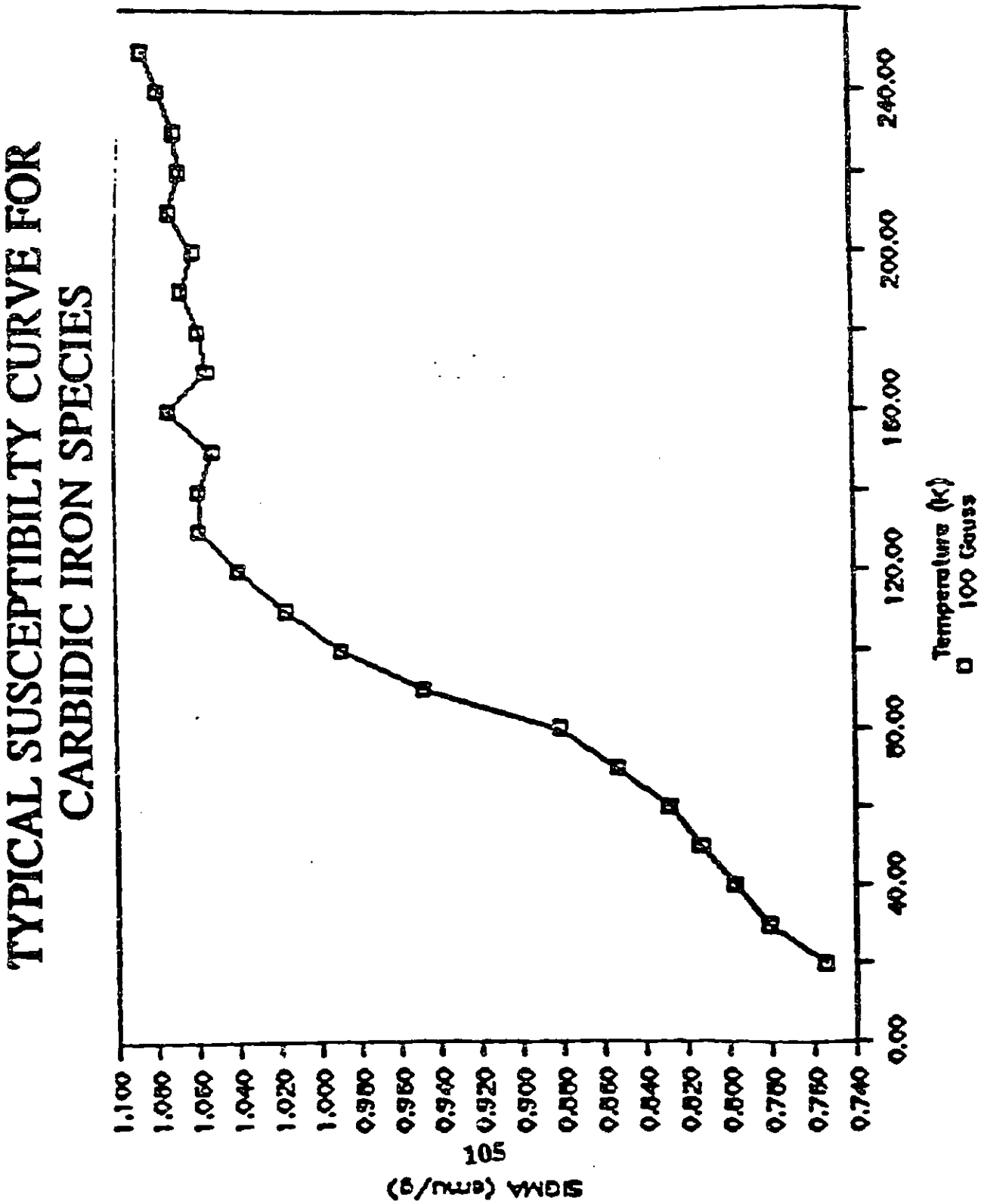

TYPICAL SUSCEPTIBILTY CURVE FOR CARBIDIC IRON SPECIES
SIGMA (emu/g)
1.100
1.080
1.060
1.040
1.020
1.000
0.980
0.960
0.940
0.920
0.900
0.880
0.860
0.840
0.820
0.800
0.780
0.760
0.740
0.00
40.00
80.00
120.00
160.00
200.00
240.00
Temperature (K)
100 Gauss

FIGURE 27

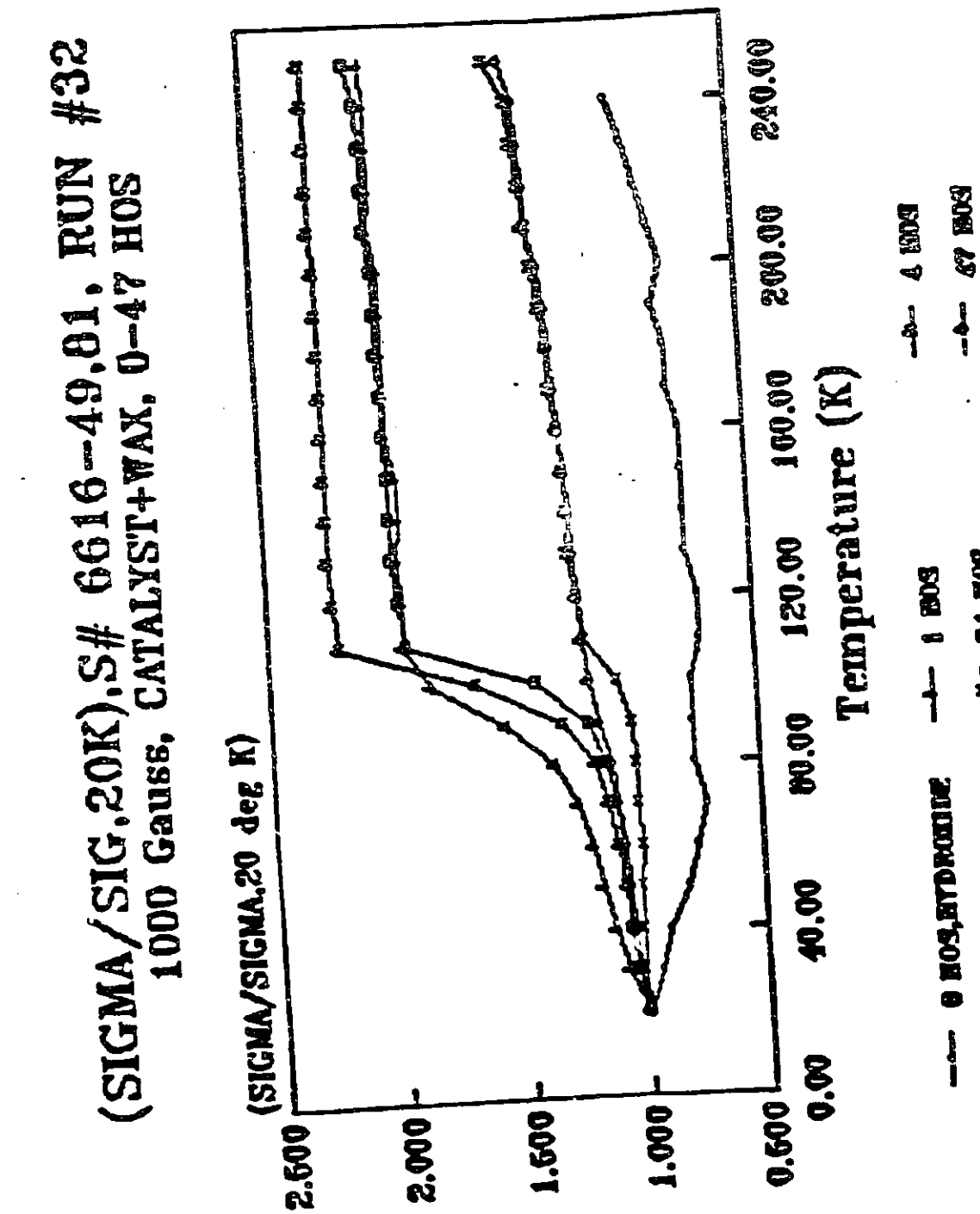
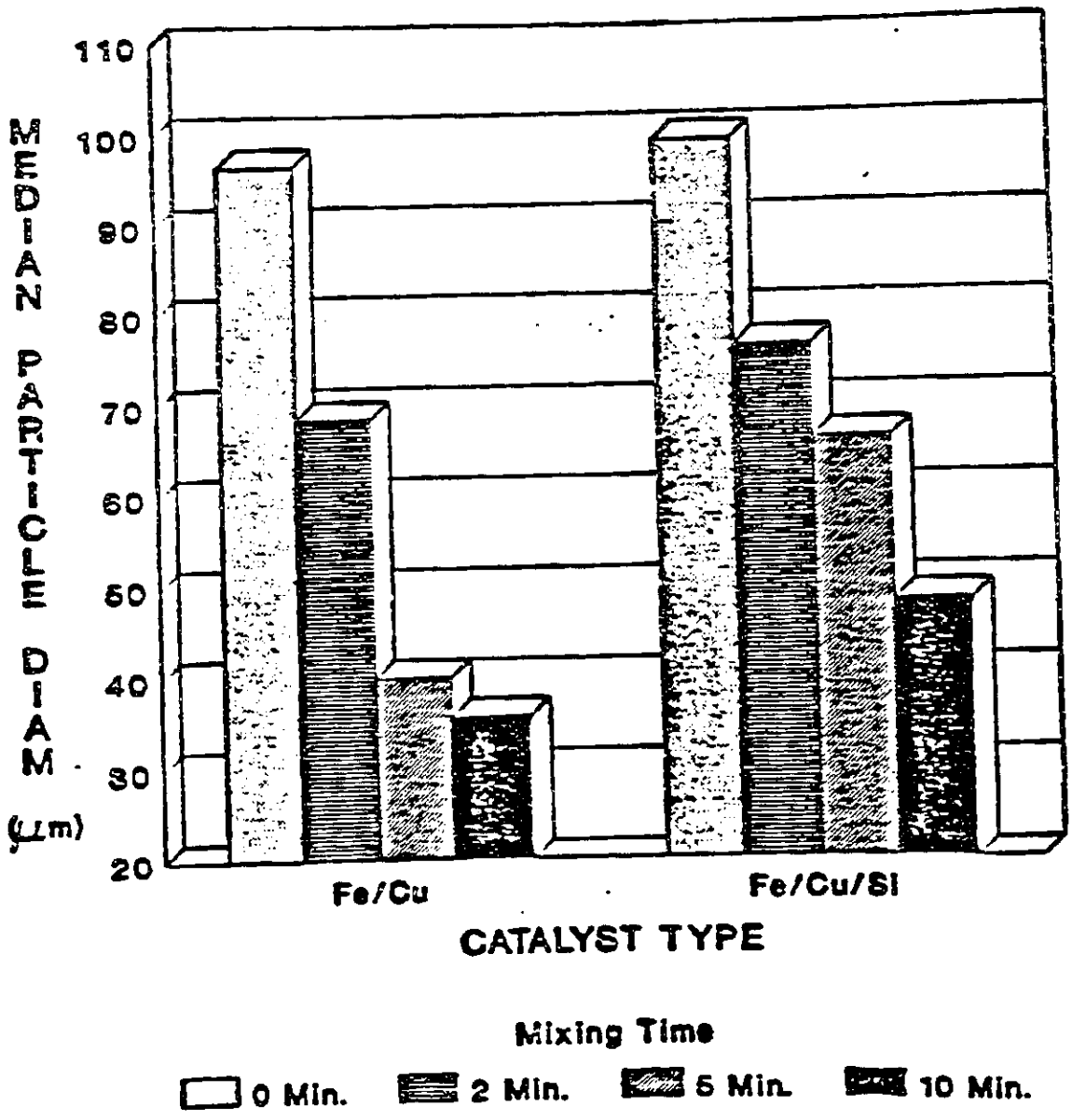

(SIGMA/SIG,20K),S# 6616-49,01, RUN #32
1000 Gauss, CATALYST+WAX, 0-47 HOS
(SIGMA/SIGMA,20 deg K)
2.500
2.000
1.500
1.000
0.500
0.00
40.00
80.00
120.00
160.00
200.00
240.00
Temperature (K)
0 HOS,HYDROGEN
1 HOS
4 HOS
12 HOS
24 HOS
47 HOS

FIGURE 28

ATTRITION OF Fe CATALYST

Particle Size by Laser Light Scattering, After Sonic Probe Mixing

(AQUEOUS SLURRY)



FT-DOE10

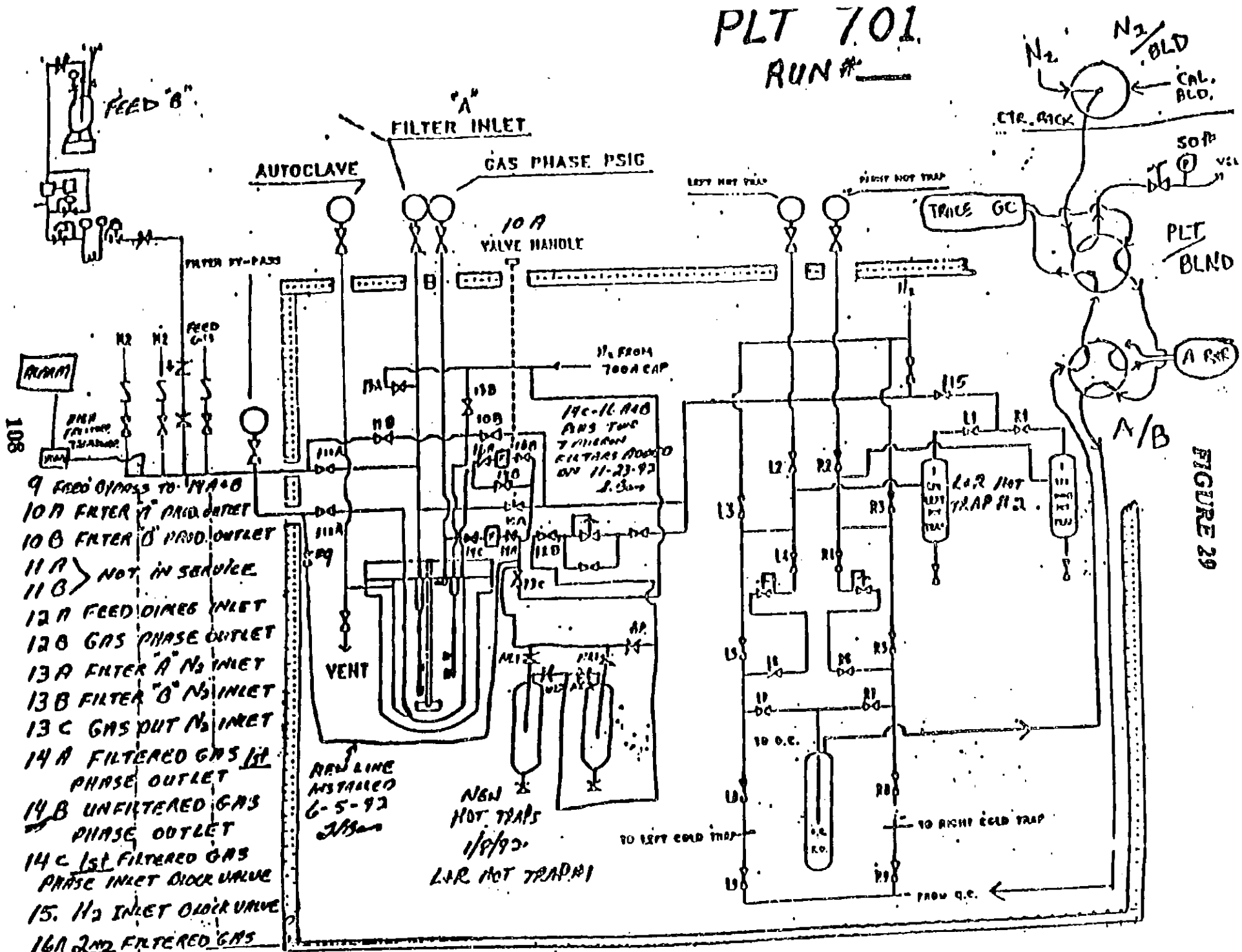


FIGURE 29

HOT BOX

Schematic of Slurry Autoclave Plant

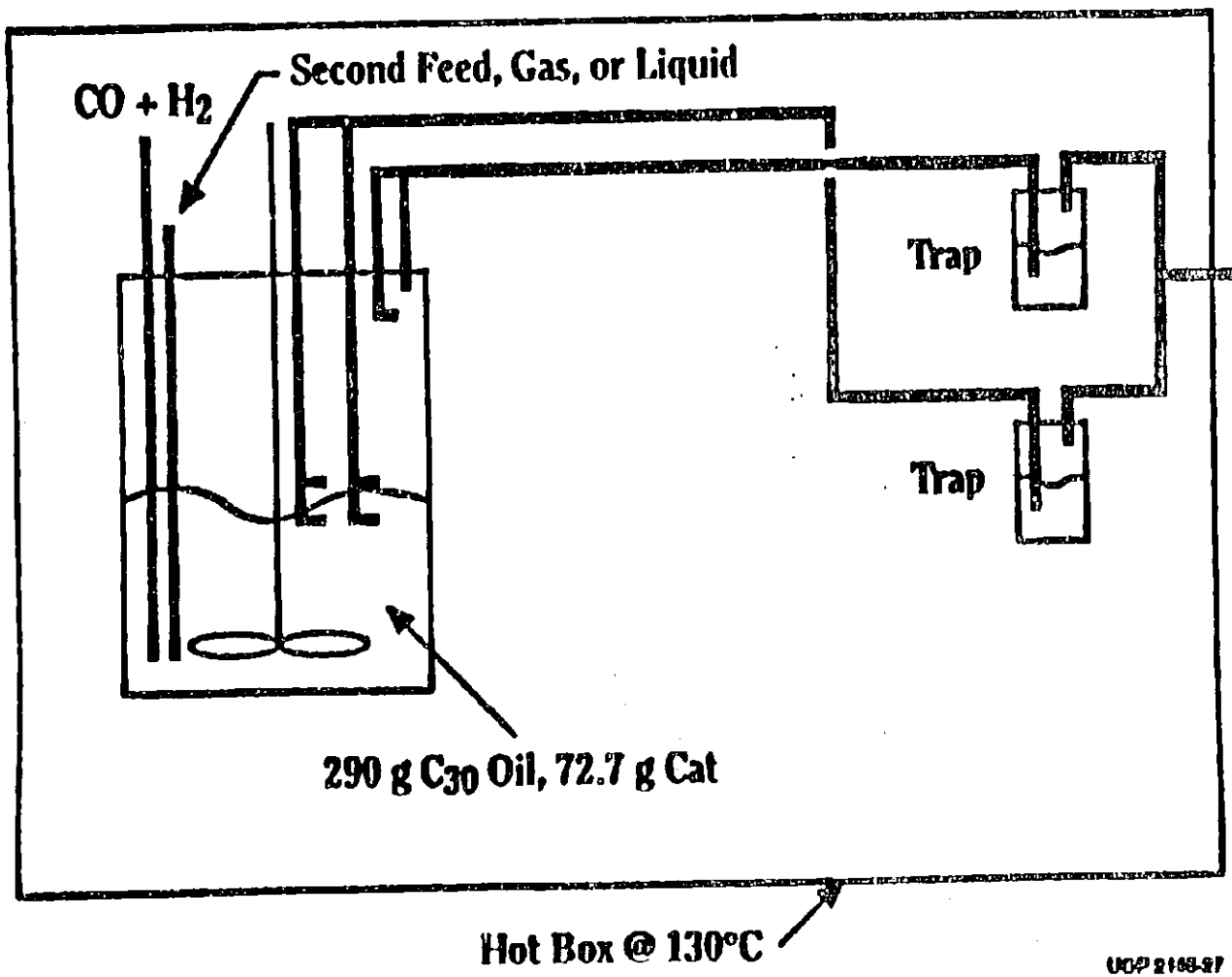


FIGURE 30

FIGURE 31

PLT 701 AUTOCLAVE 1 LTR

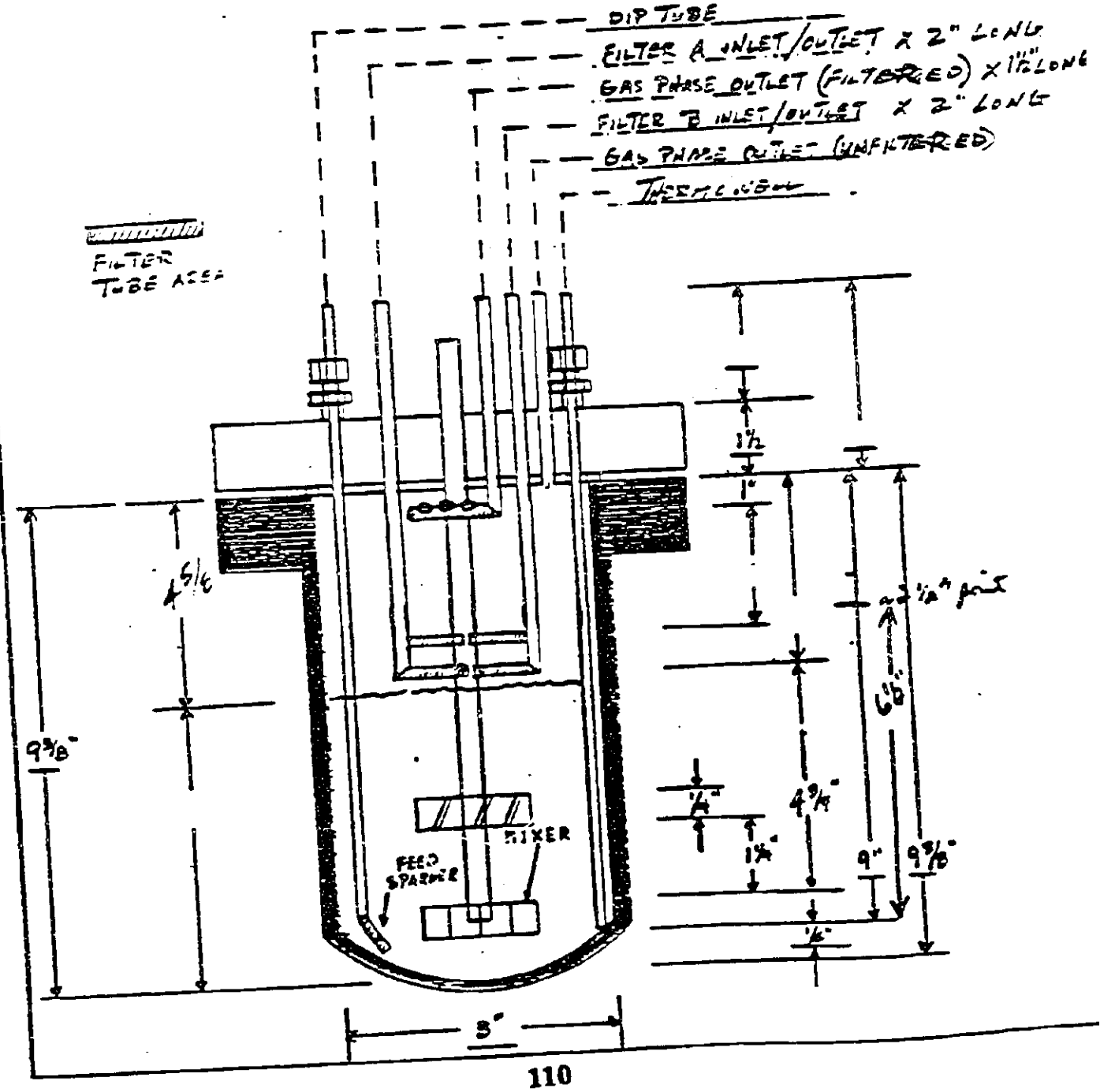
RUN NO. _____

CATALYST GMS: _____ CC'S: _____ CATALYST NO. _____

CATALYST DESCRIPTION: _____

WAX GMS: _____ CC'S: _____

MEASURE TC TO _____



OXIDE USED FOR SLURRY AUTOCLAVE CERTIFICATION

PHYSICAL PROPERTIES

Fe/Cu OXIDE CATALYST PREP PLANT RUN NUMBER	METALS, WT%		Na, ppm	BET	
	Fe	Cu		SA, m^2/g	PV, cc/g
17	58.3	2.4	<100	79	0.21

FIGURE 32

FIGURE 33

COMPARISON OF RUNS 28,29 & 30, CATALYST 6616-49

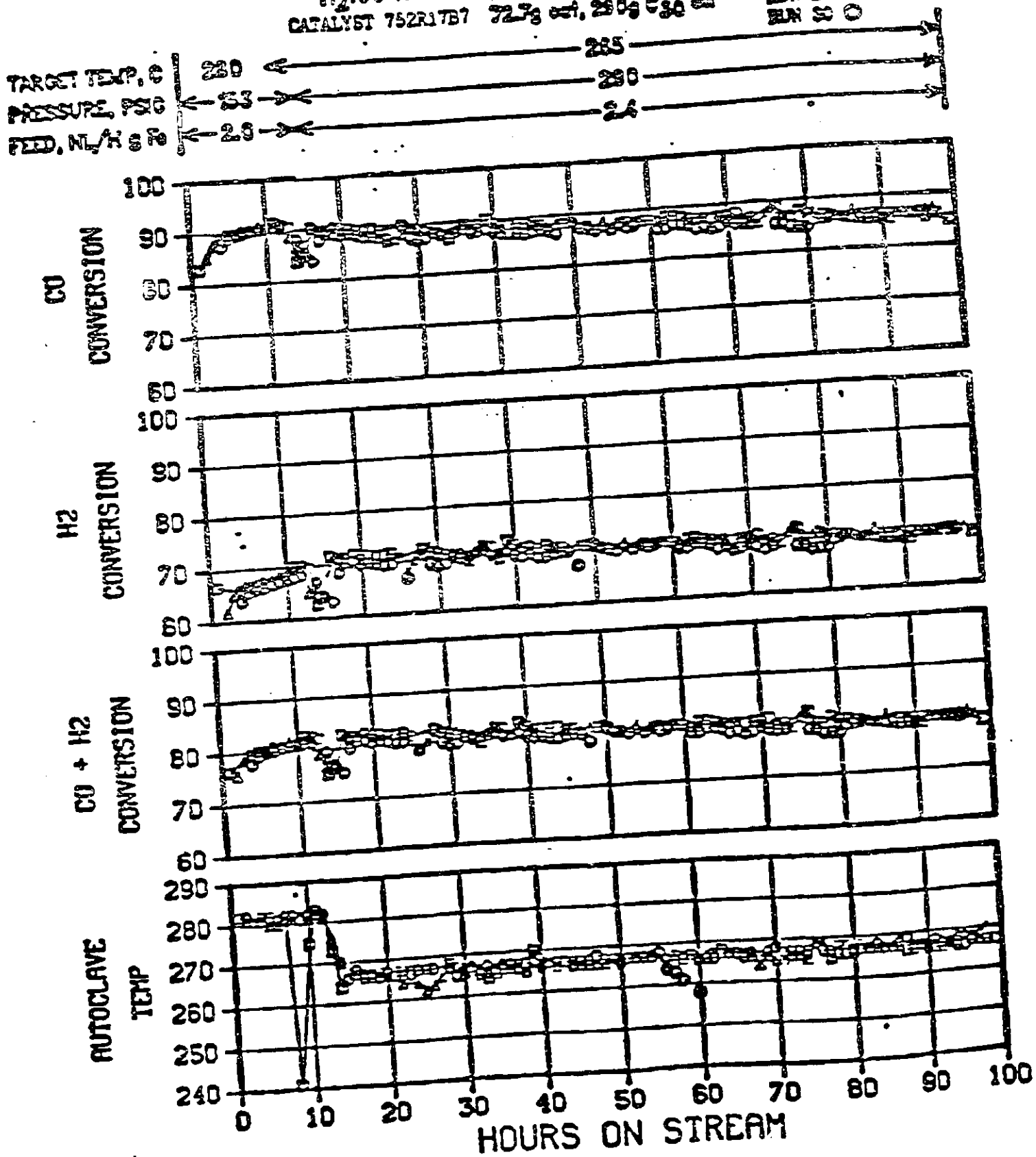


FIGURE 34

COMPARISON OF RUNS 28,29 & 30, CATALYST 6615-49

H_2:CO feed = 0.7, 1100 rpm

CATALYST 75ZR17B7 72.7g act., 290g C_{30} oil

RUN 28 Δ
RUN 29 □
RUN 30 ○

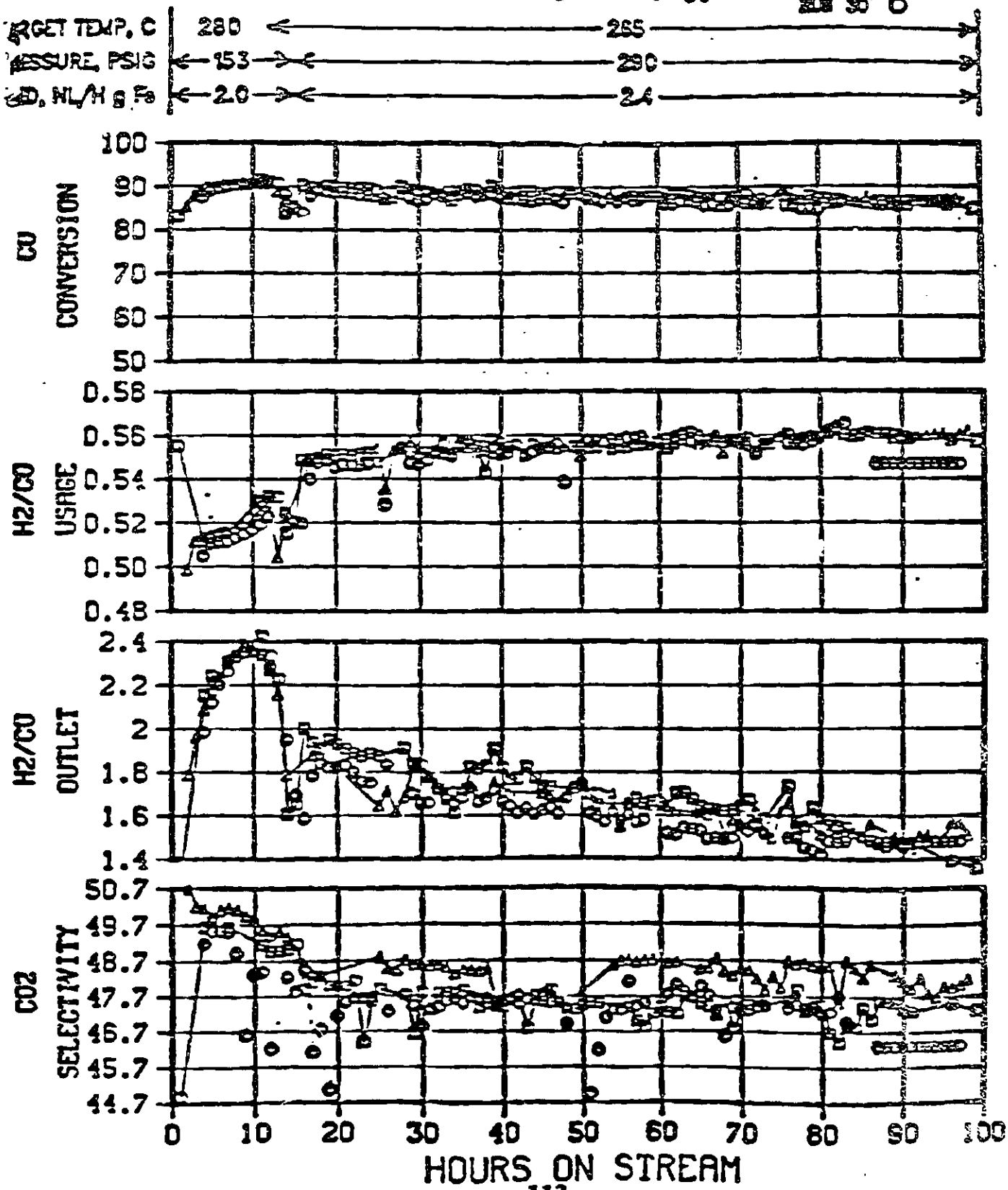


FIGURE 35

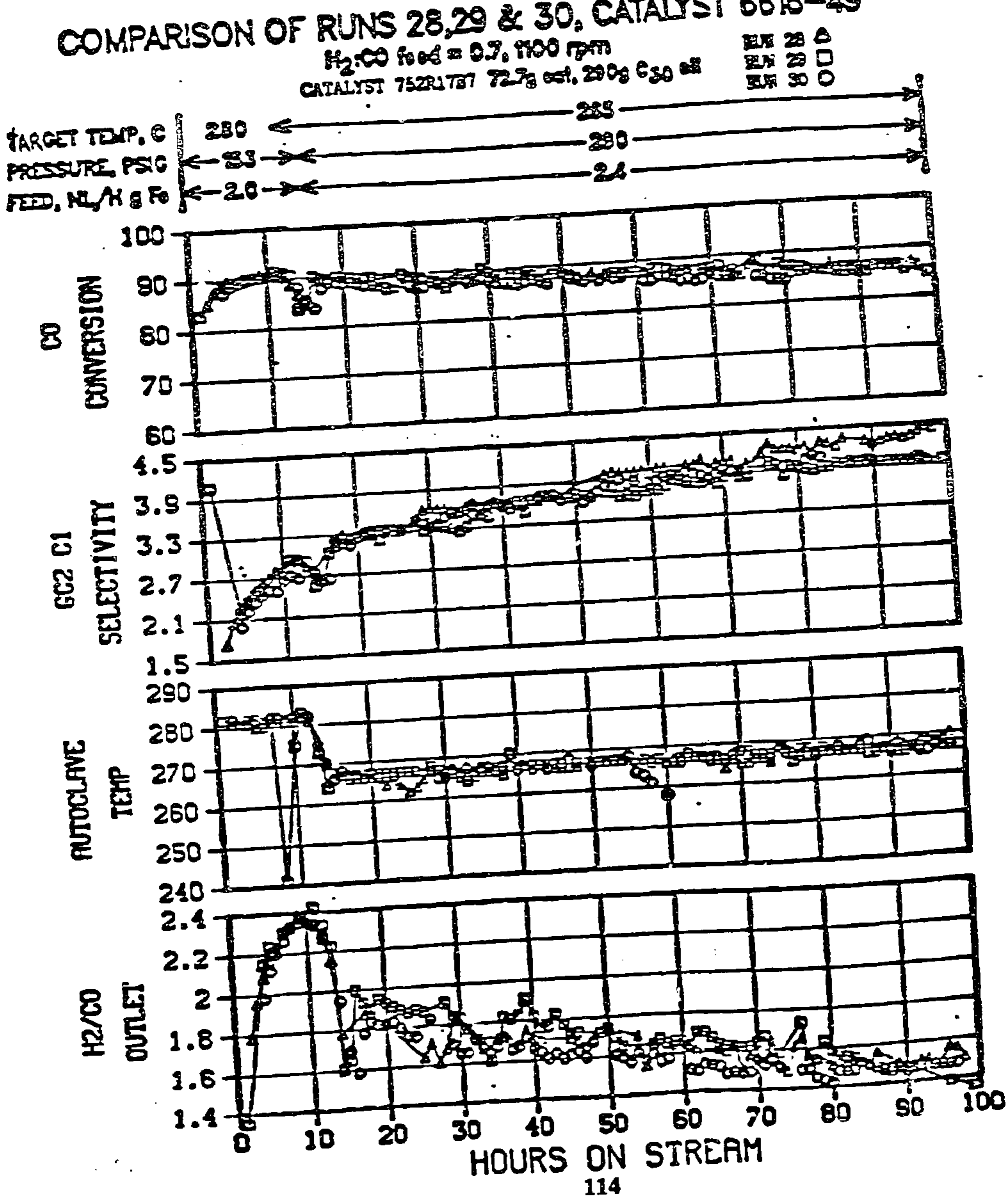

COMPARISON OF RUNS 28,29 & 30, CATALYST 6616-49
H2:CO feed = 0.7, 1100 rpm
CATALYST 752R17B7 72.7g cat, 290g C30 oil
RUN 28 △
RUN 29 □
RUN 30 ○
TARGET TEMP, C
280
285
280
PRESSURE, PSIG
133
24
FEED, NL/H g Fe
2.0
CO CONVERSION
GC2 C1 SELECTIVITY
AUTOCLAVE TEMP
H2/CO OUTLET
HOURS ON STREAM

FIGURE 36

COMPARISON OF RUNS 28,29 & 30, CATALYST 6515-49

H_2:CO feed = 0.7, 1100 rpm

CATALYST 752R17B7 72.5g cat, 200g C_{30} oil

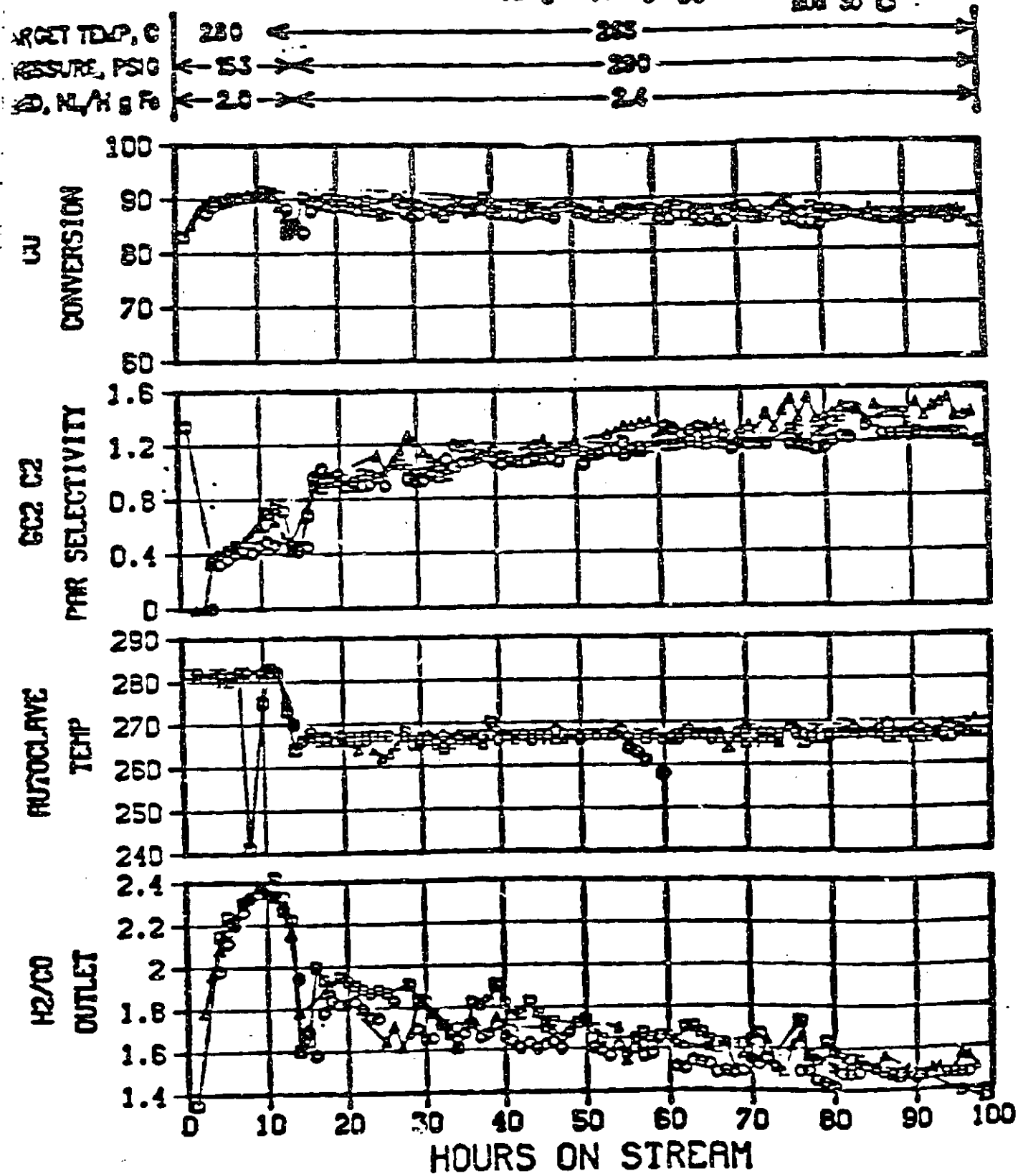


FIGURE 37

COMPARISON OF RUNS 28,29 & 30, CATALYST 6616-49

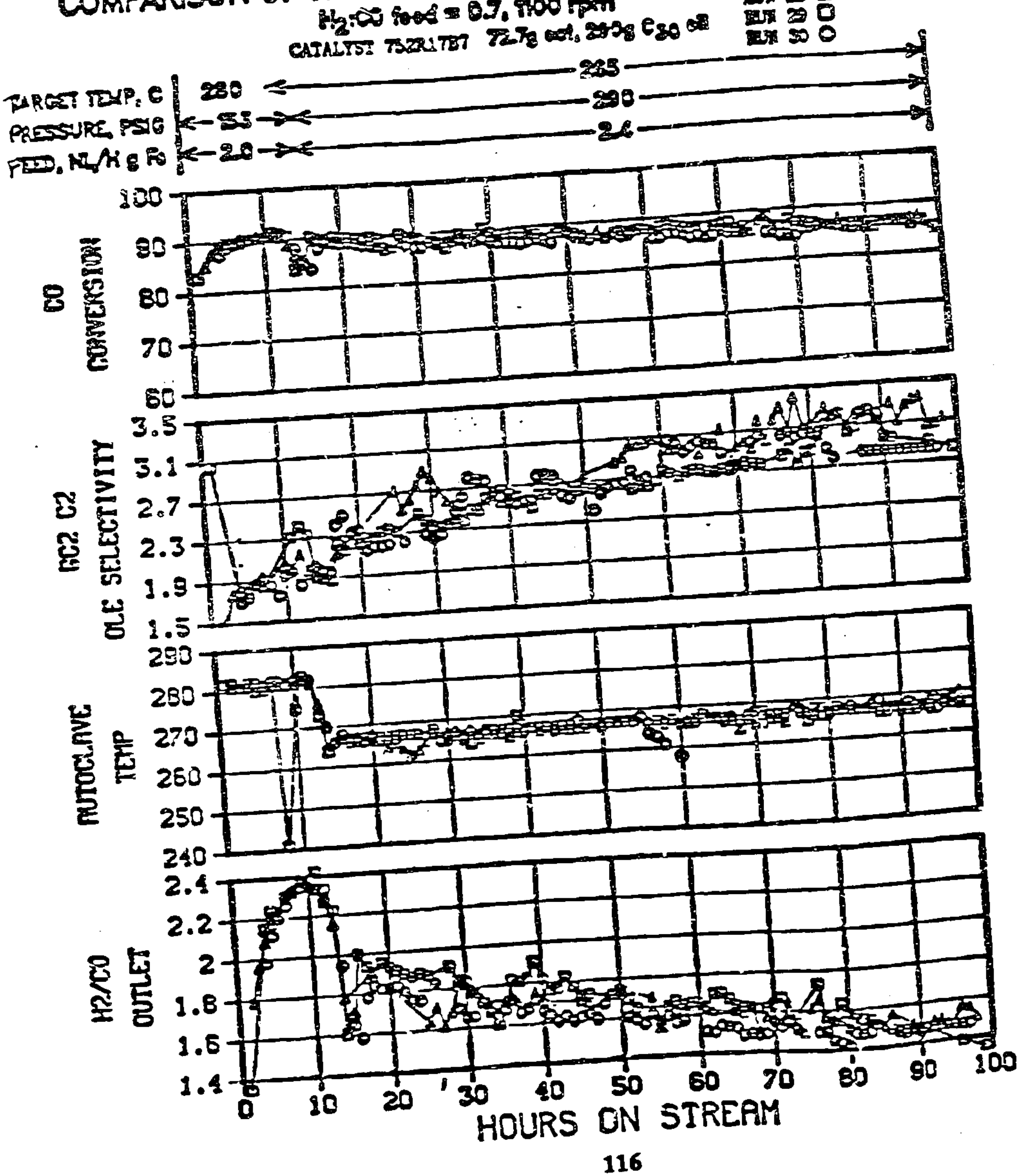


FIGURE 38

COMPARISON OF RUNS 28,29 & 30, CATALYST 6616-49

H_2:CO feed = 0.7, 1100 rpm

CATALYST 75ZR1737 72.3g ccf, 290g C_{30} oil

RUN 28 Δ
RUN 29 □
RUN 30 ○

TARGET TEMP, C: 280 ← 265

PRESSURE, PSIG: ← 153 → ← 290

FEED, NL/H g Fe: ← 2.0 → ← 2.6

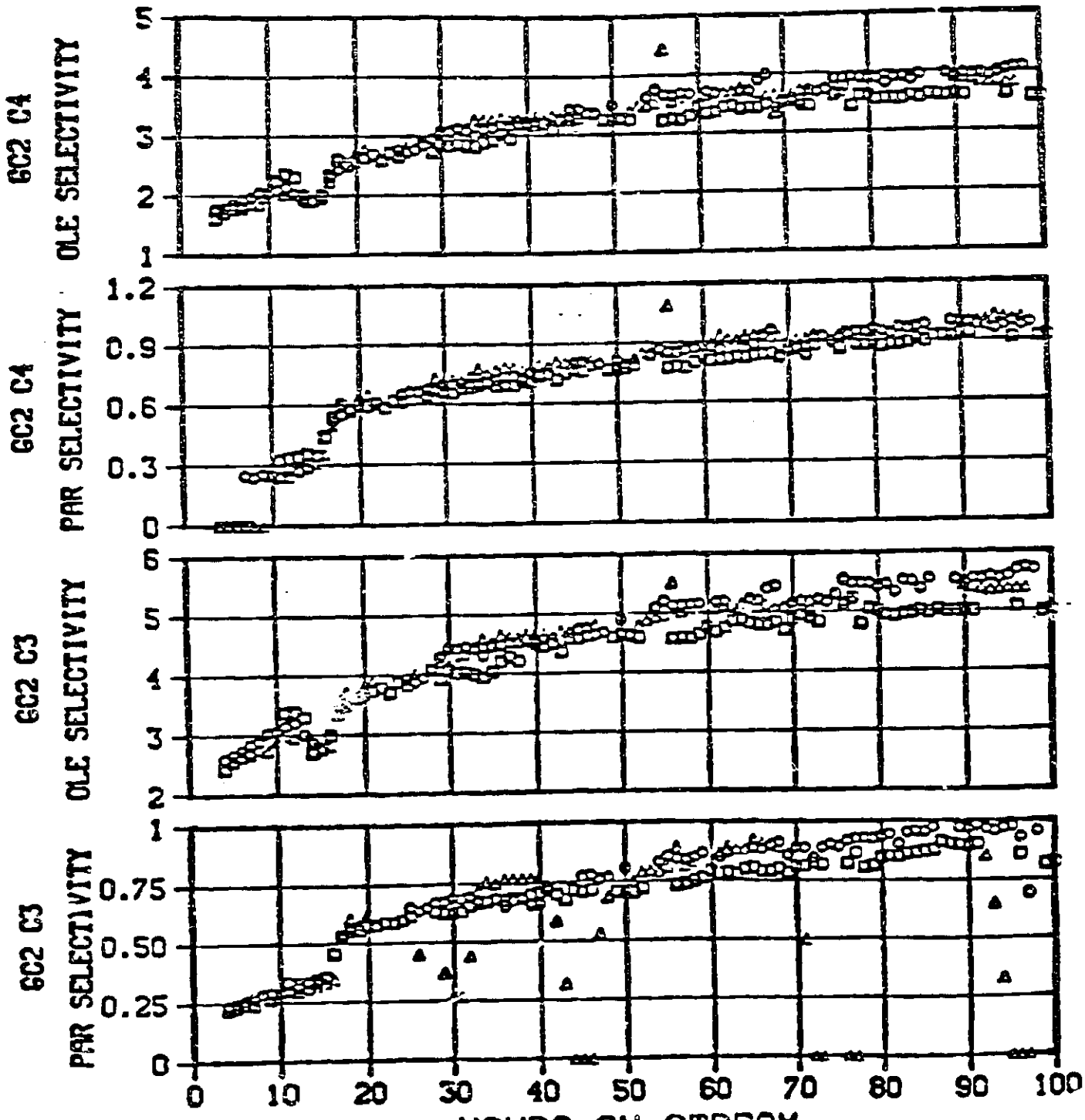


FIGURE 39

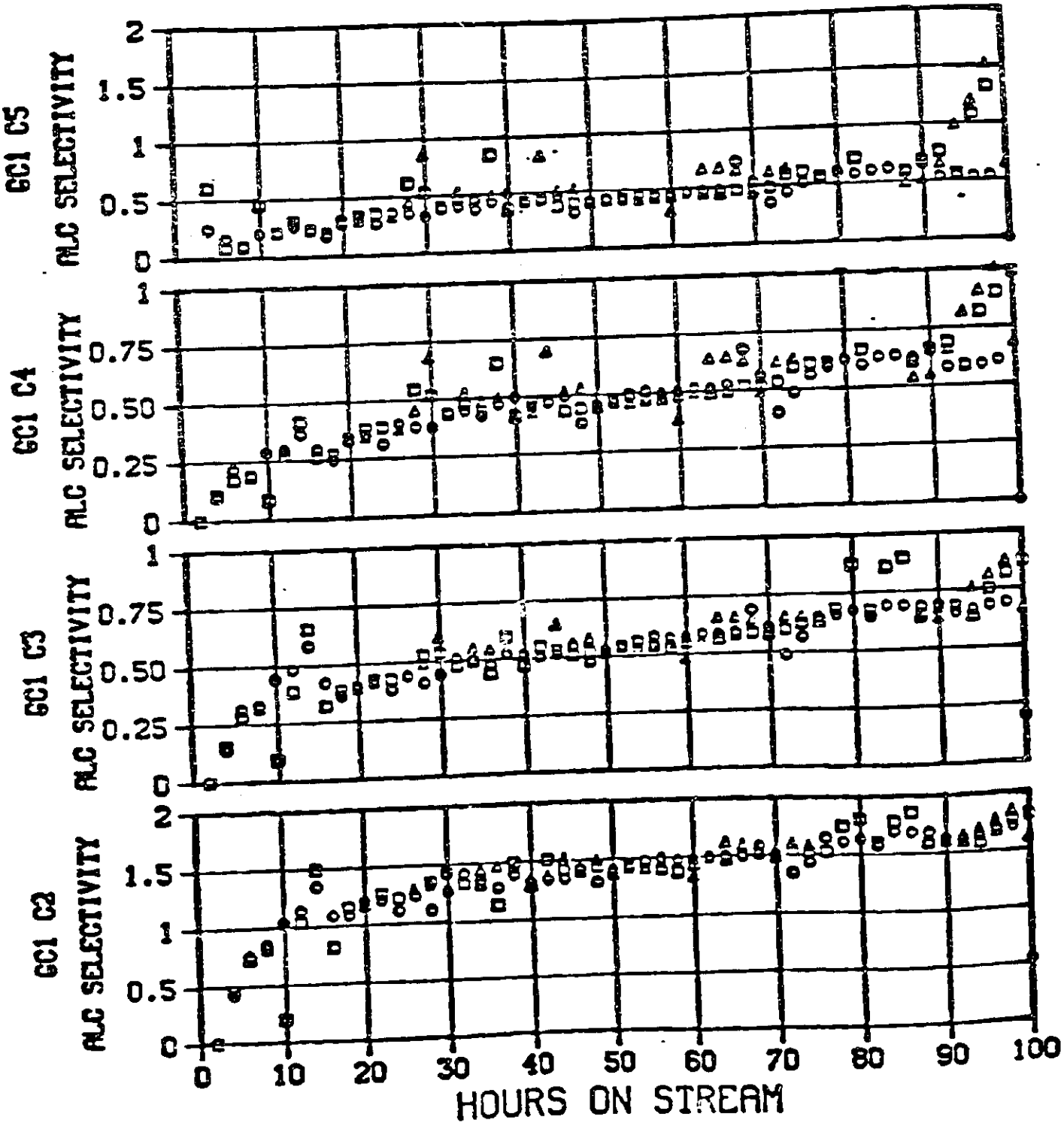
COMPARISON OF RUNS 28,29 & 30, CATALYST 6616-49

H_2:CO feed = 0.7, 1100 rpm

CATALYST 75ZR17B7 72.7% oct, 29.0% C_{30} oil

RUN 28 □
RUN 29 ○
RUN 30 △

TARGET TEMP, C	280	←	285
PRESSURE, PSIG	← 153 →	←	290
FEED, NL/H g Fe	← 2.0 →	←	2.4



RUHR CHEMIE OXIDE

PHYSICAL PROPERTIES

SOURCE OF CATALYST	METALS, WT %, V.F.				Fe:K (WT)	BET	
	Fe	Cu	Si	K		SA, m^2/g	PV, cc/g
RUHR CHEMIE	43.8	2.2	4.8	1.35	100 : 3.1	313	0.53

FIGURE 40

FIGURE 41

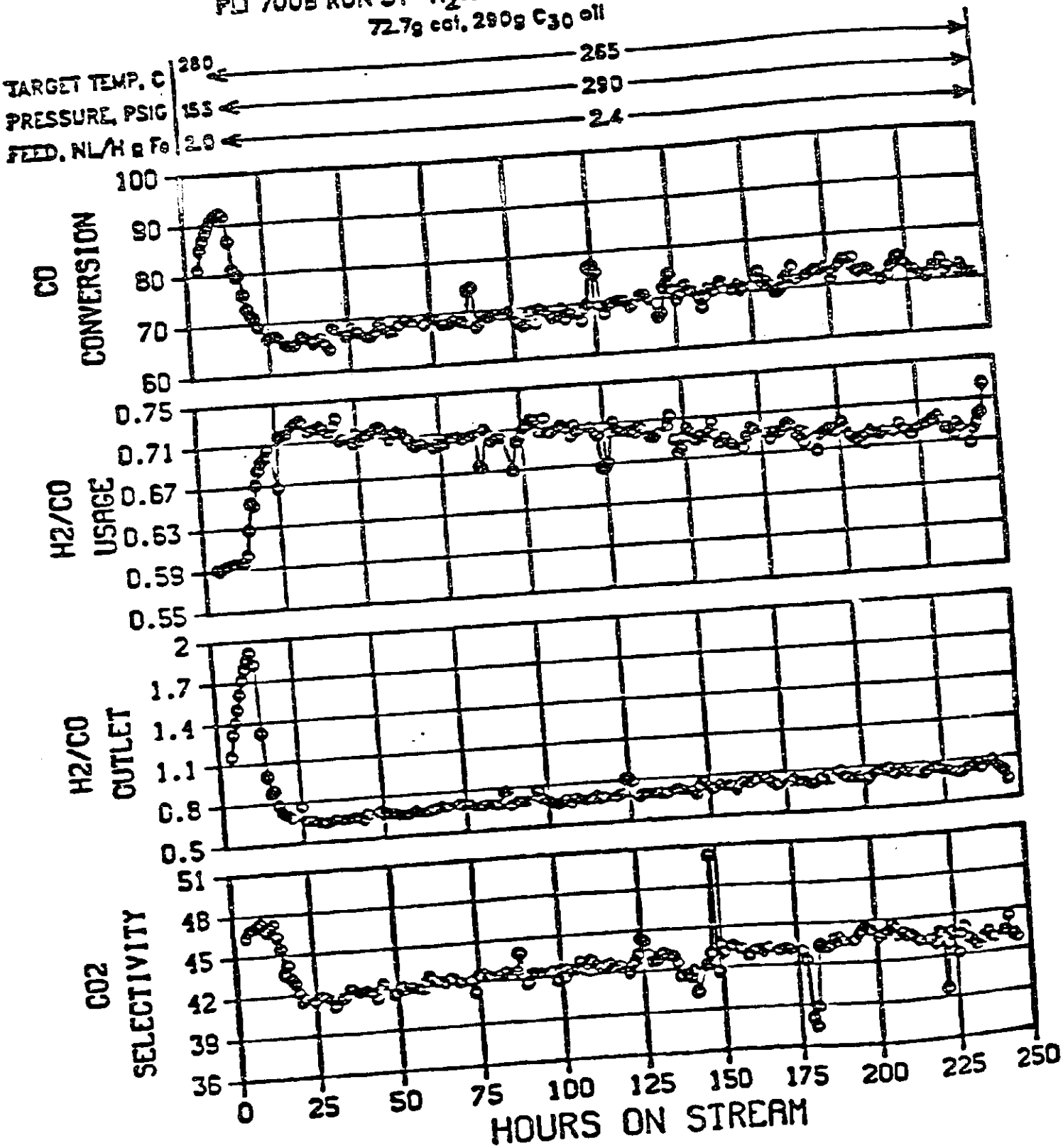

RUHR CHEMIE REFERENCE CATALYST
PIJ 700B RUN 31 H2:CO feed = 0.7, 1100 rpm
72.7g cat, 290g C30 oil
TARGET TEMP, C
PRESSURE, PSIG
FEED, NL/H @ Fe
280
155
2.0
265
290
2.4
CO CONVERSION
100
90
80
70
60
H2/CO USAGE
0.75
0.71
0.67
0.63
0.59
0.55
H2/CO OUTLET
2
1.7
1.4
1.1
0.8
0.5
CO2 SELECTIVITY
51
48
45
42
39
36
0
25
50
75
100
125
150
175
200
225
250
HOURS ON STREAM

FIGURE 42

RUHR CHEMIE REFERENCE CATALYST

PLT 700B RUN 31 H_2:CO feed = 0.7, 1100 rpm

72.7g cat, 290g C_{30} oil

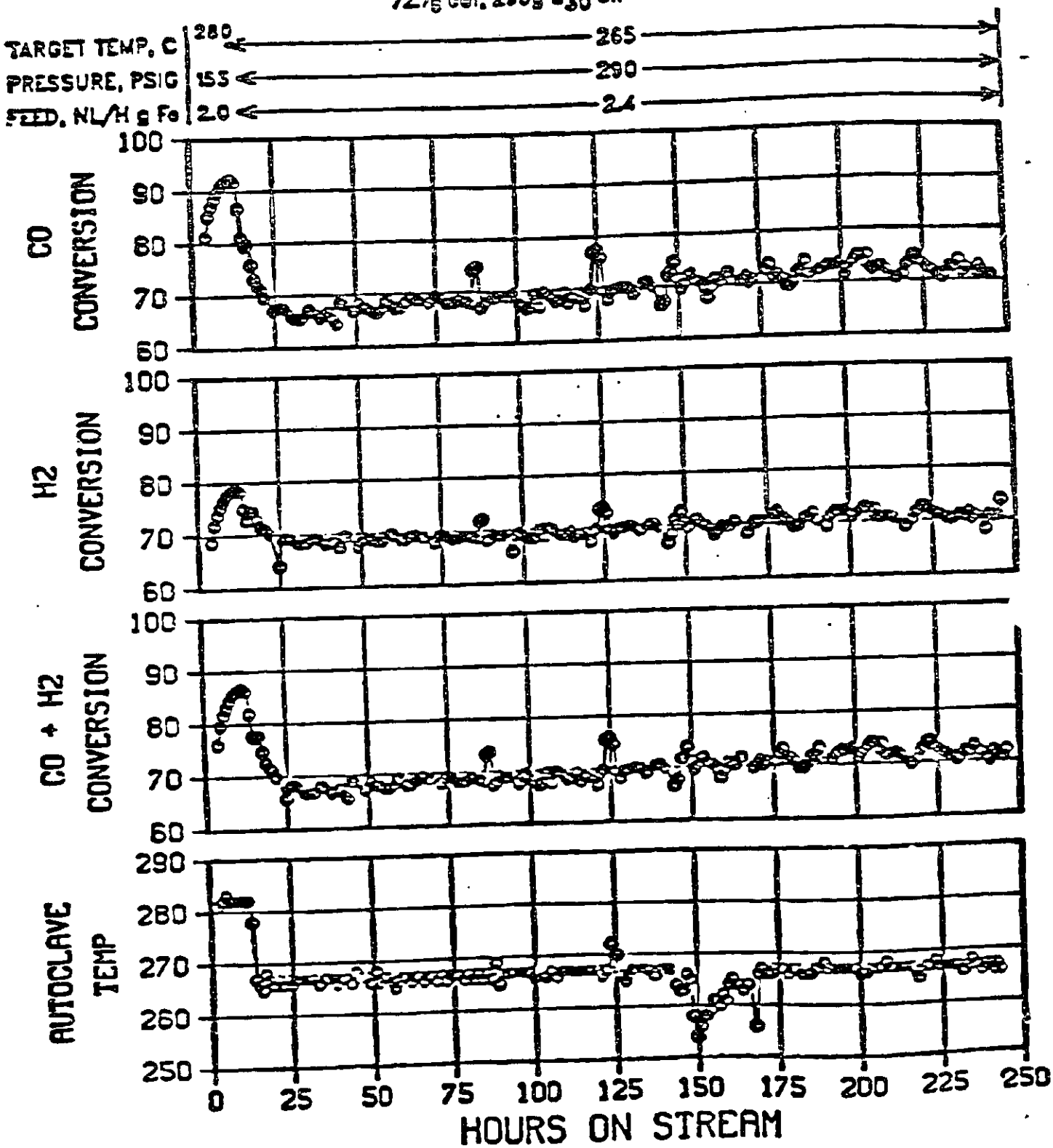


FIGURE 43

RUHR CHEMIE REFERENCE CATALYST

PDU 7009 RUN 31 H_2:CO feed = 0.7, 1100 rpm

72.7g cat, 230g C_{30} oil

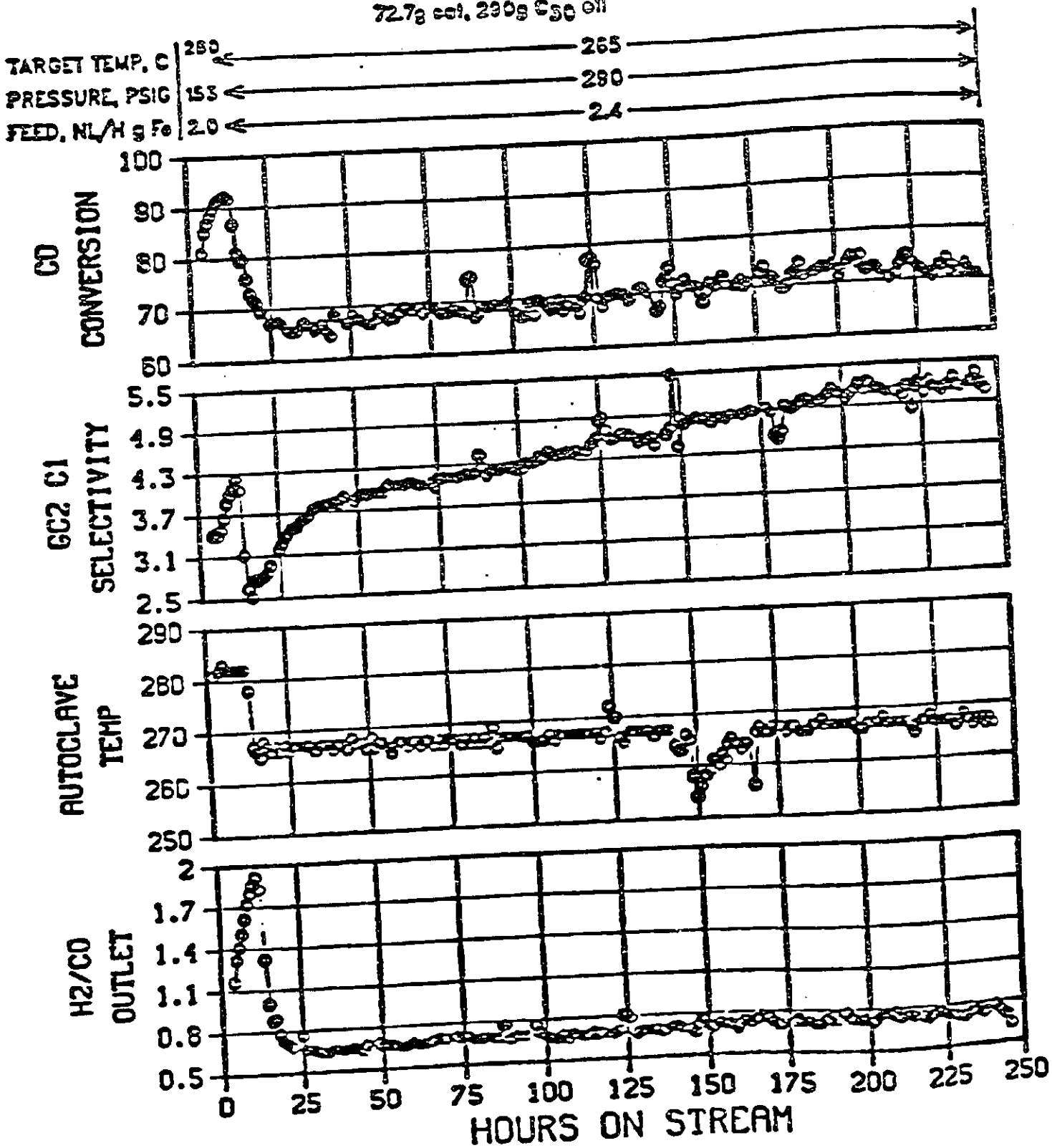


FIGURE 44

RUHR CHEMIE REFERENCE CATALYST

PLT 700B RUN 31 H_2:CO feed = 0.7, 1100 rpm

72.7g cat, 290g C_{30} oil

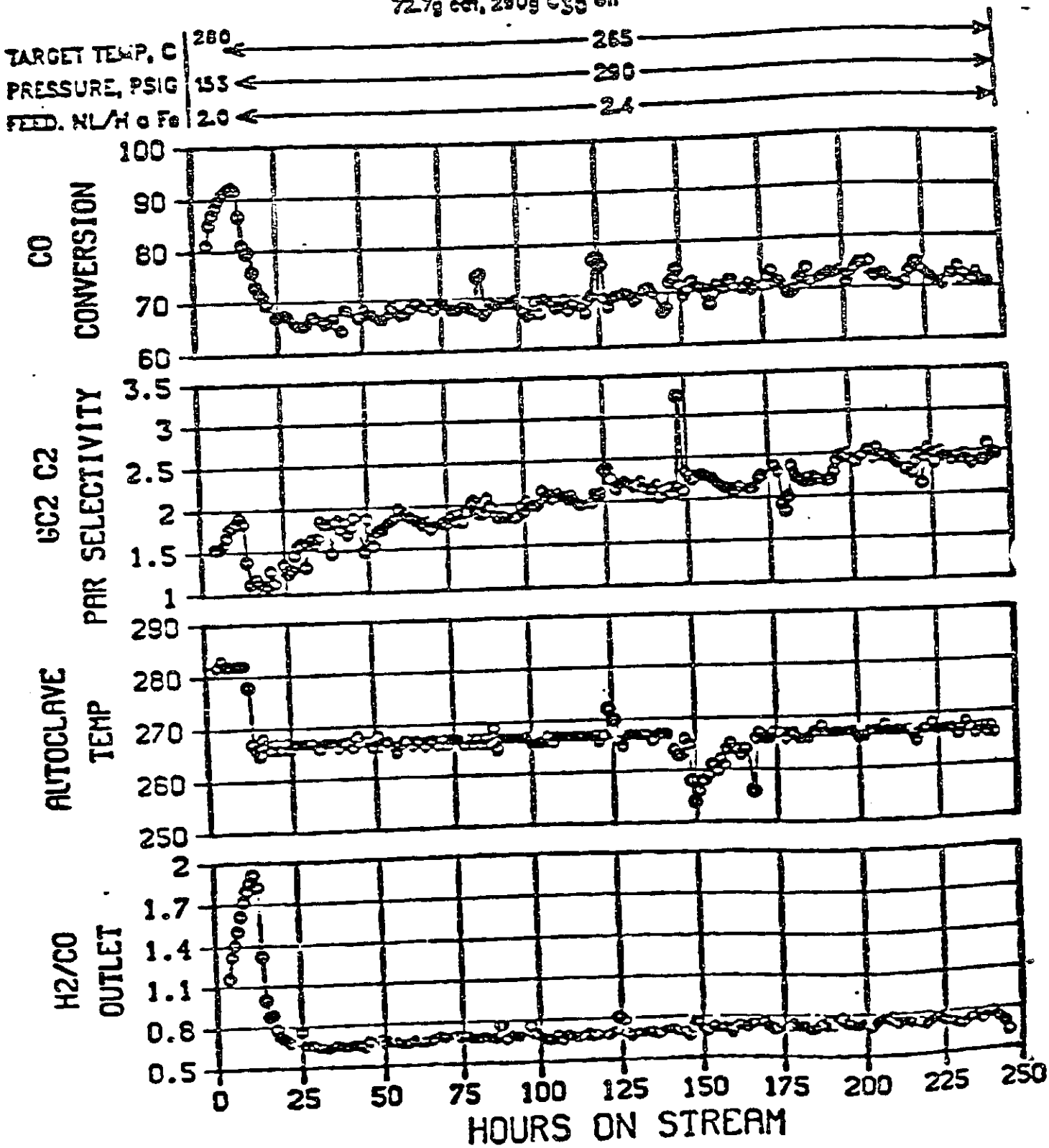


FIGURE 45

RUHR CHEMIE REFERENCE CATALYST

PU 700B RUN 31 H_2:CO feed = 0.7, 1100 rpm

72.7g cat, 290g C_{30} oil

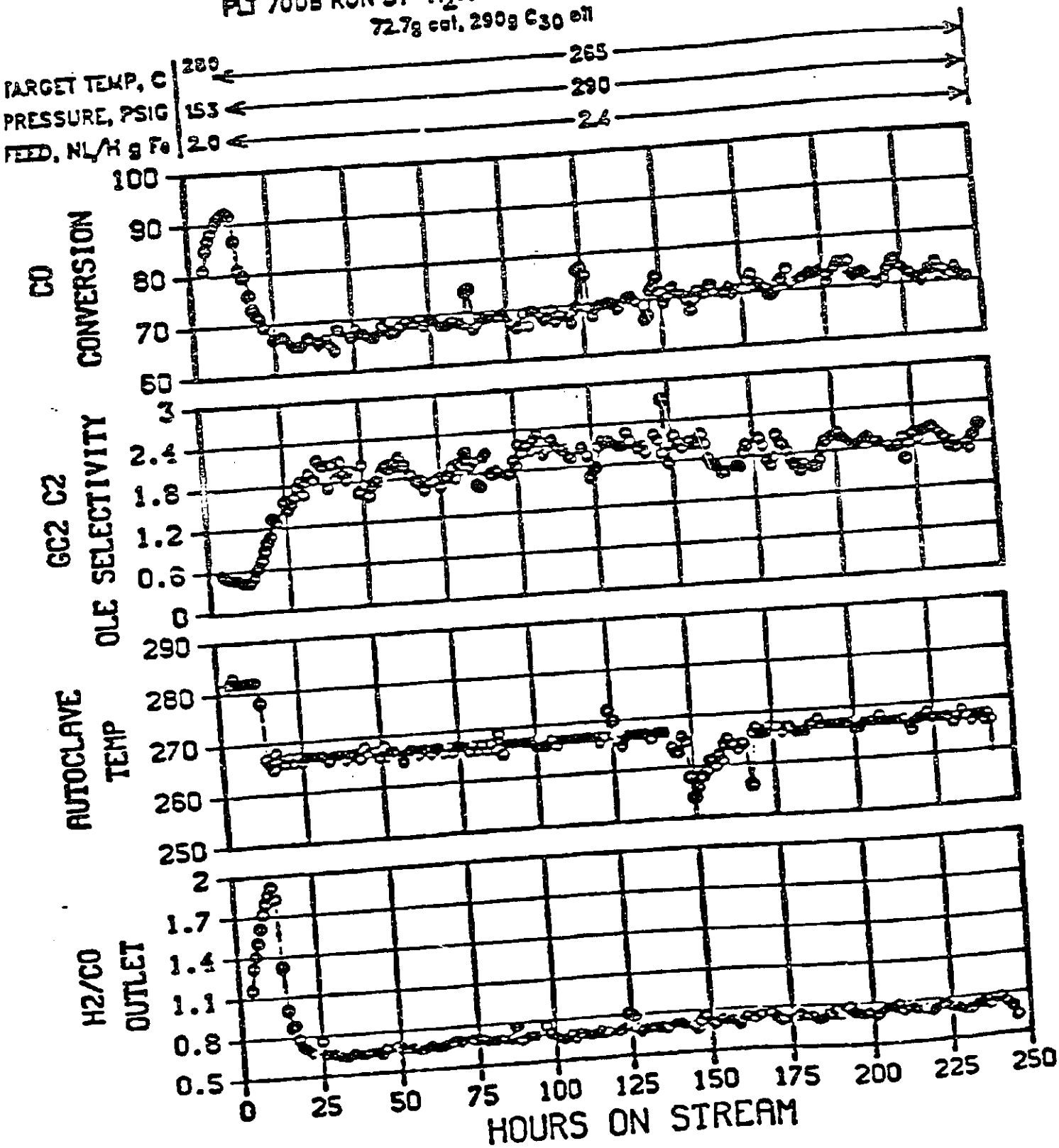


FIGURE 46

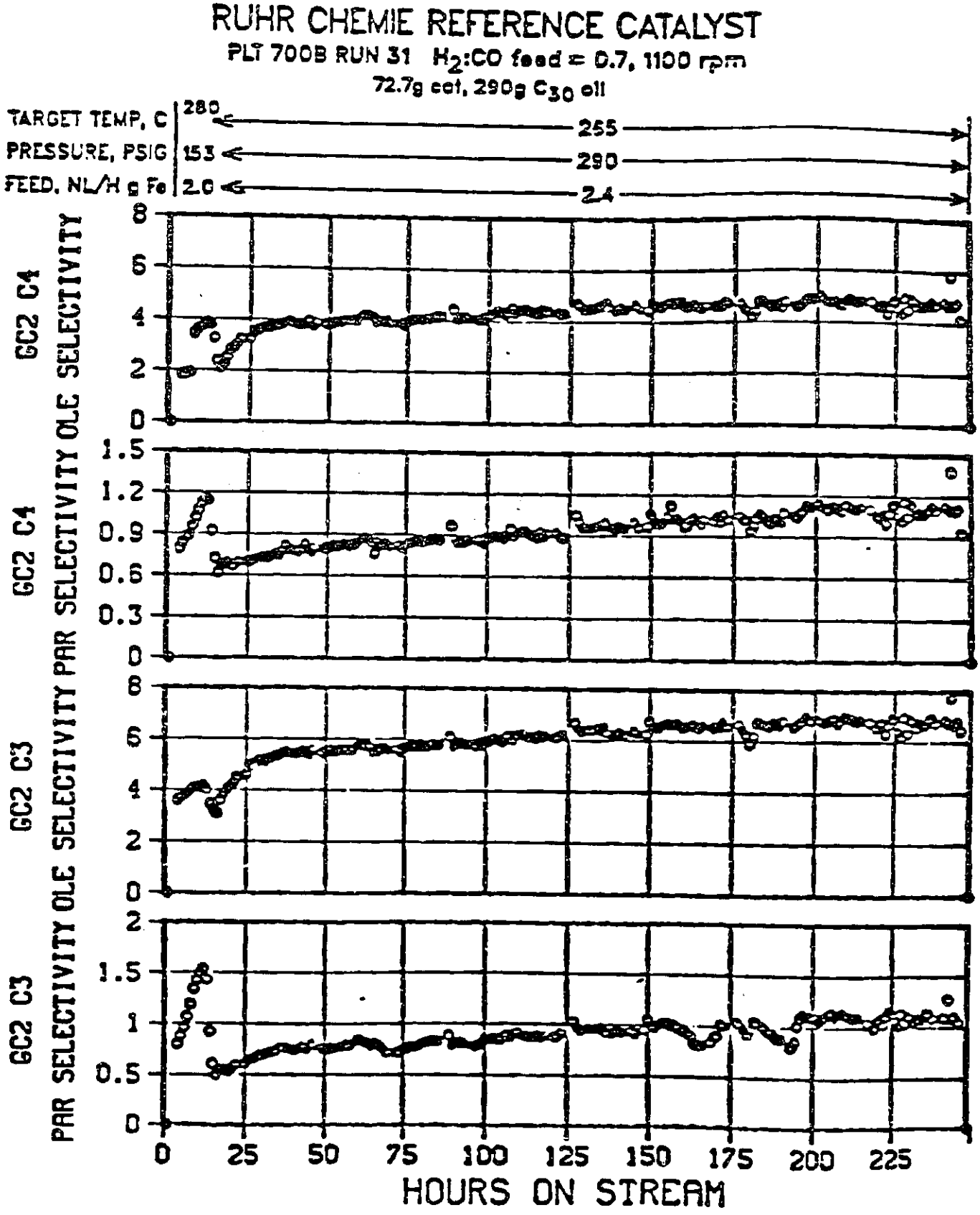

RUHR CHEMIE REFERENCE CATALYST
PLT 700B RUN 31 H_2:CO feed = 0.7, 1100 rpm
72.7g cat, 290g C_{30} oil
TARGET TEMP, C 280 255
PRESSURE, PSIG 153 290
FEED, NL/H g Fe 2.0 2.4
GC2 C4
GC2 C4
GC2 C3
GC2 C3
PAR SELECTIVITY OLE SELECTIVITY PAR SELECTIVITY OLE SELECTIVITY
HOURS ON STREAM

FIGURE 47

RUHR CHEMIE REFERENCE CATALYST

PLI 7008 RUN 31 H_2:CO feed = 0.7, 1100 rpm

72.7g cat, 290g C_{30} oil

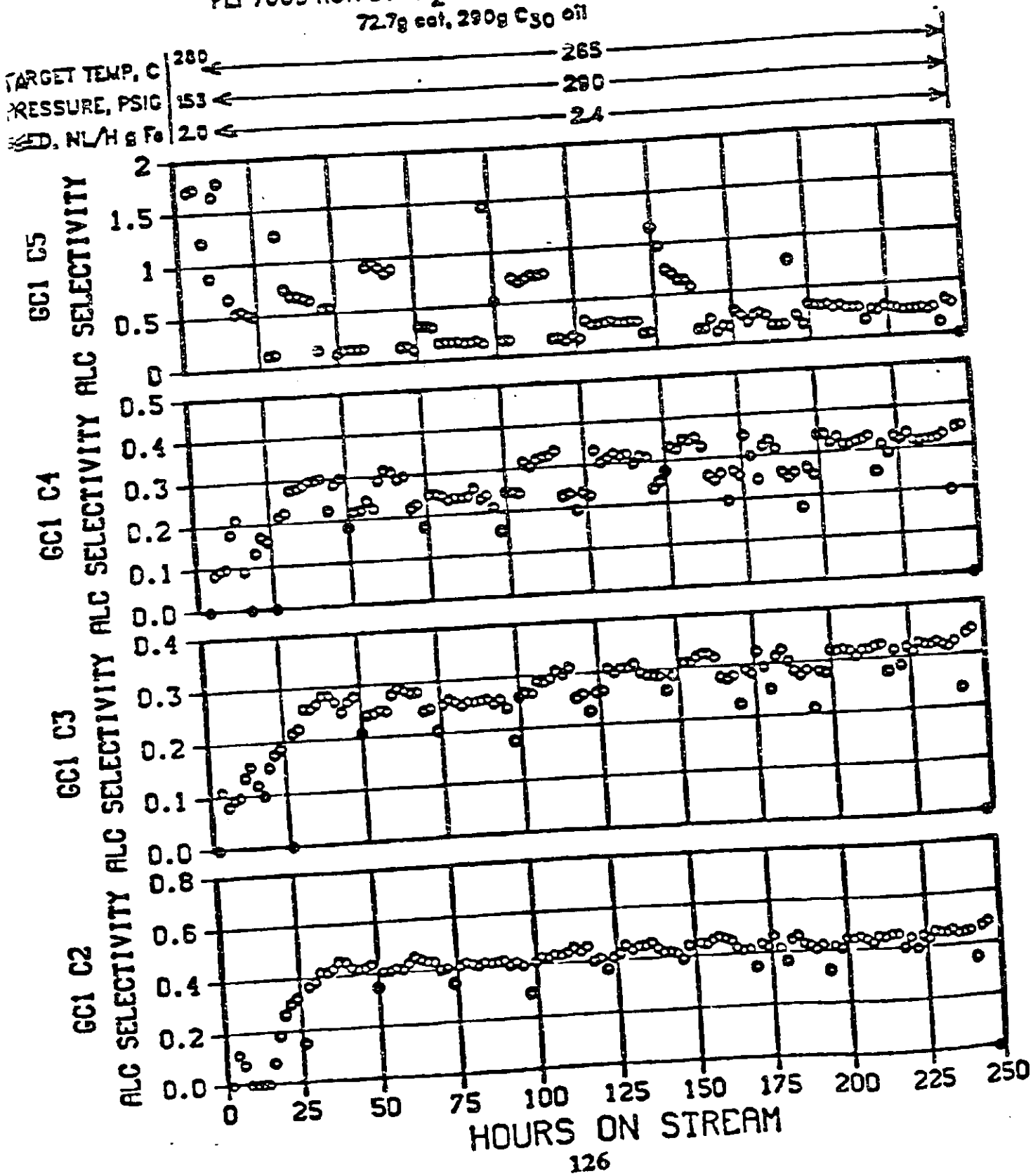
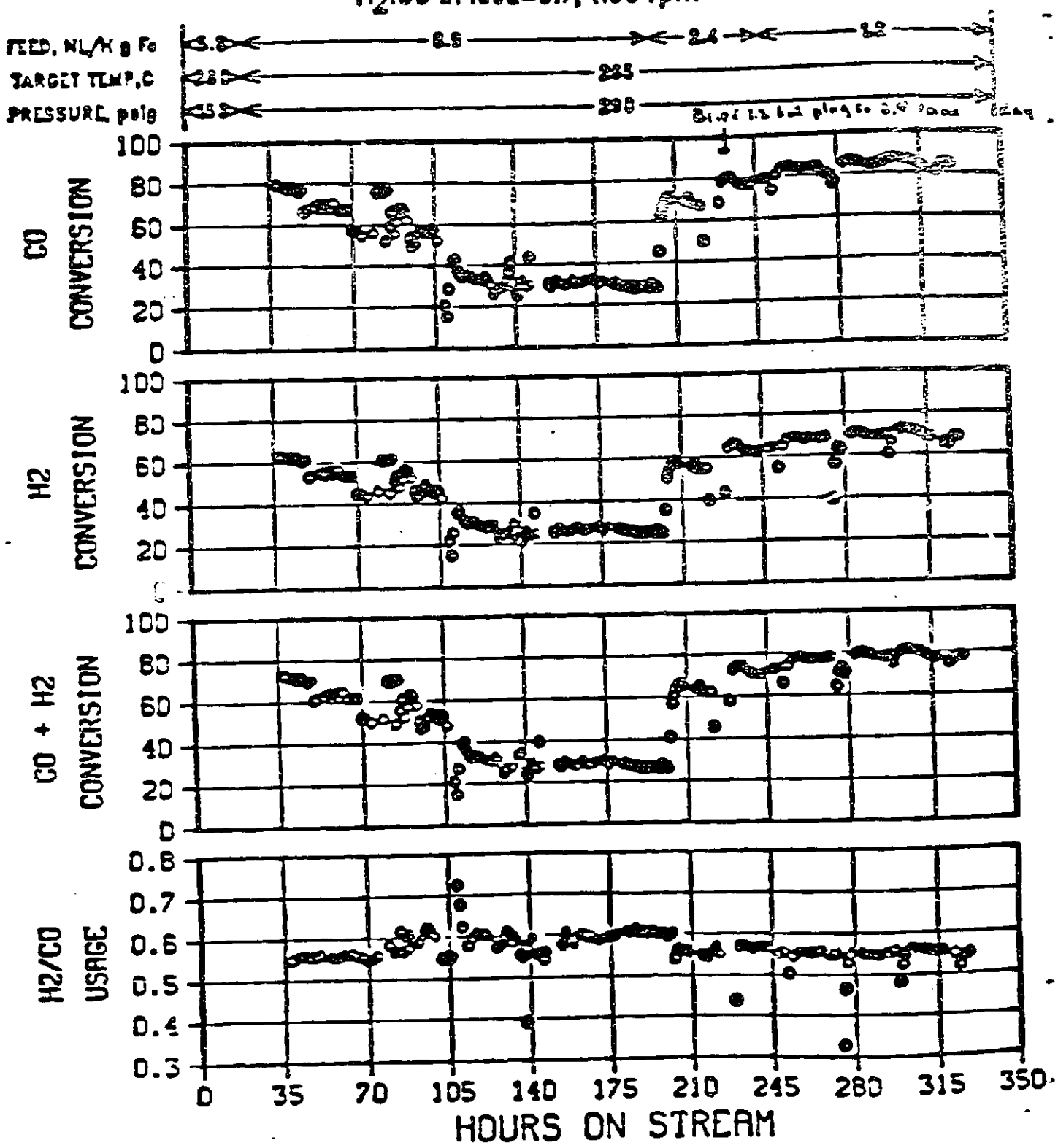


FIGURE 48


PRECIPITATED IRON CATALYST IN SLURRY AUTOCLAVE REACTOR
PLT 701 R-82 25g 5827-104 in 290g C_{30} oil
H_2:CO in feed=0.7, 1100 rpm
FEED, NL/H g Fe
TARGET TEMP,C
PRESSURE, psig
CO CONVERSION
H2 CONVERSION
CO + H2 CONVERSION
H2/CO USAGE
HOURS ON STREAM

CATALYSTS FROM IDENTICAL PRECIPITATION RUNS

PERFORMANCE COMPARISON AT LINE OUT

AUTOCLAVE RUN NO.	58	62	65	68
PRECIP PLT NO./ HOW FILTERED	30/DIRECT	30/OVERFLOW	33/DIRECT	33/OVERFLOW
CONV.,%				
CO	20	28	40	46
H_2	20	25	38	40
CO + H_2	22	29	39	42
H_2/CO USAGE	0.65	0.60	0.68	0.60
SELECTIVITIES				
CO_2	42	48	48	48
C_1	1.8	2.9	3.6	3.5
C_2	0.1	0.5	0.7	0.8
$C_2^=$	0.8	3.0	3.6	4.5
C_3	.05	0.7	0.9	0.8
$C_3^=$	2.7	3.5	4.4	4.3
C_4	0.0	0.0	0.0	0.0
$C_4^=$	1.5	1.5	3.0	3.3

FIGURE 49

FIGURE 50

Properties of Oxides

Run No.	Oxide after K_2CO_3 Fe:Cu:K:Si, wt	Surface Area, m^2/g	Pore Volume, cc/g
35	100:2.05:2.37:1.15	192	0.24
36	100:2.31:2.41:1.72	196	0.25
37	100:2.10:2.31:2.06	187	0.23
39	100:2.46:2.25:2.70	193	0.23
38	100:2.13:2.22:3.85	179	0.22