

FIGURE 1

EFFECT OF SURFACE AREA ON BULK ACTIVITY AND SELECTIVITY

(Fixed-Bed Reactor -  $\text{CO}/\text{H}_2=1$ ,  $1000 \text{ hr}^{-1}$ , 300 psig)

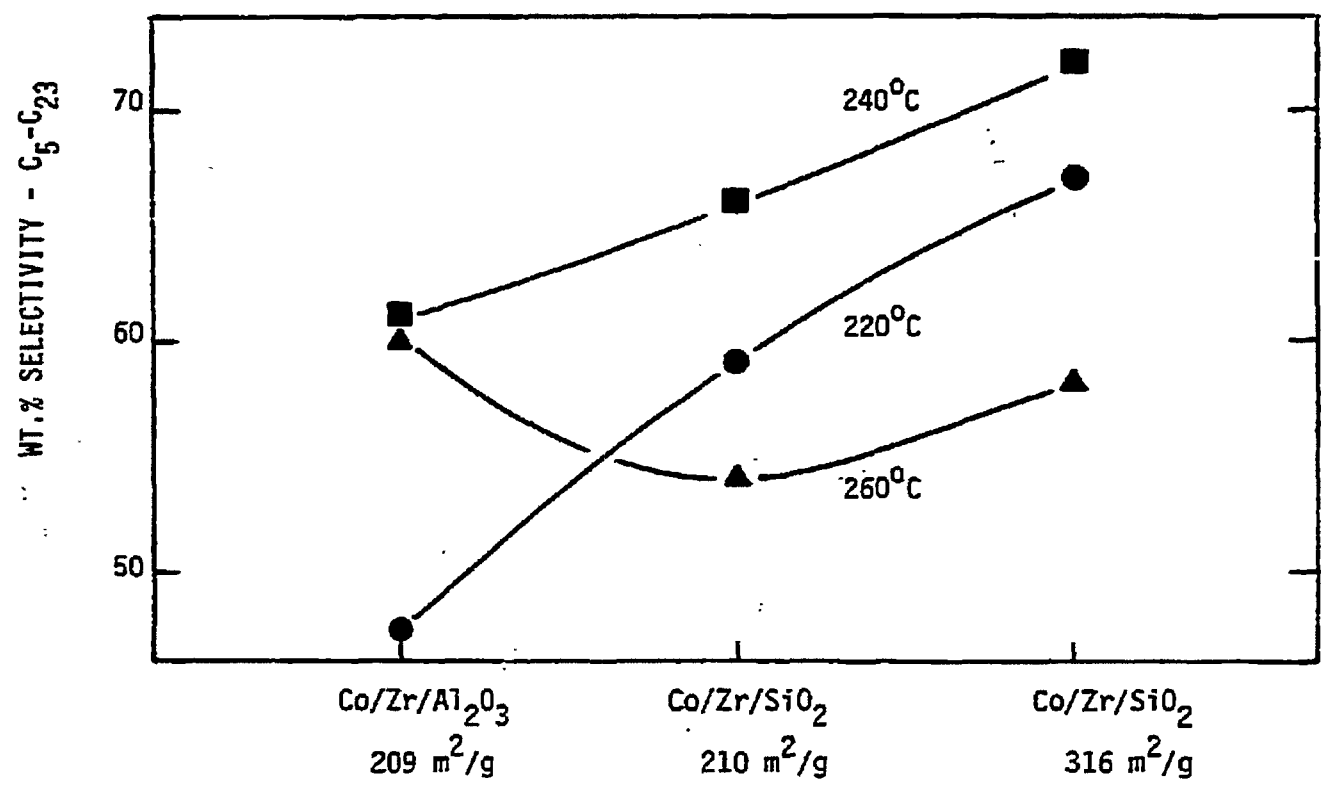
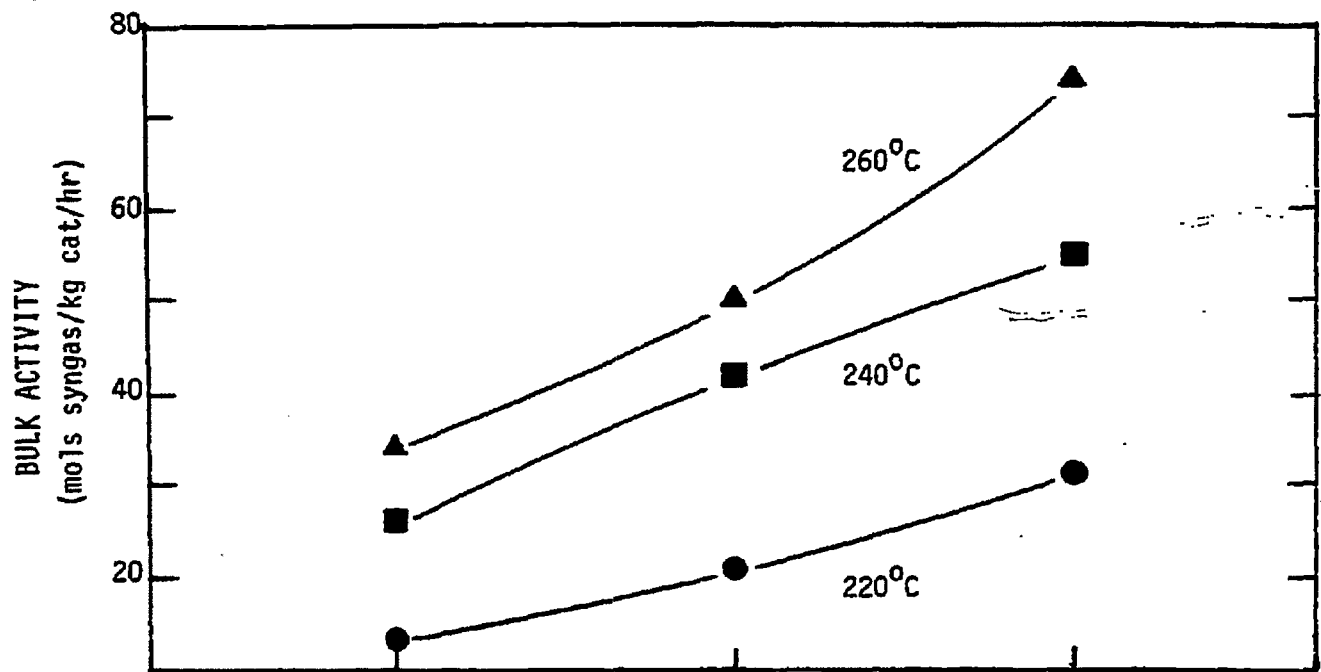


FIGURE 2

EFFECT OF COBALT LOADING ON  
BULK ACTIVITY OF  $\text{Co/Zr/SiO}_2$  CATALYST  
(Fixed Bed Reactor -  $\text{CO/H}_2=1$ ,  $1000 \text{ hr}^{-1}$ , 300 psig)

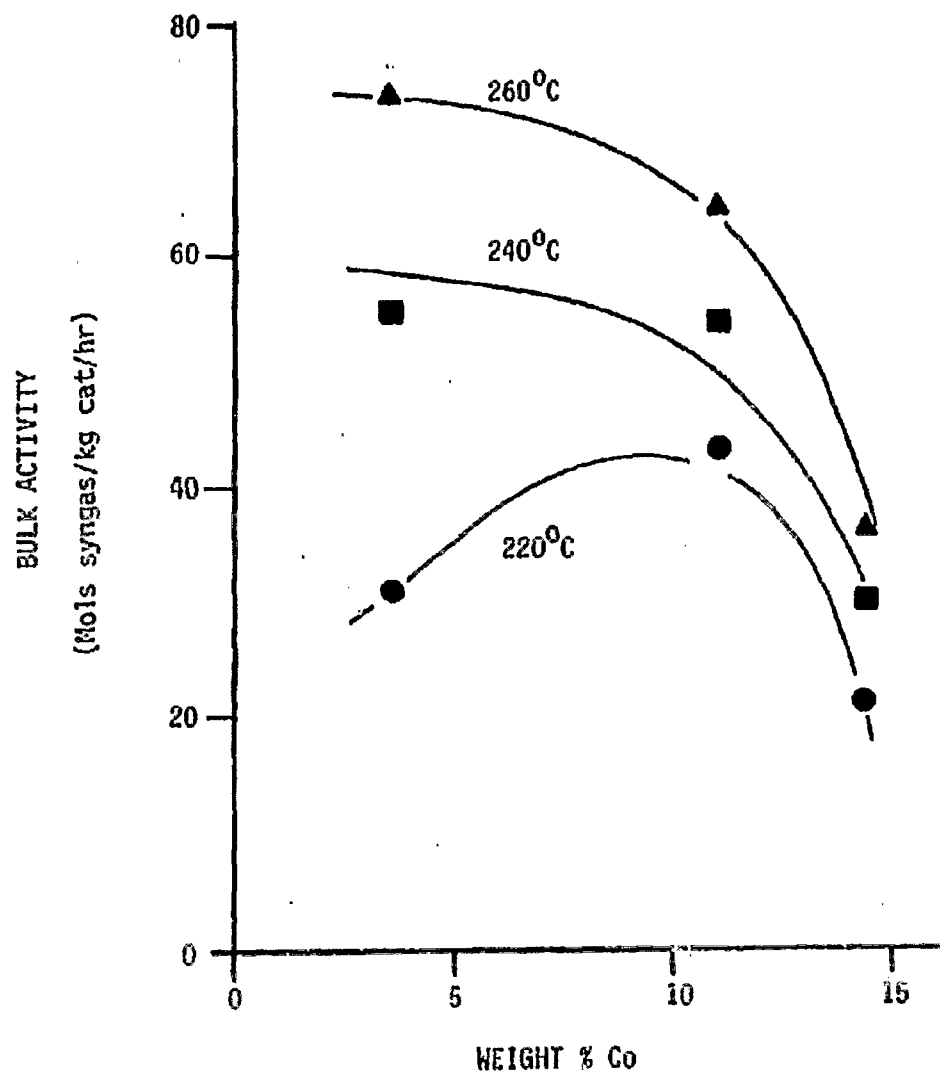


FIGURE 3

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-3

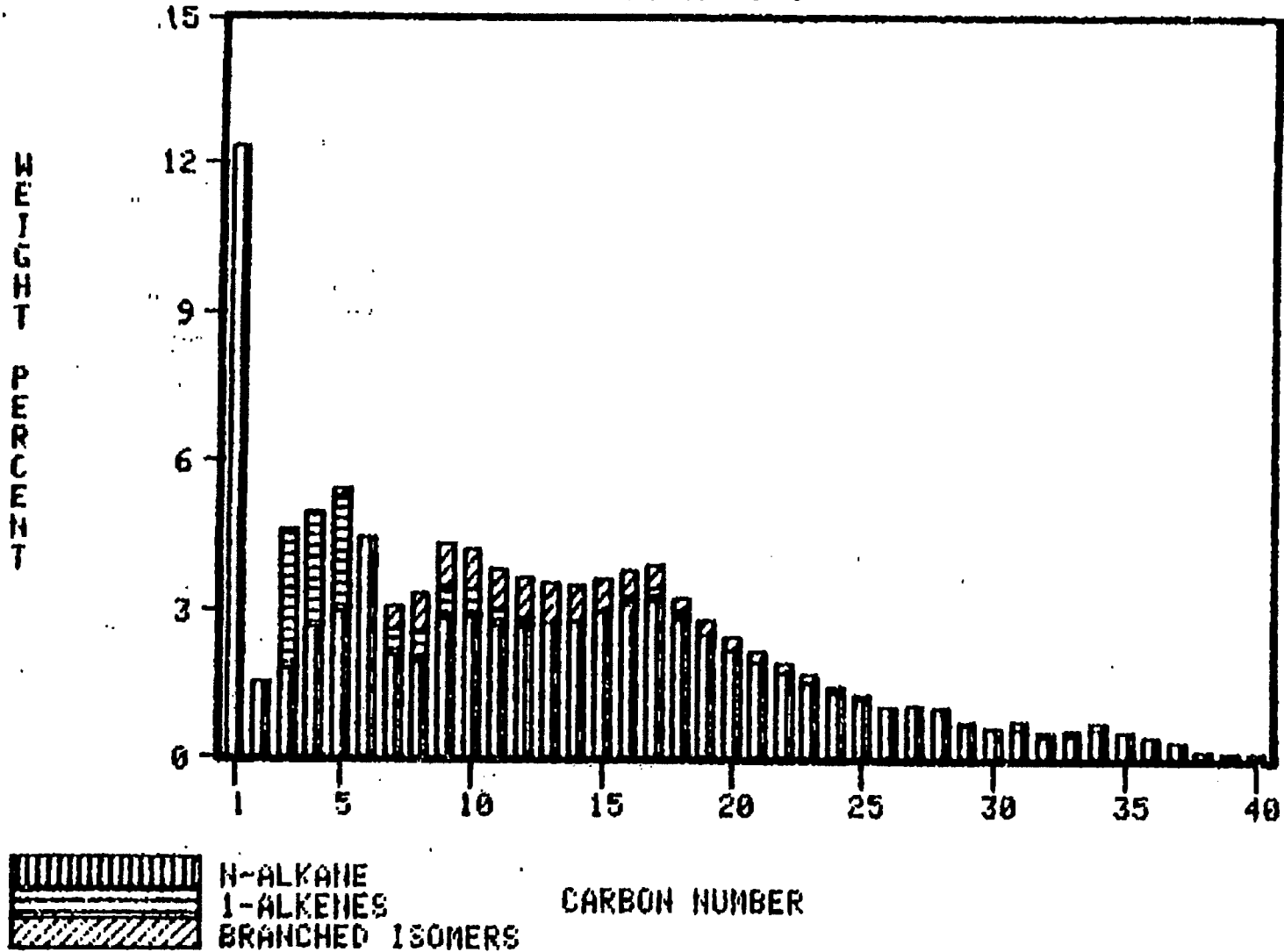


FIGURE 4

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-6

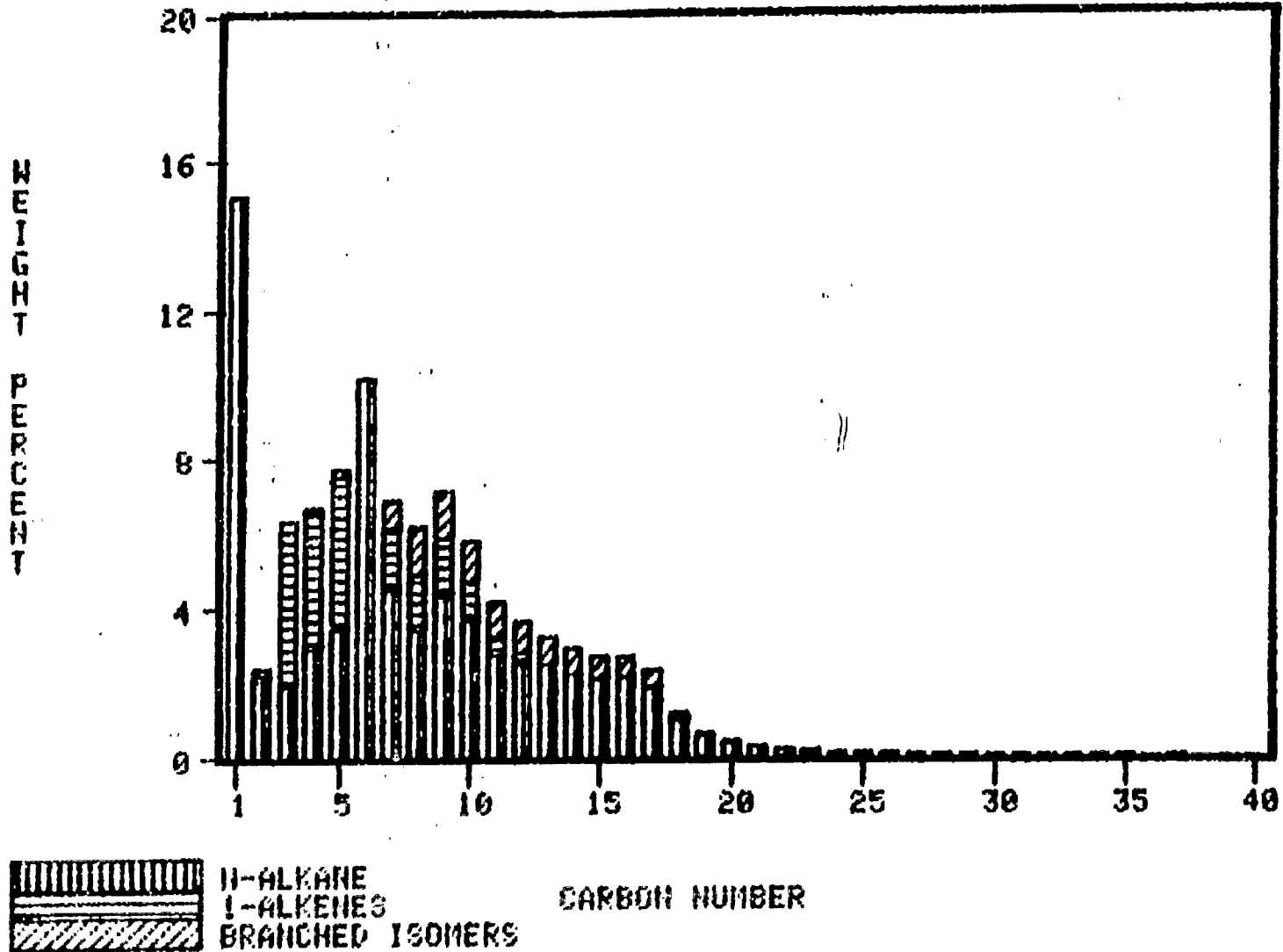


FIGURE 5

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-9

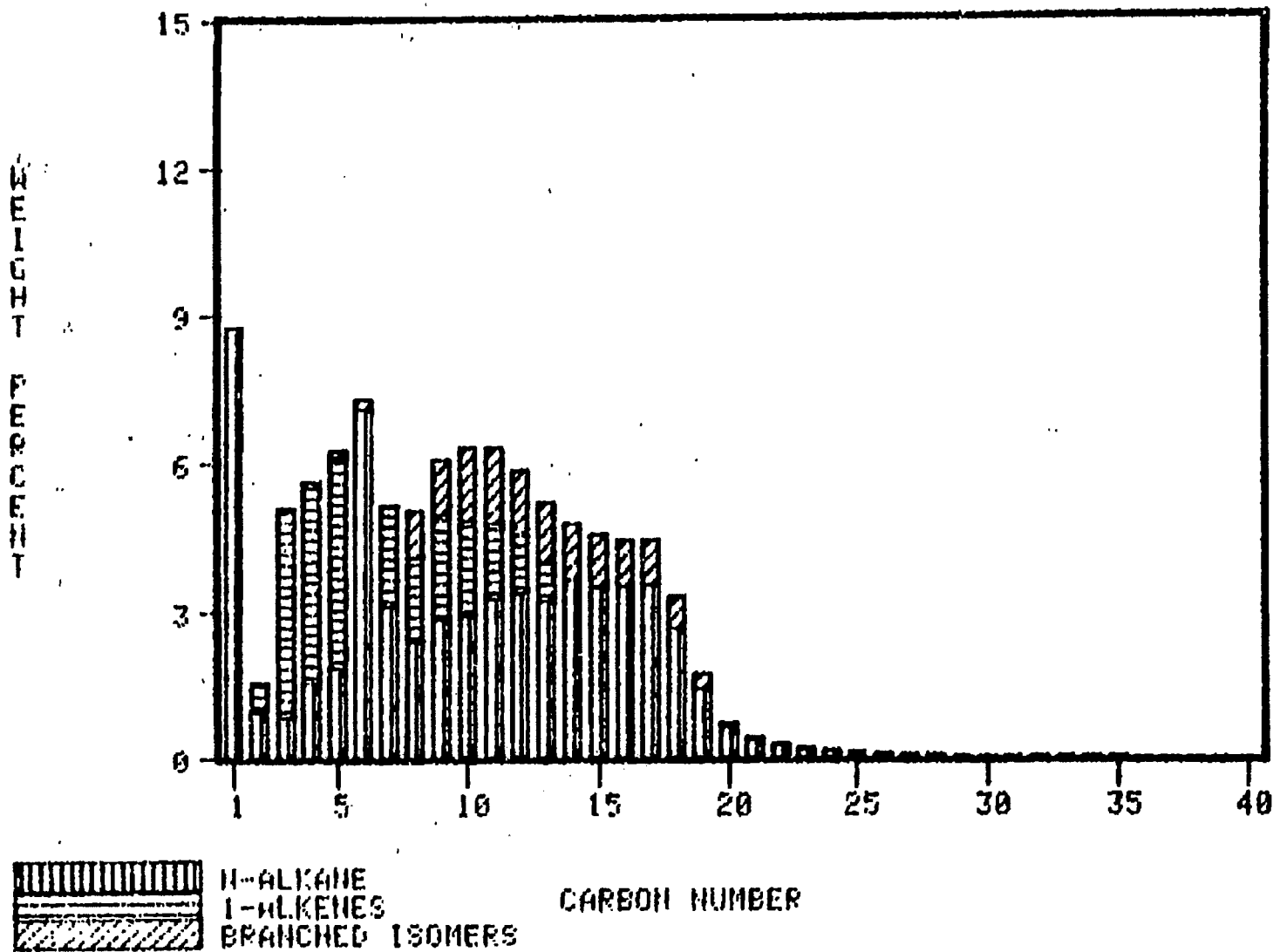


FIGURE 6

HYDROCARBON WEIGHT DISTRIBUTION

0662-00-49-12

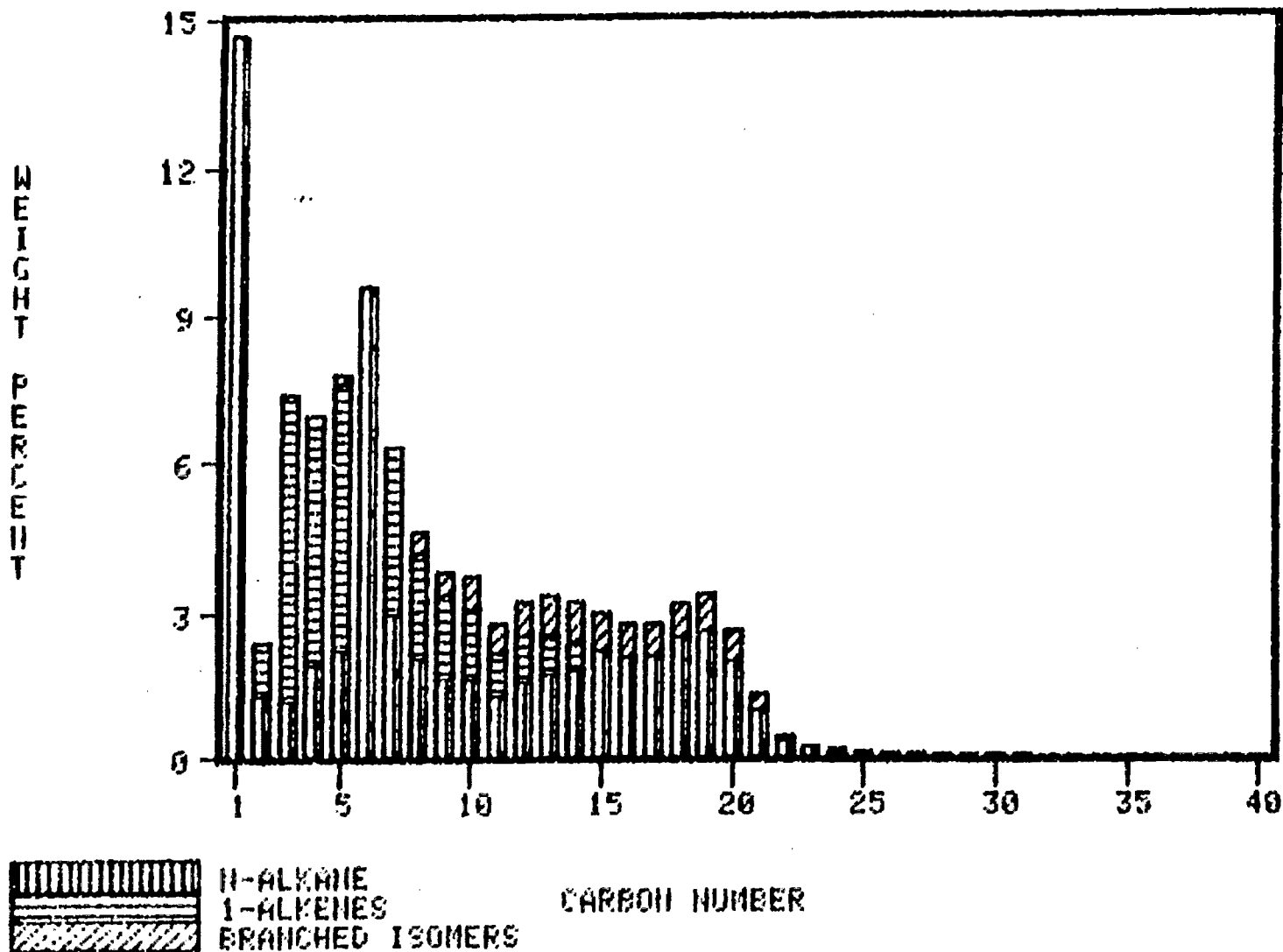


FIGURE 7

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-15

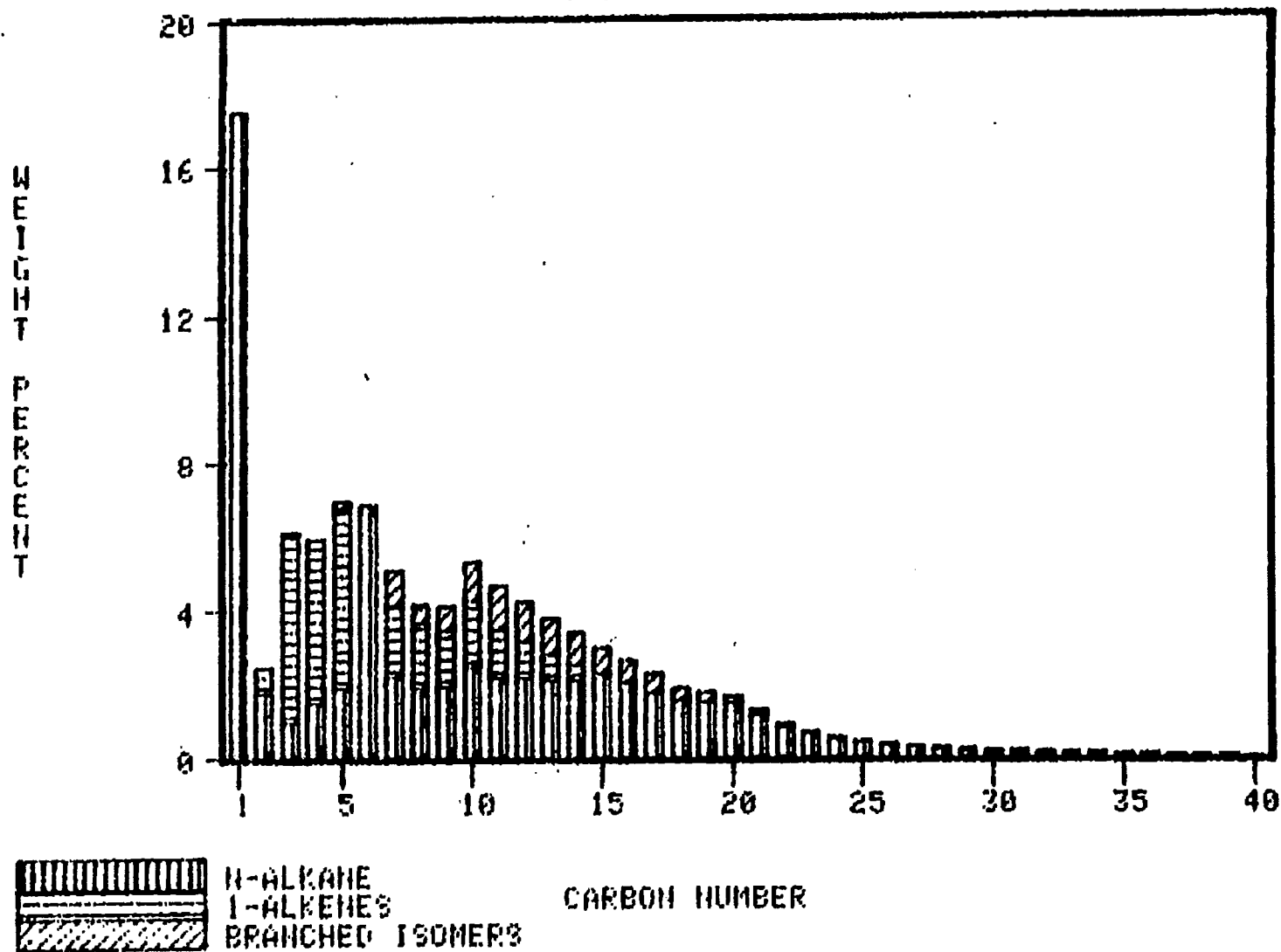


FIGURE 8

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-18

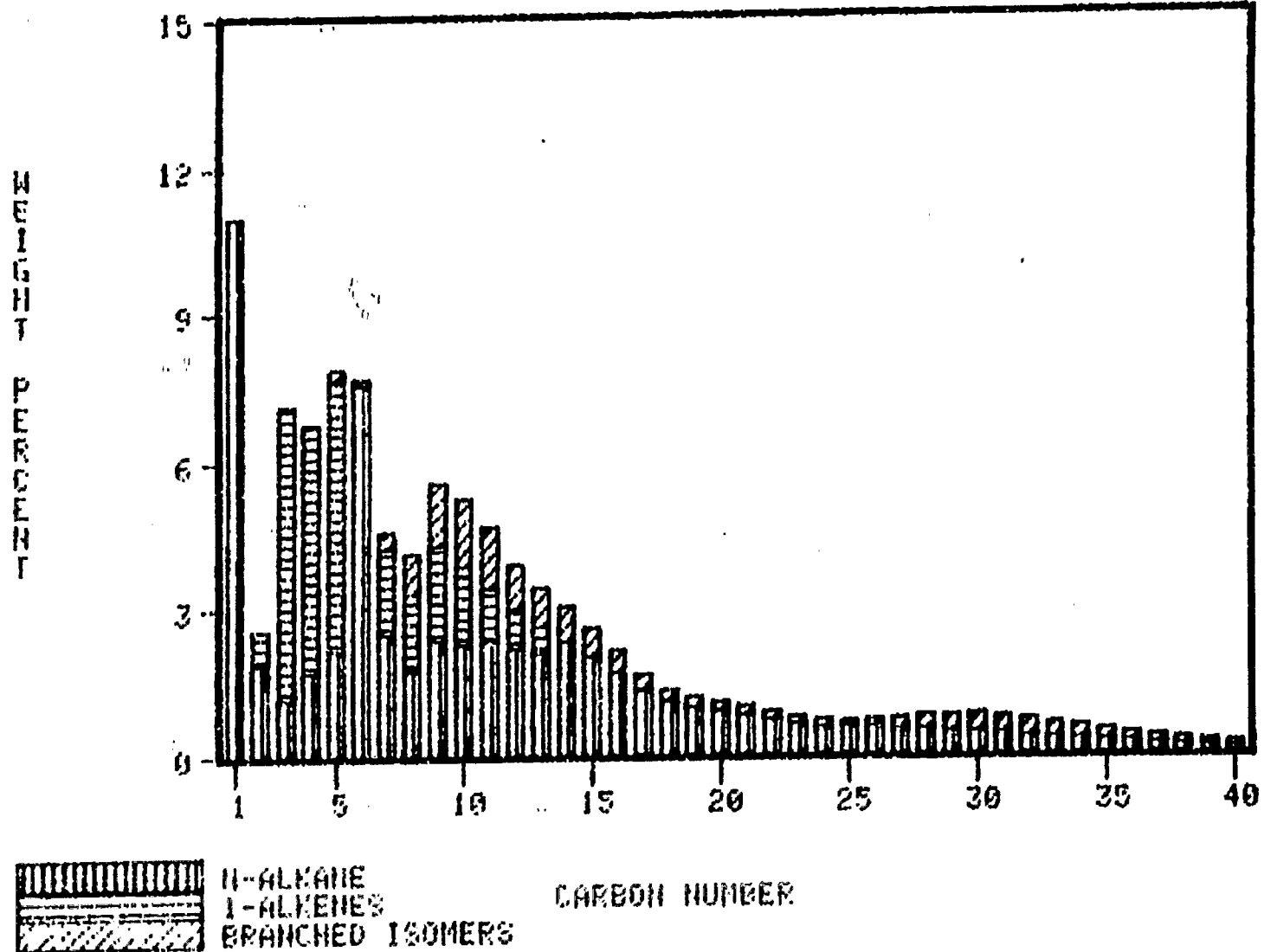




FIGURE 9

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-21

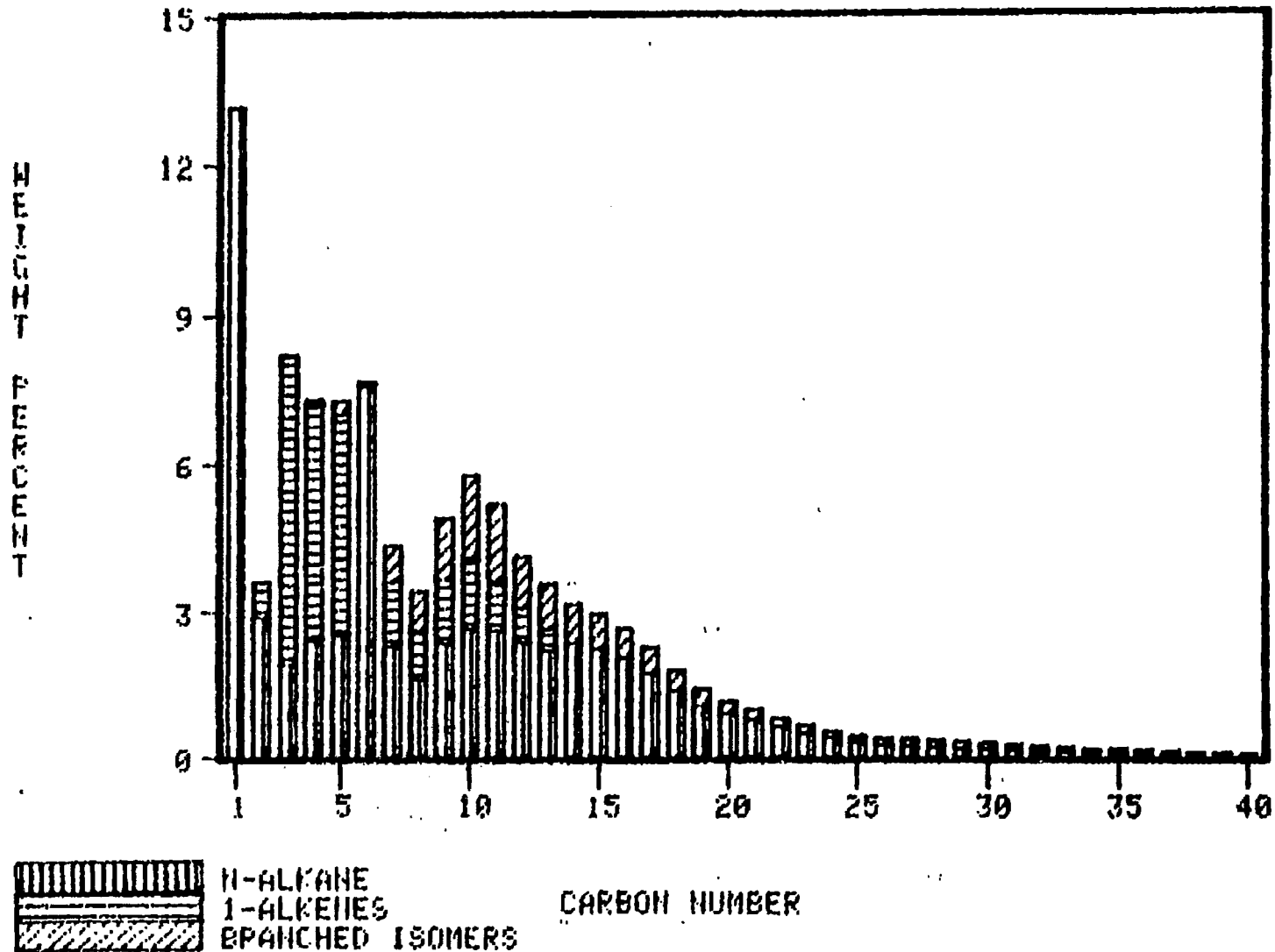


FIGURE 10

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-23

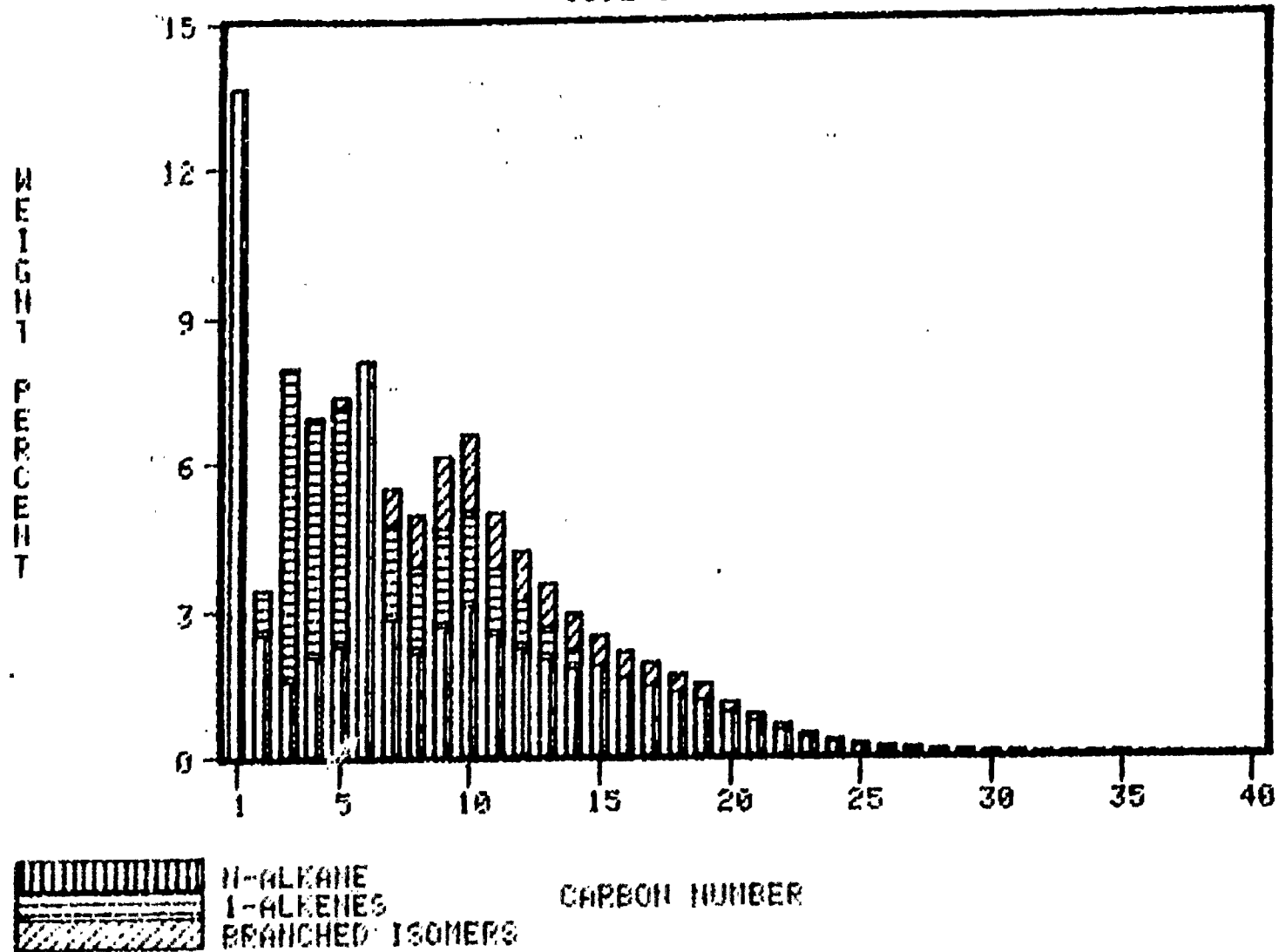


FIGURE 11

HYDROCARBON WEIGHT DISTRIBUTION

8862-88-49-27

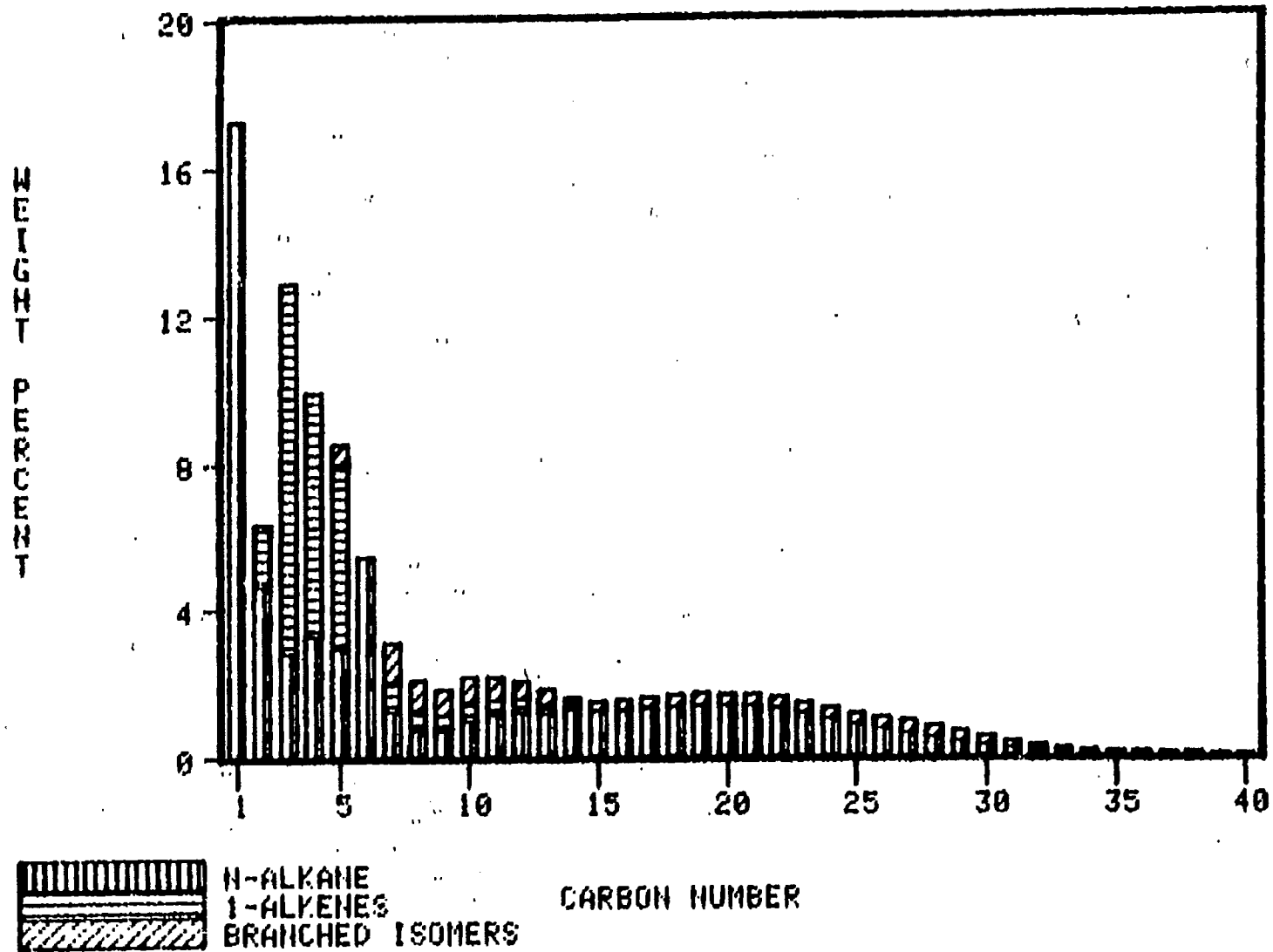


FIGURE 12

HYDROCARBON WEIGHT DISTRIBUTION

8862-80-49-30

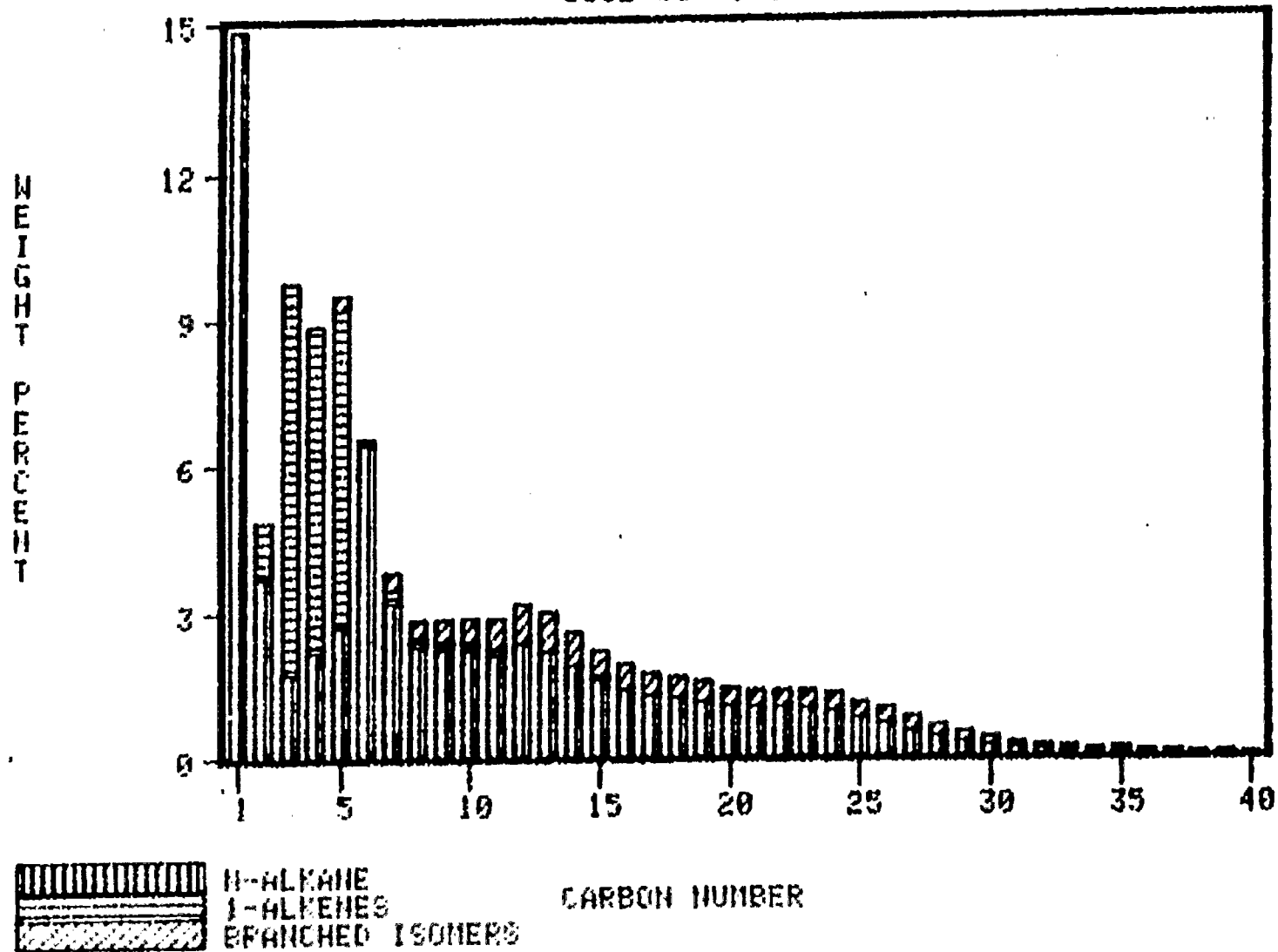


FIGURE 13

HYDROCARBON WEIGHT DISTRIBUTION

9093-10-58-2

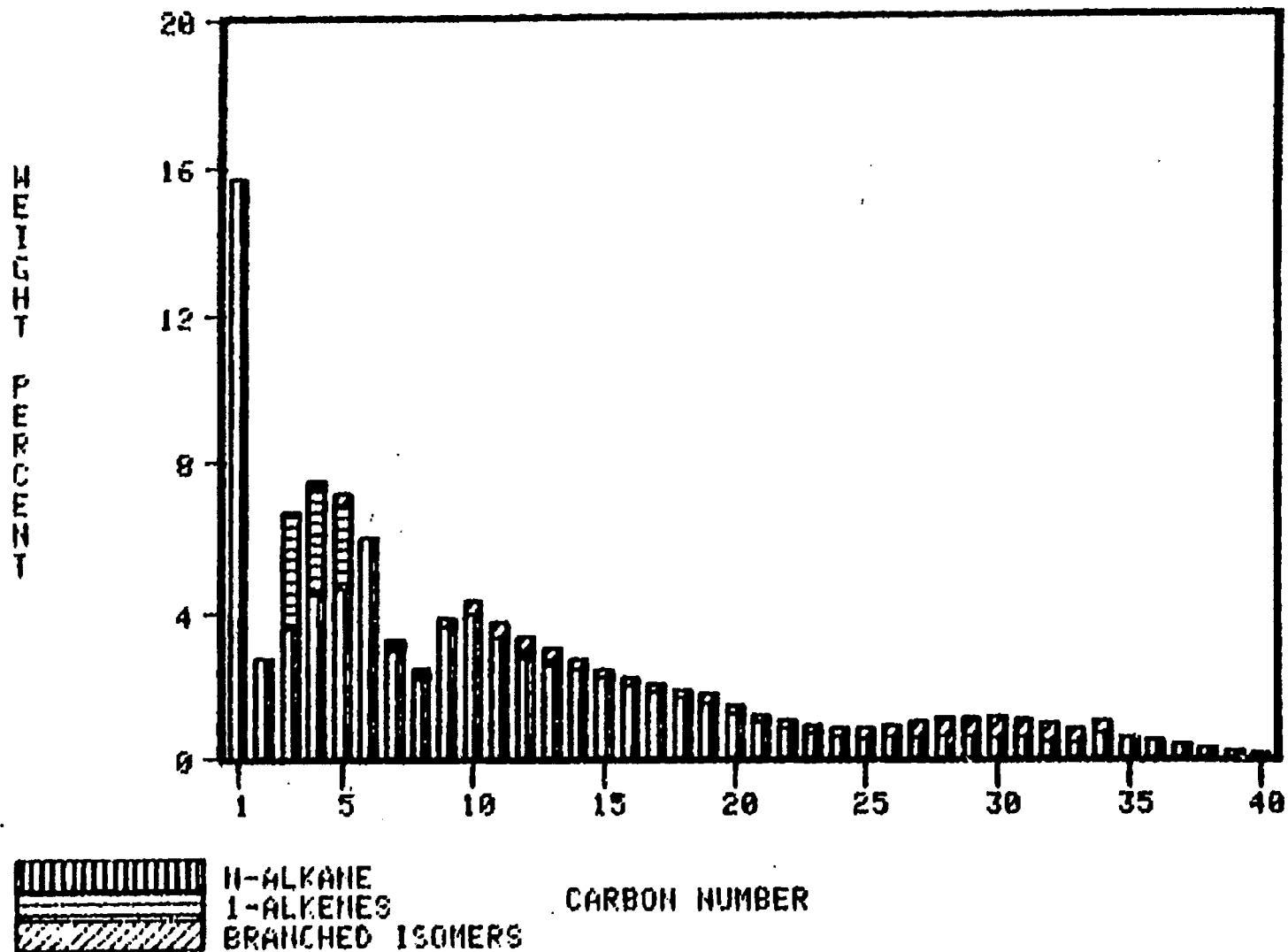


FIGURE 14

HYDROCARBON WEIGHT DISTRIBUTION

9093-10-58-4

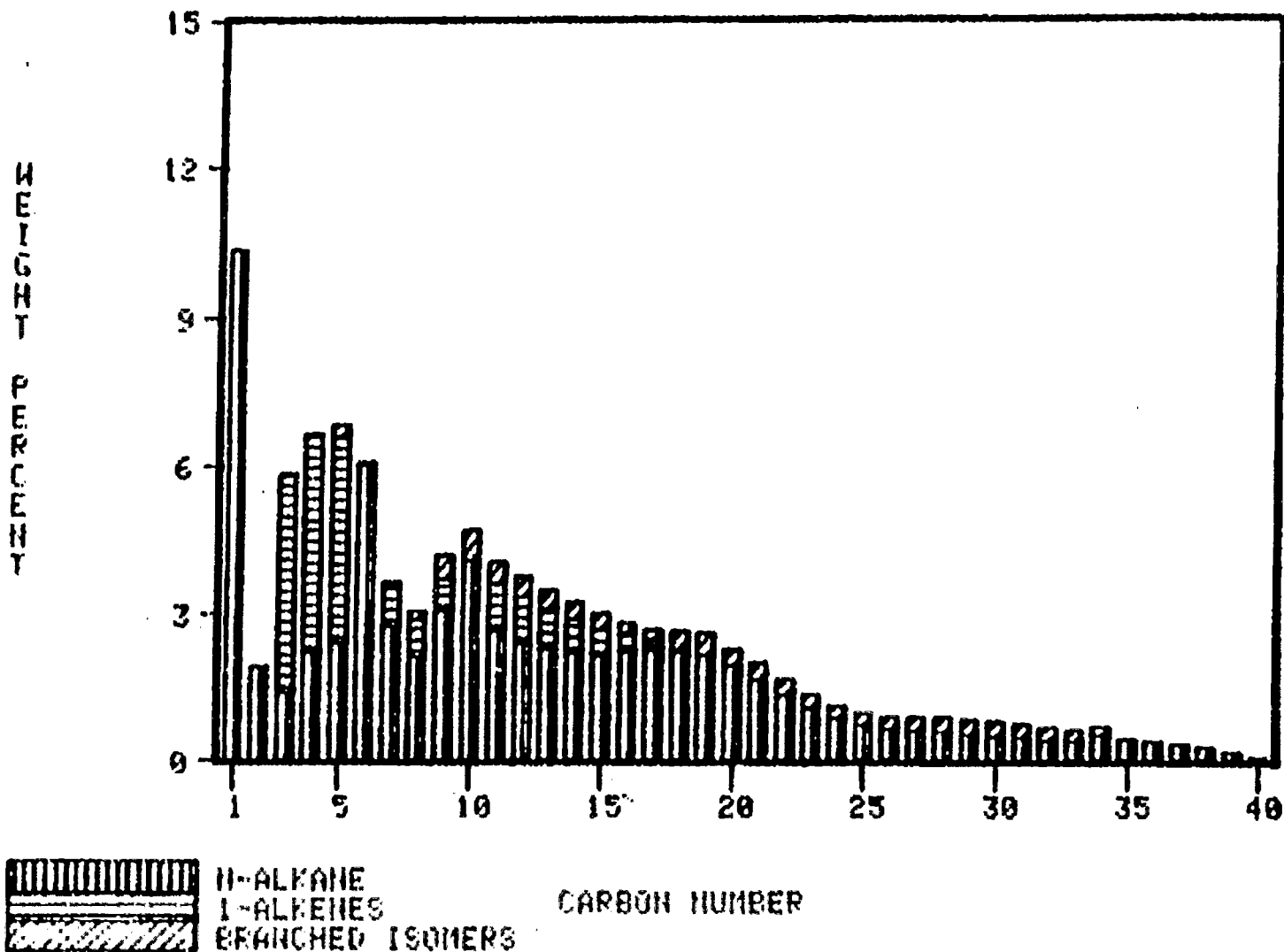


FIGURE 15

HYDROCARBON WEIGHT DISTRIBUTION

9093-10-58-7

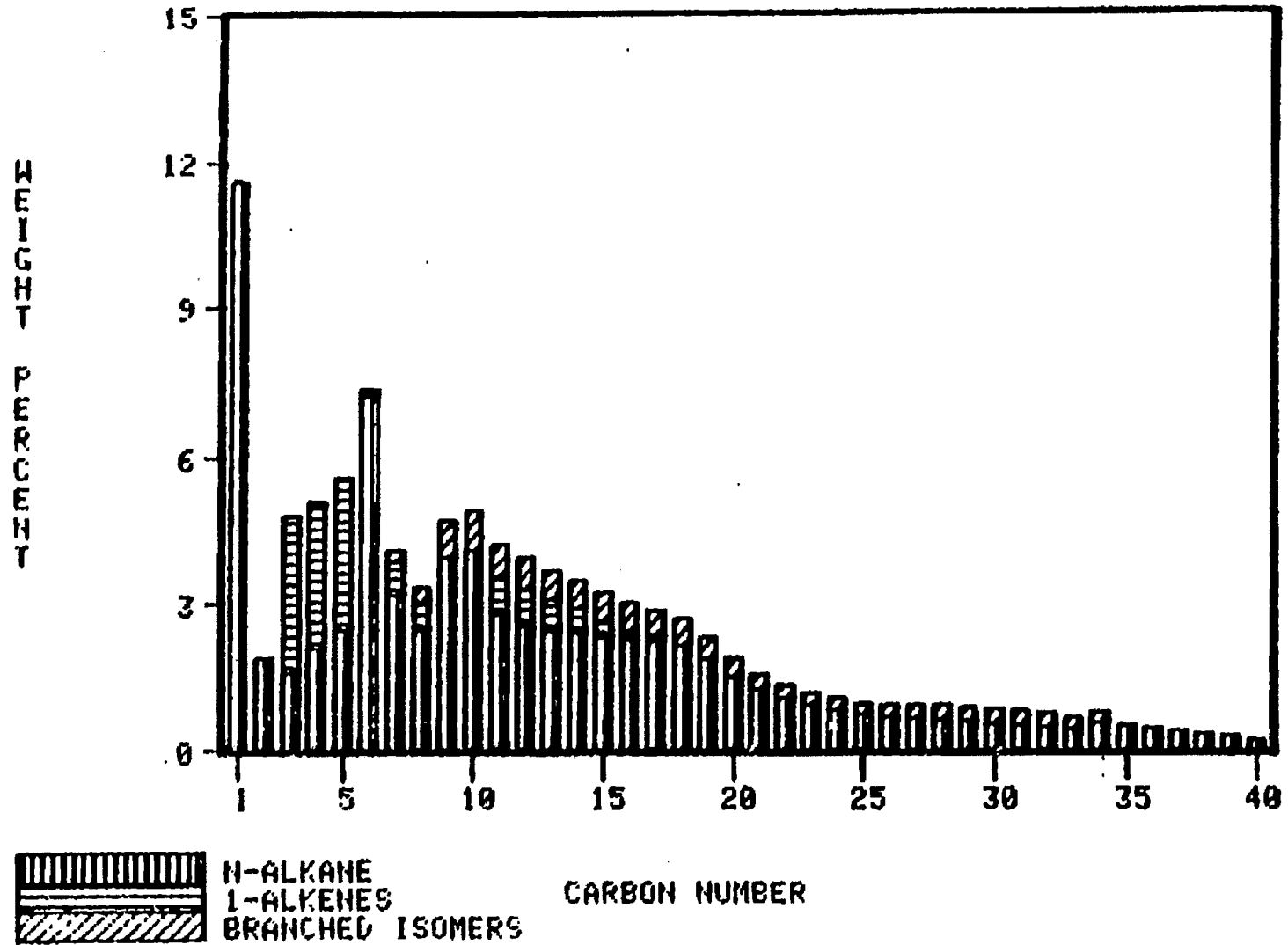


FIGURE 16

HYDROCARBON WEIGHT DISTRIBUTION

9093-10-50-10

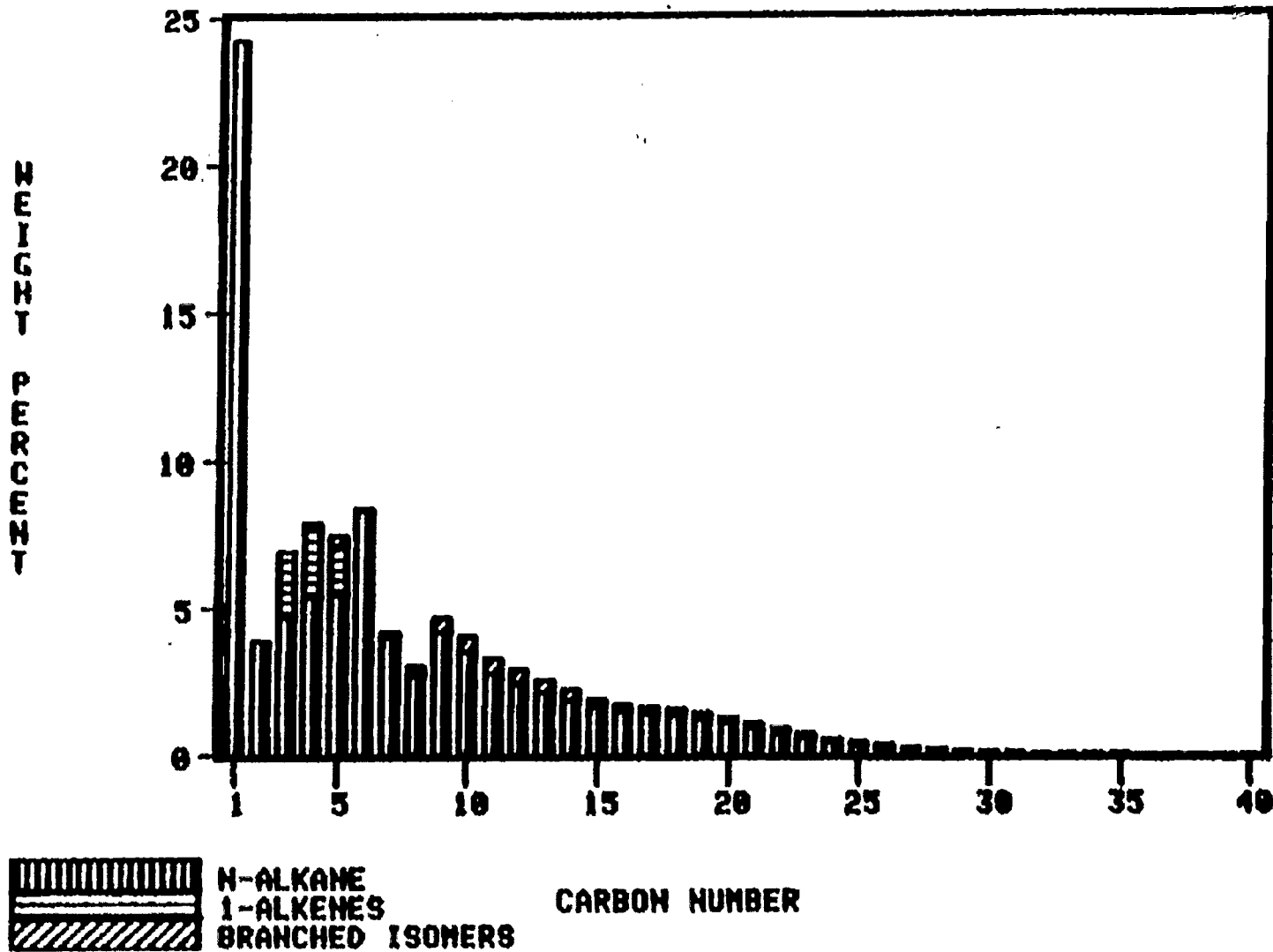




FIGURE 17

HYDROCARBON WEIGHT DISTRIBUTION

9093-10-50-12

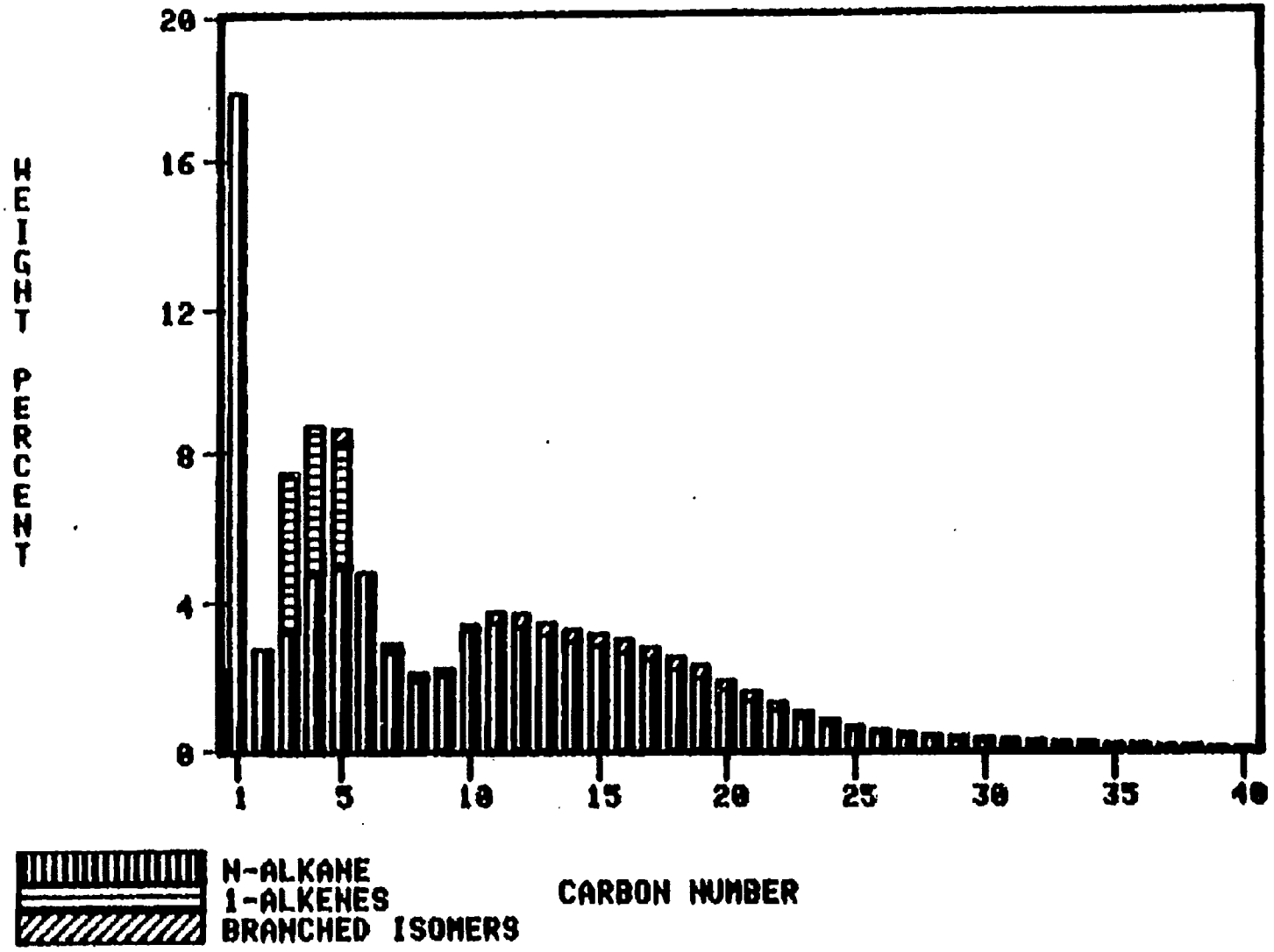


FIGURE 18

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-94

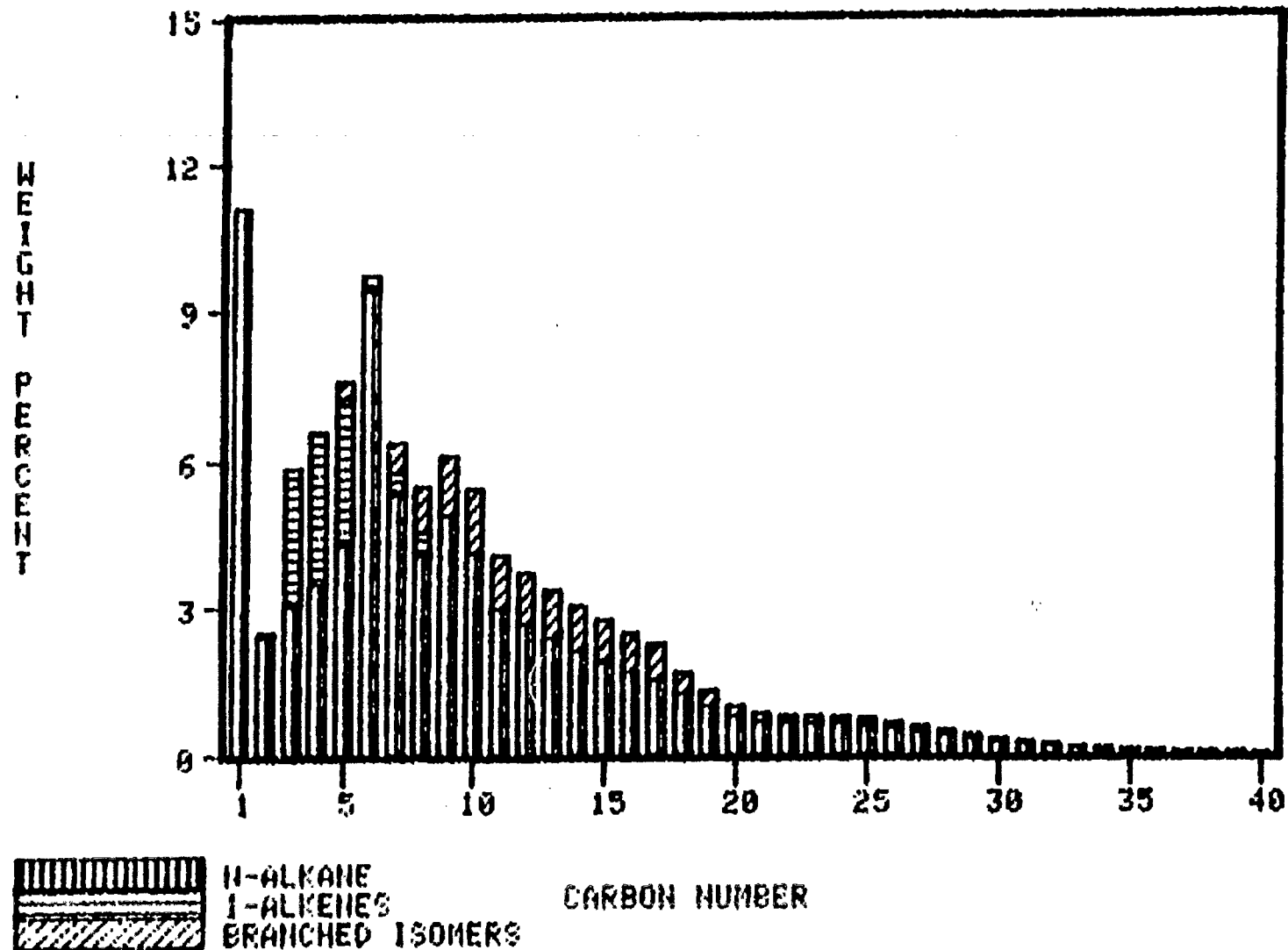


FIGURE 19

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-98

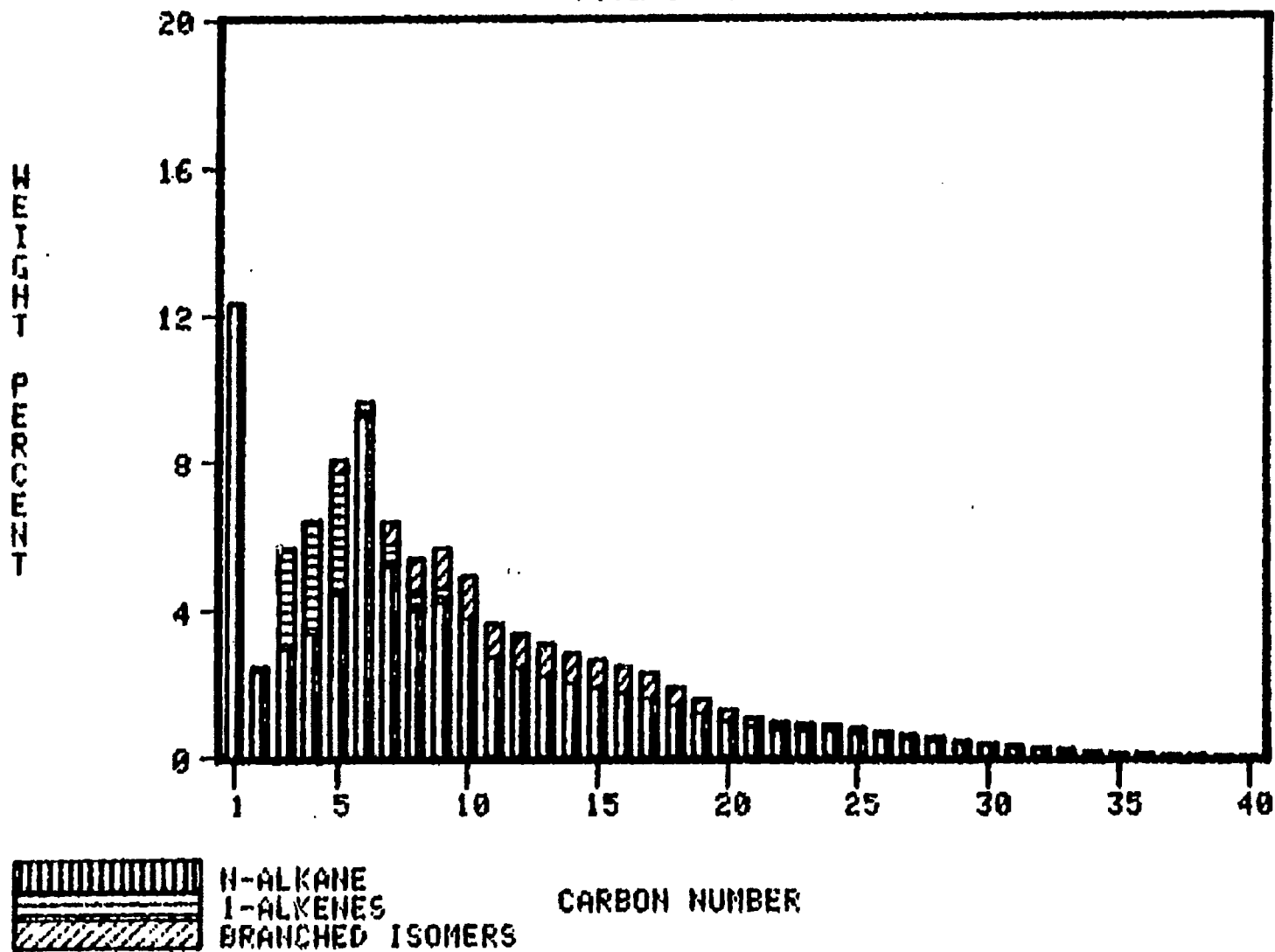


FIGURE 20

## HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-100

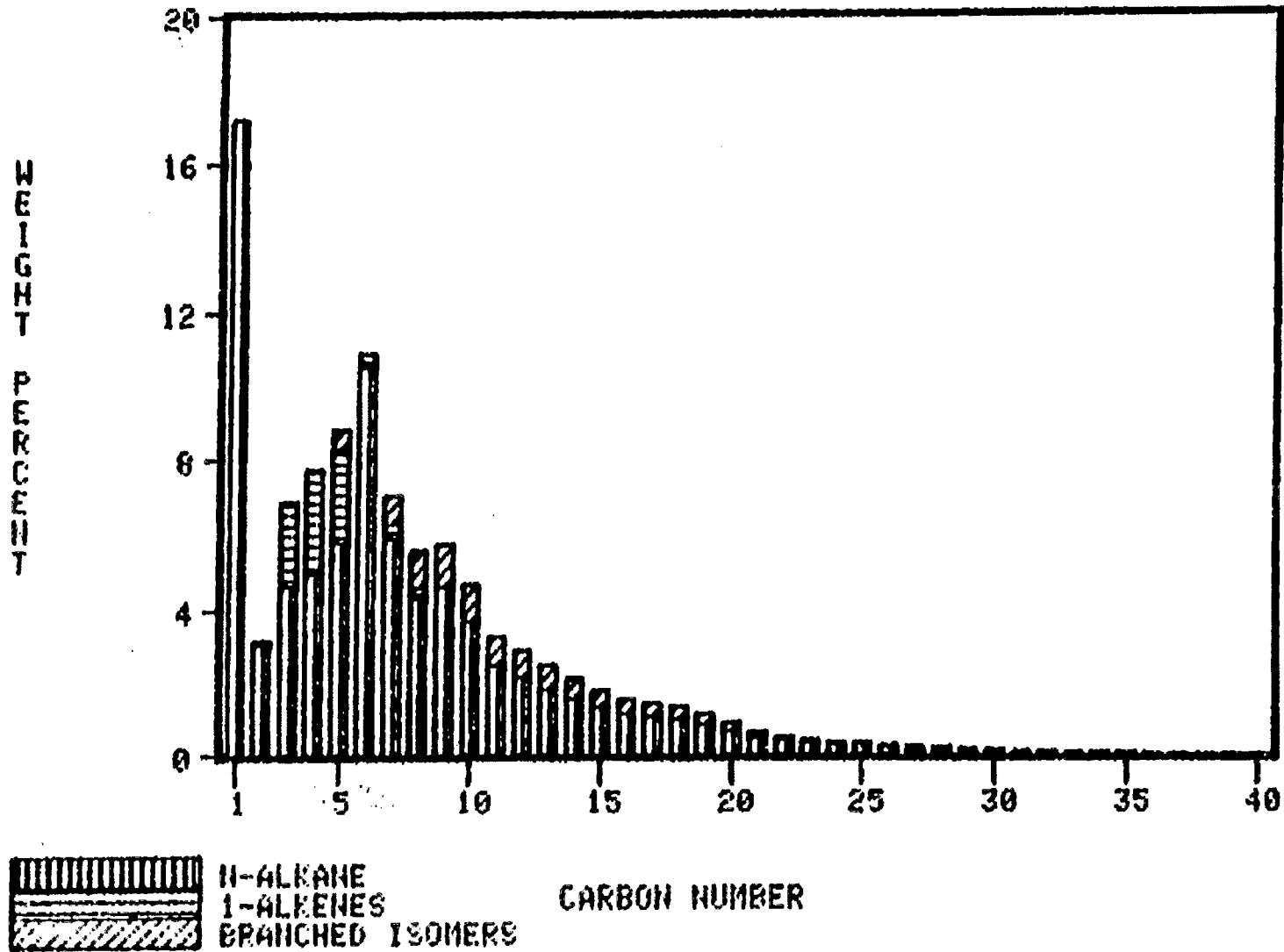
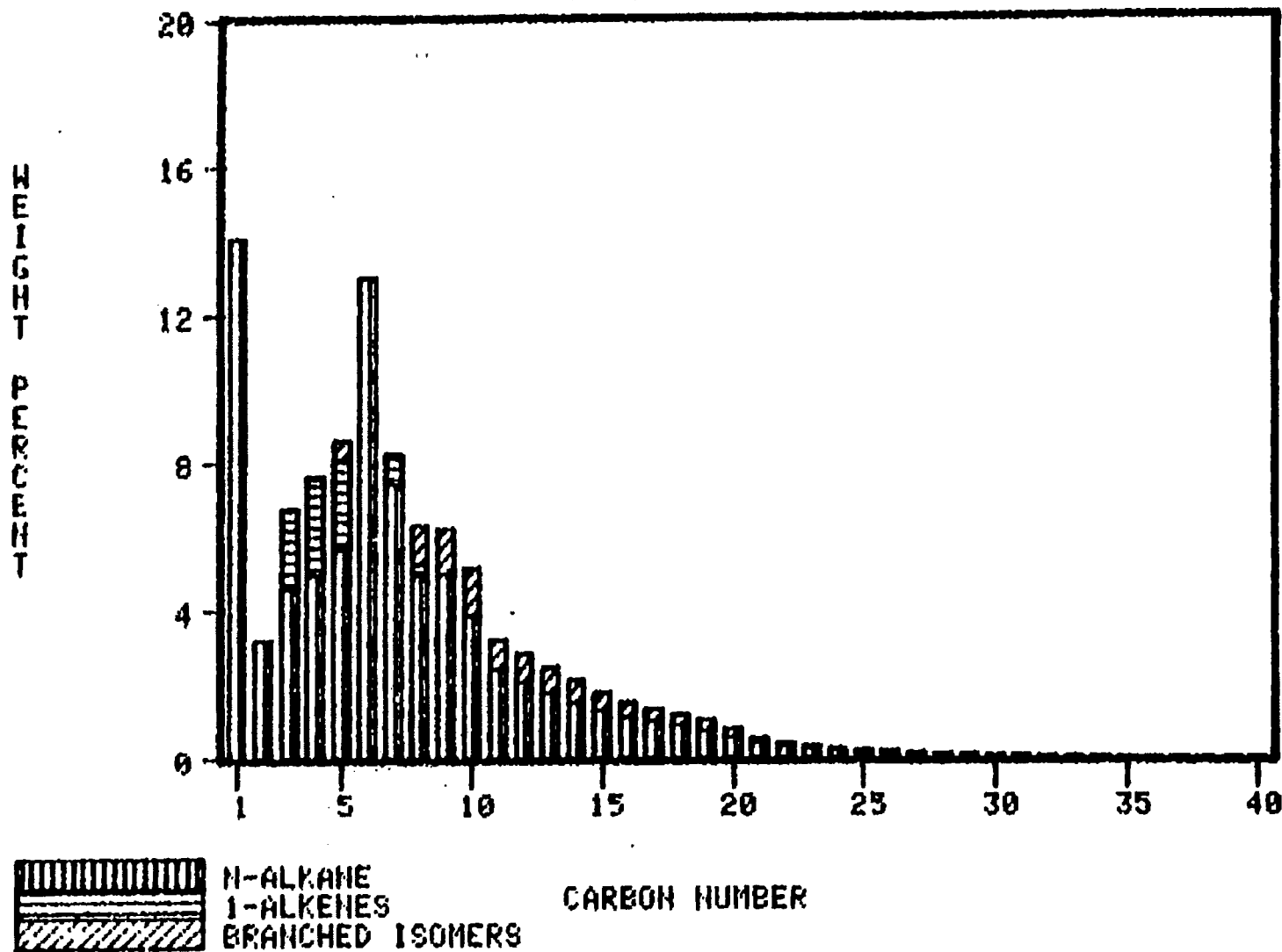


FIGURE 21

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-104



190

FIGURE 22

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-107

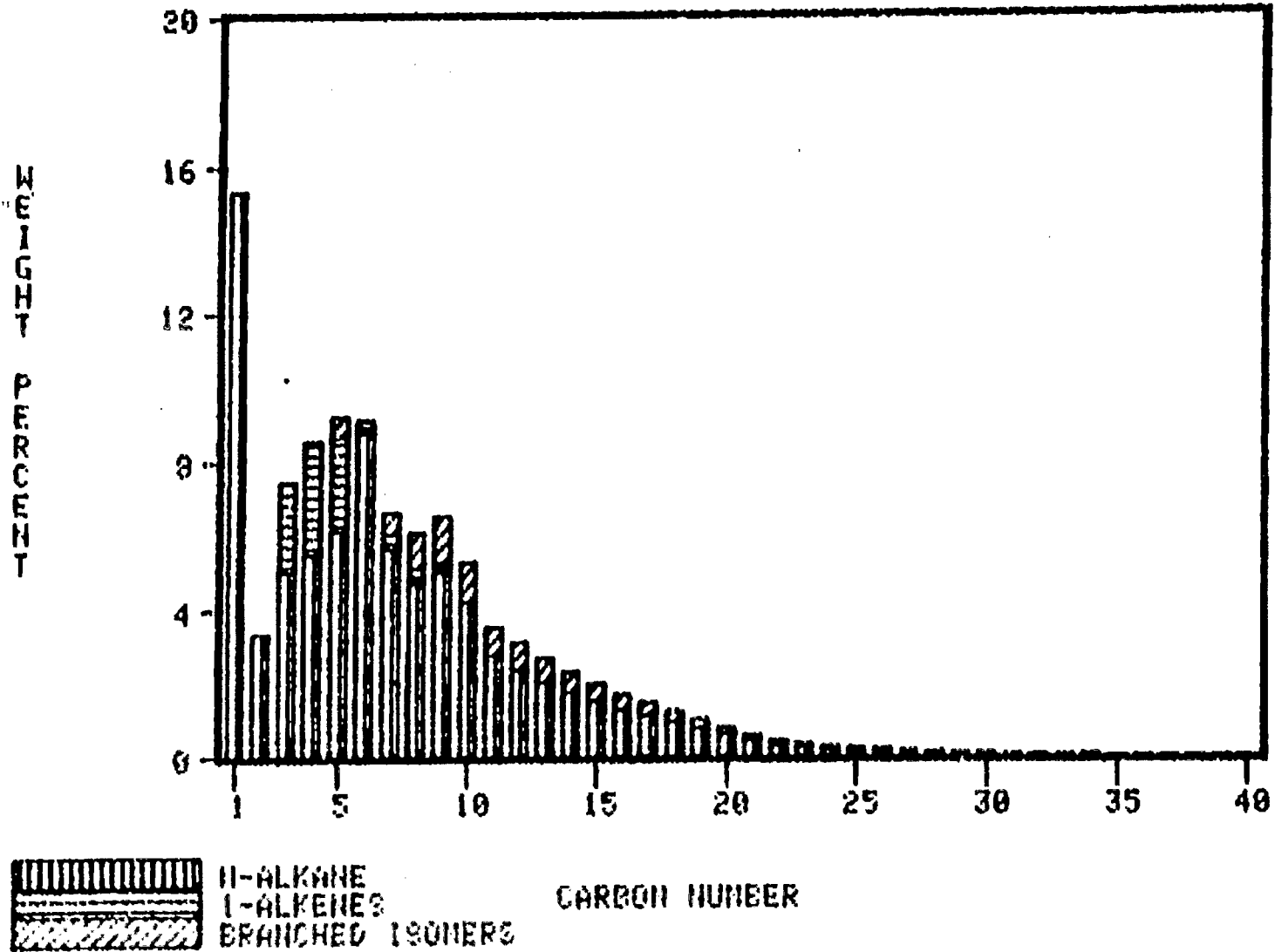


FIGURE 23

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-109

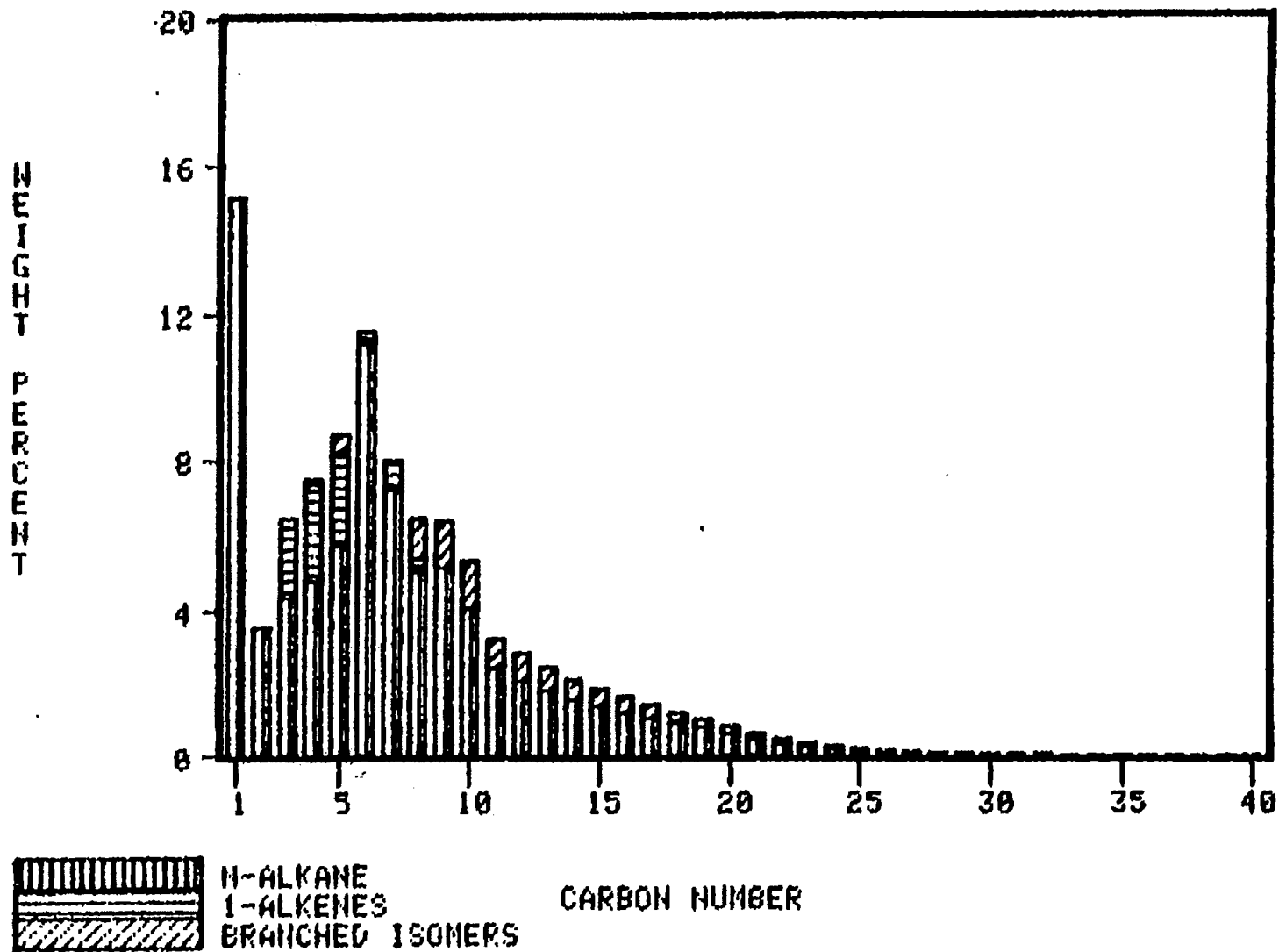


FIGURE 24

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-112

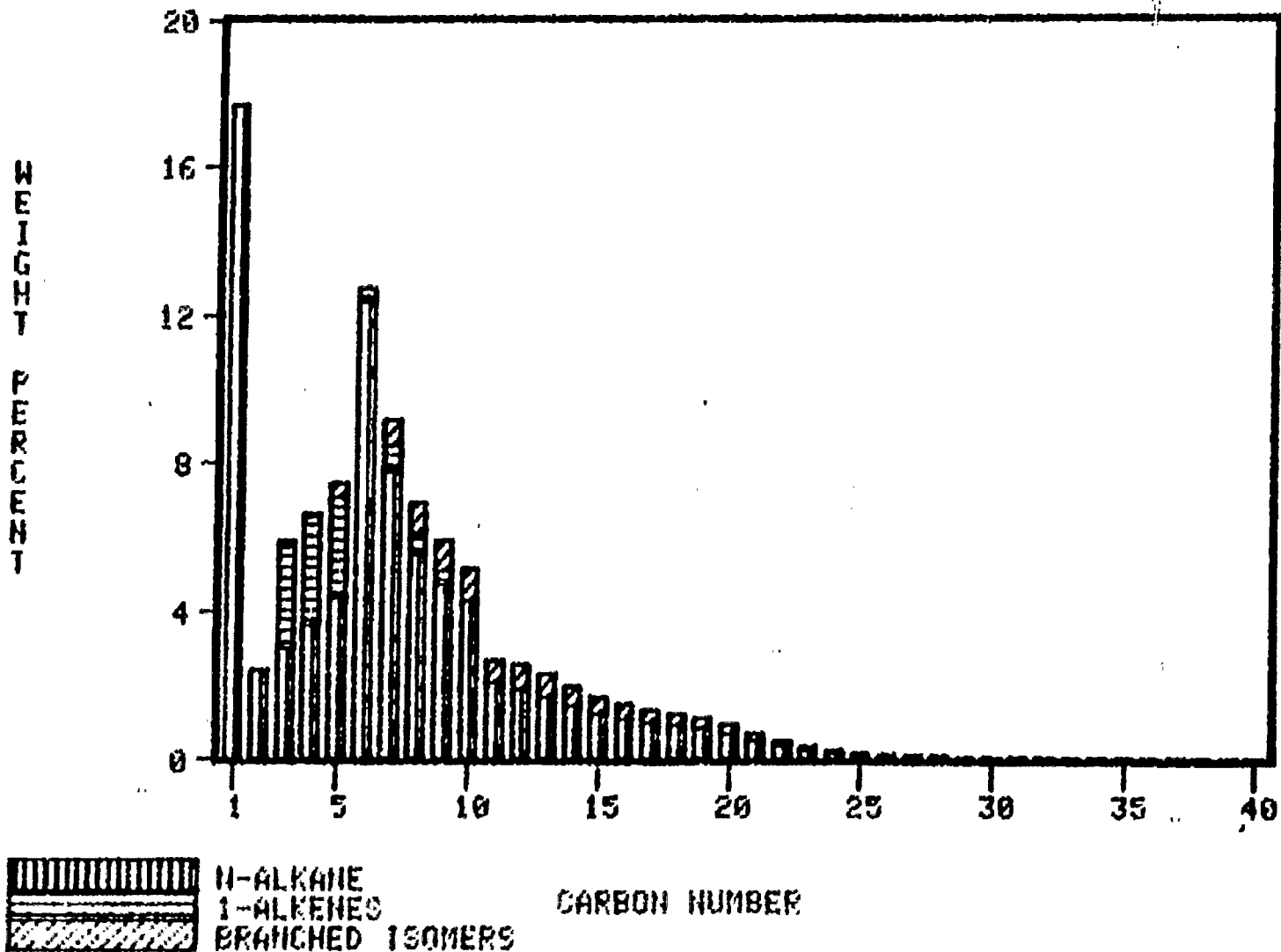




FIGURE 25

HYDROCARBON WEIGHT DISTRIBUTION

8852-1-31-115

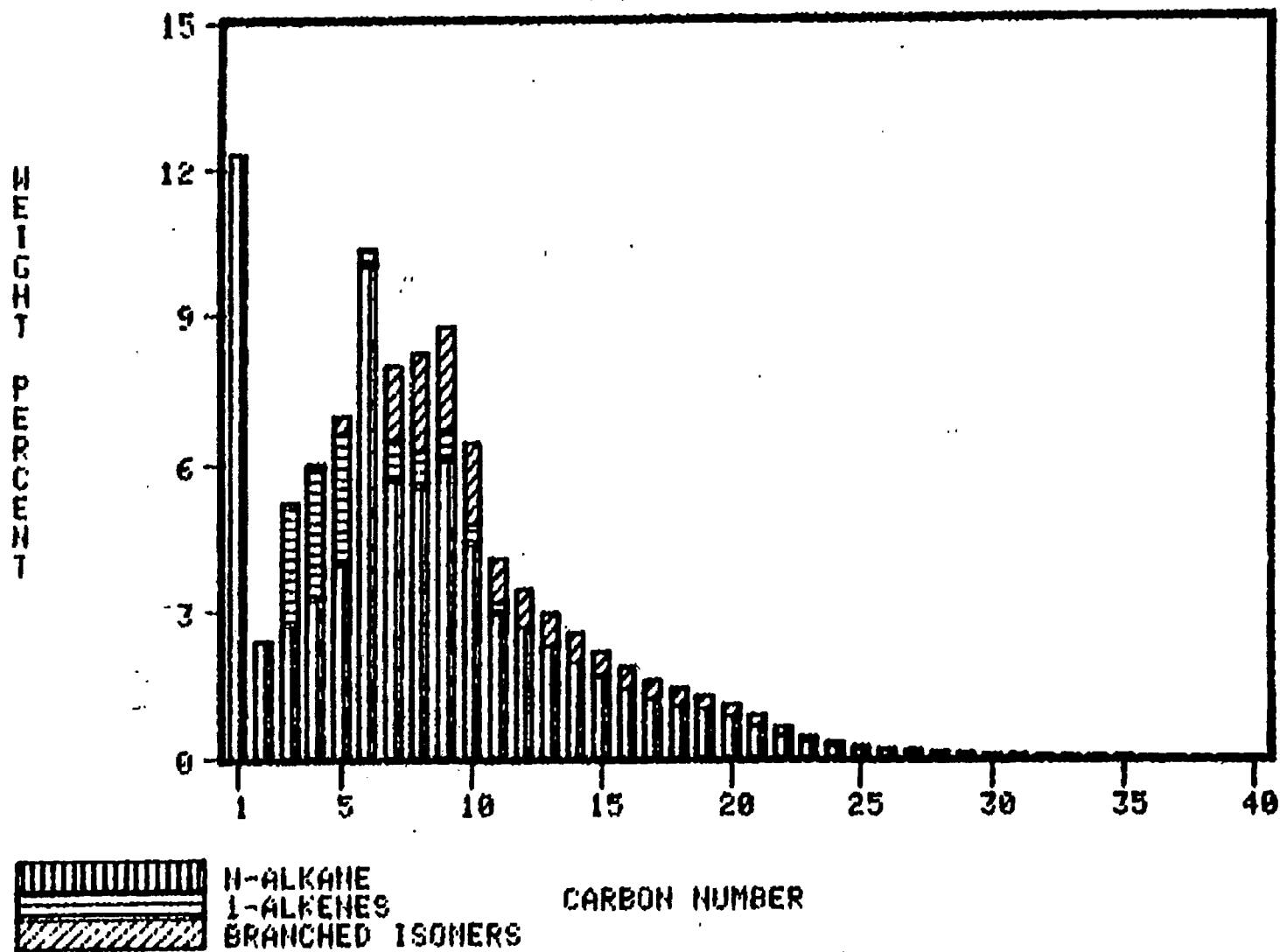


FIGURE 26

HYDROCARBON WEIGHT DISTRIBUTION

0062-1-31-110

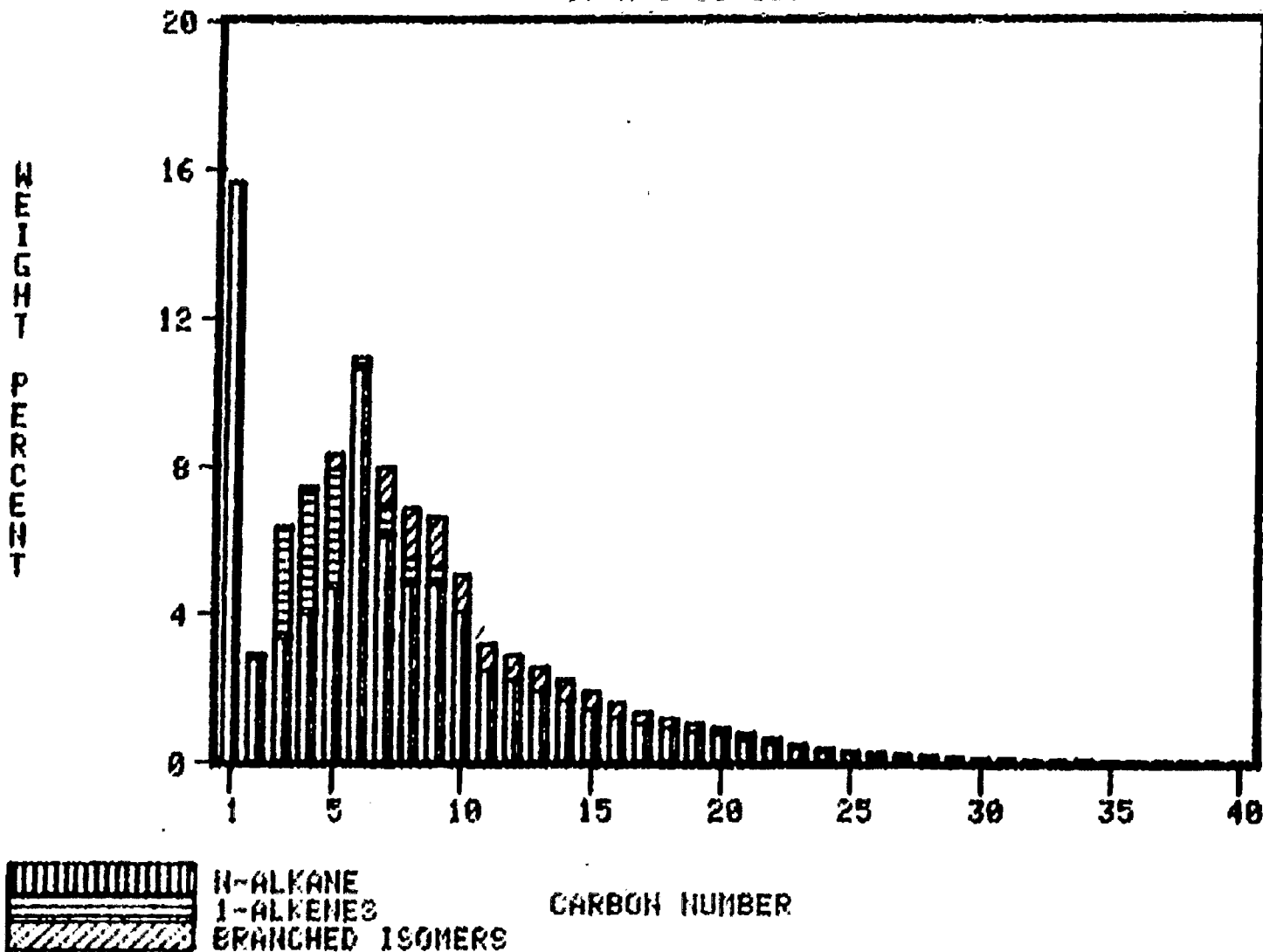


FIGURE 27

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-121

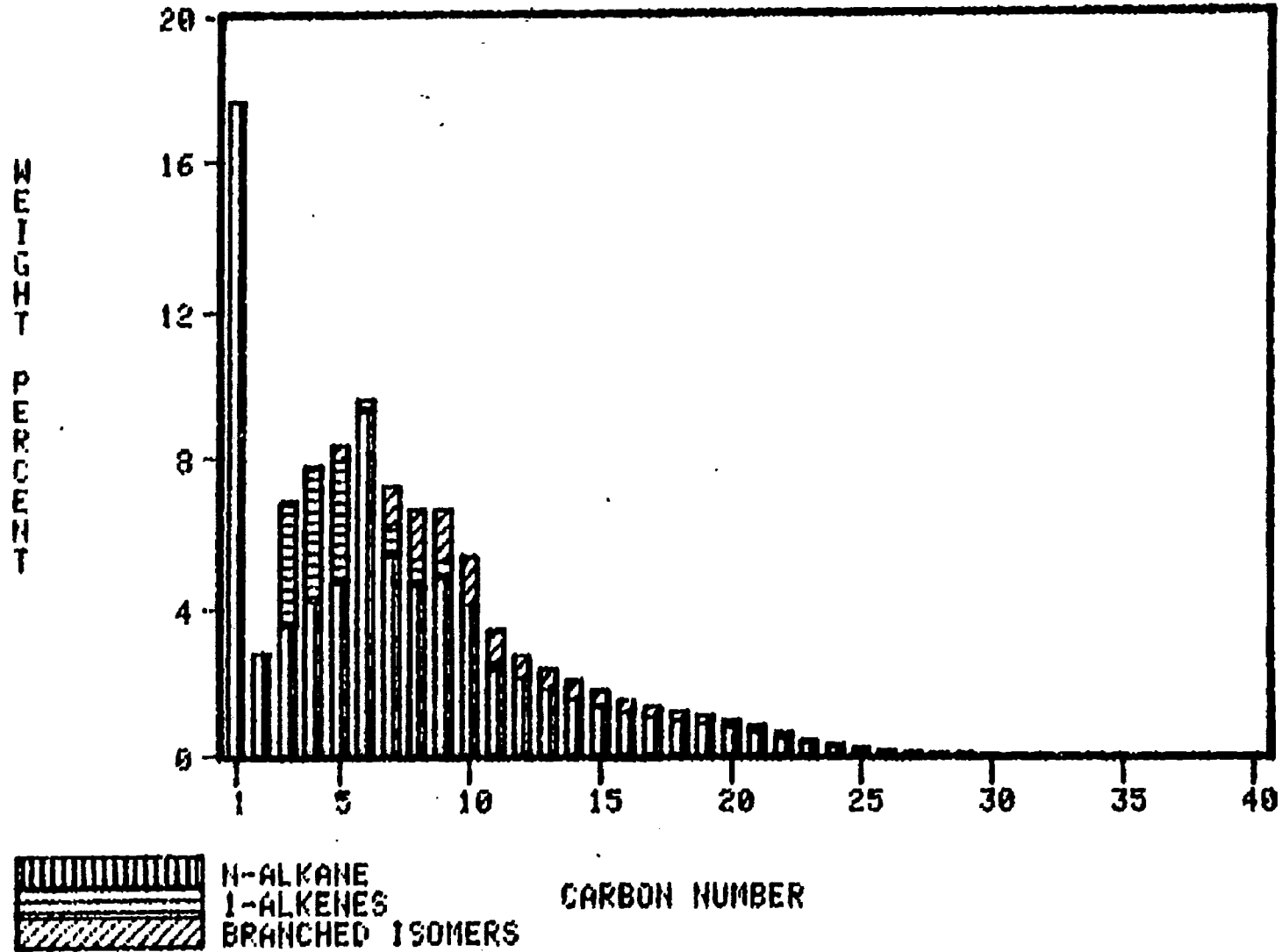


FIGURE 28

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-124

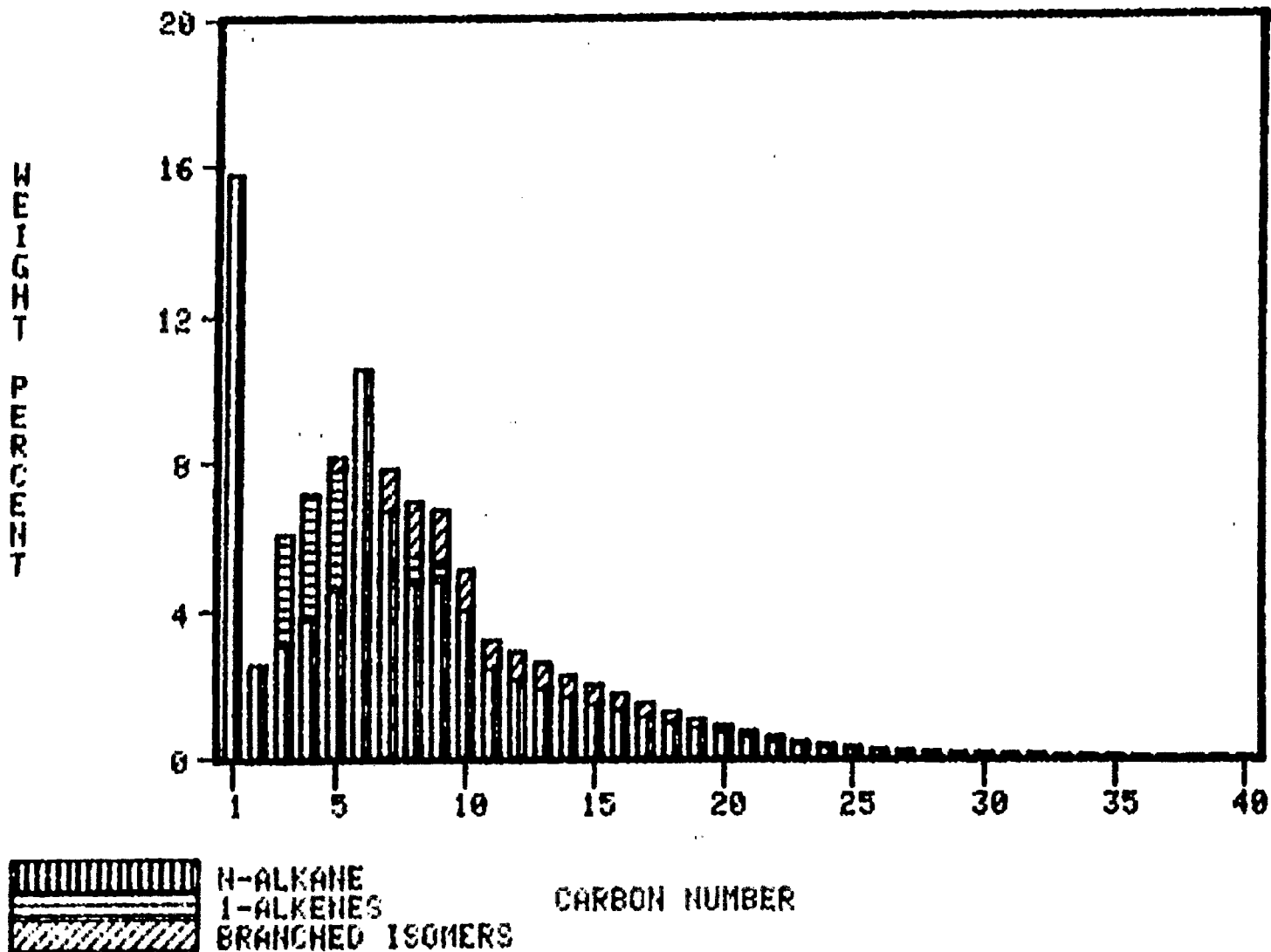
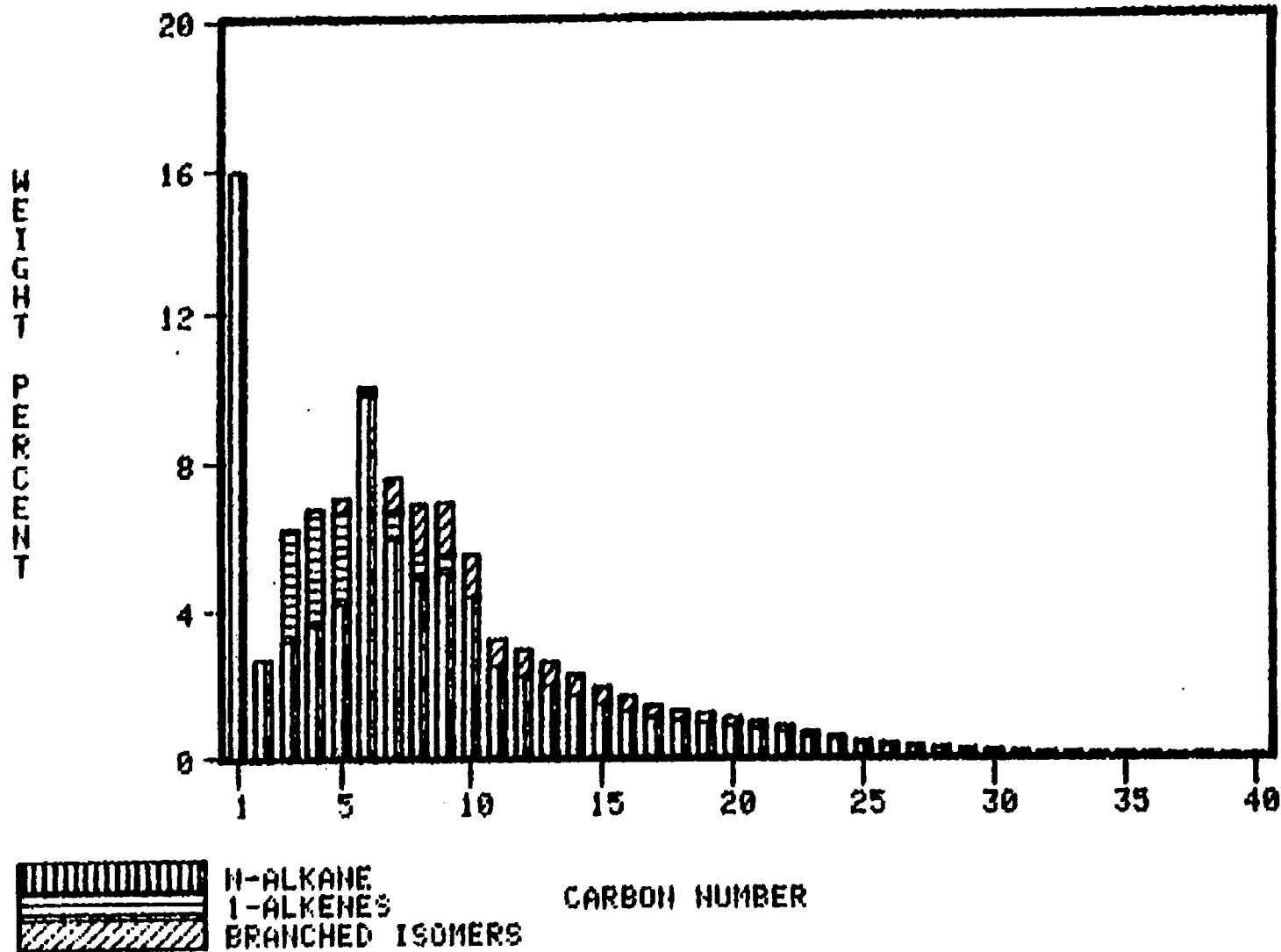


FIGURE 29

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-128



195

FIGURE 30

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-131

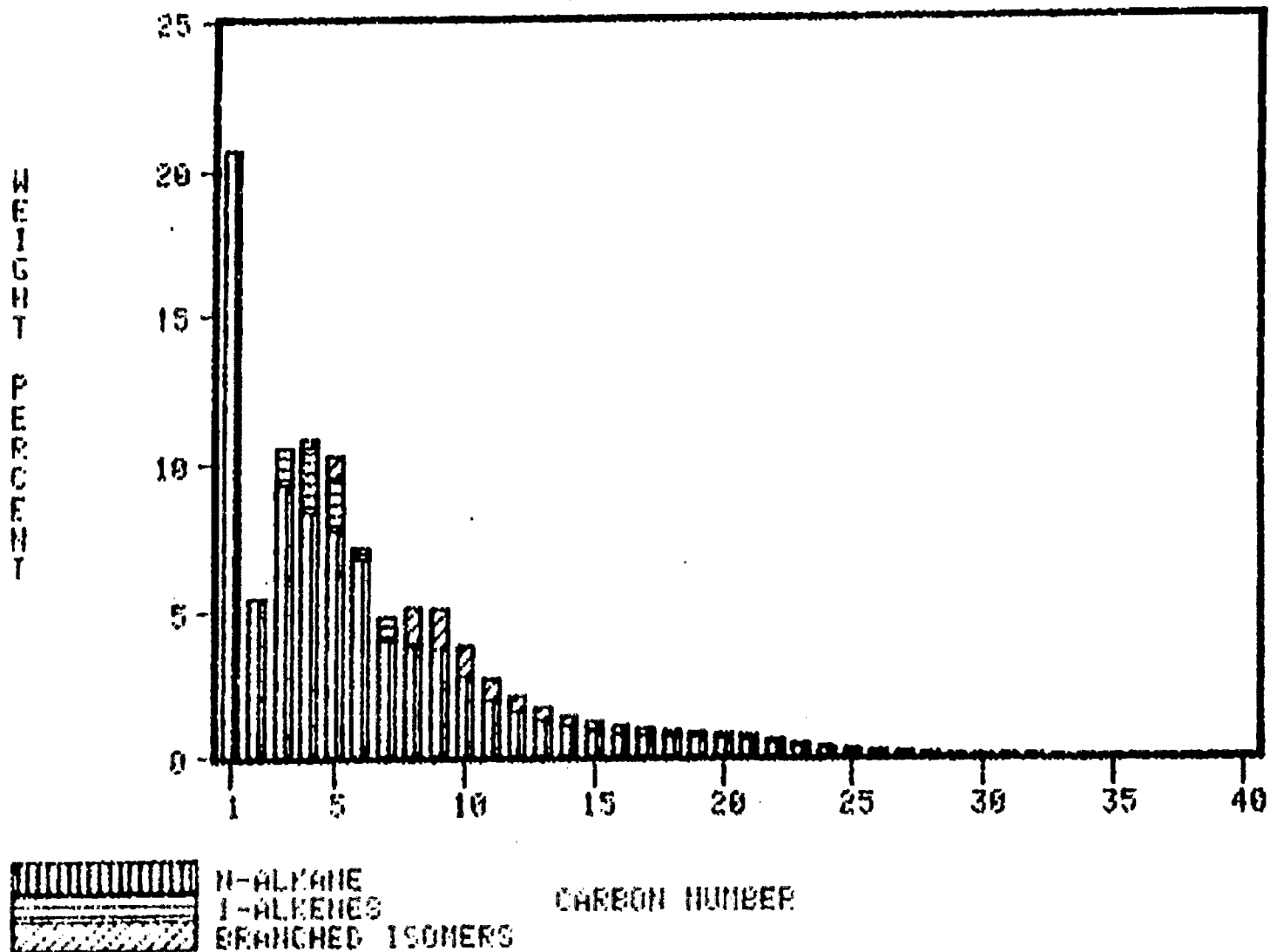


FIGURE 31

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-134

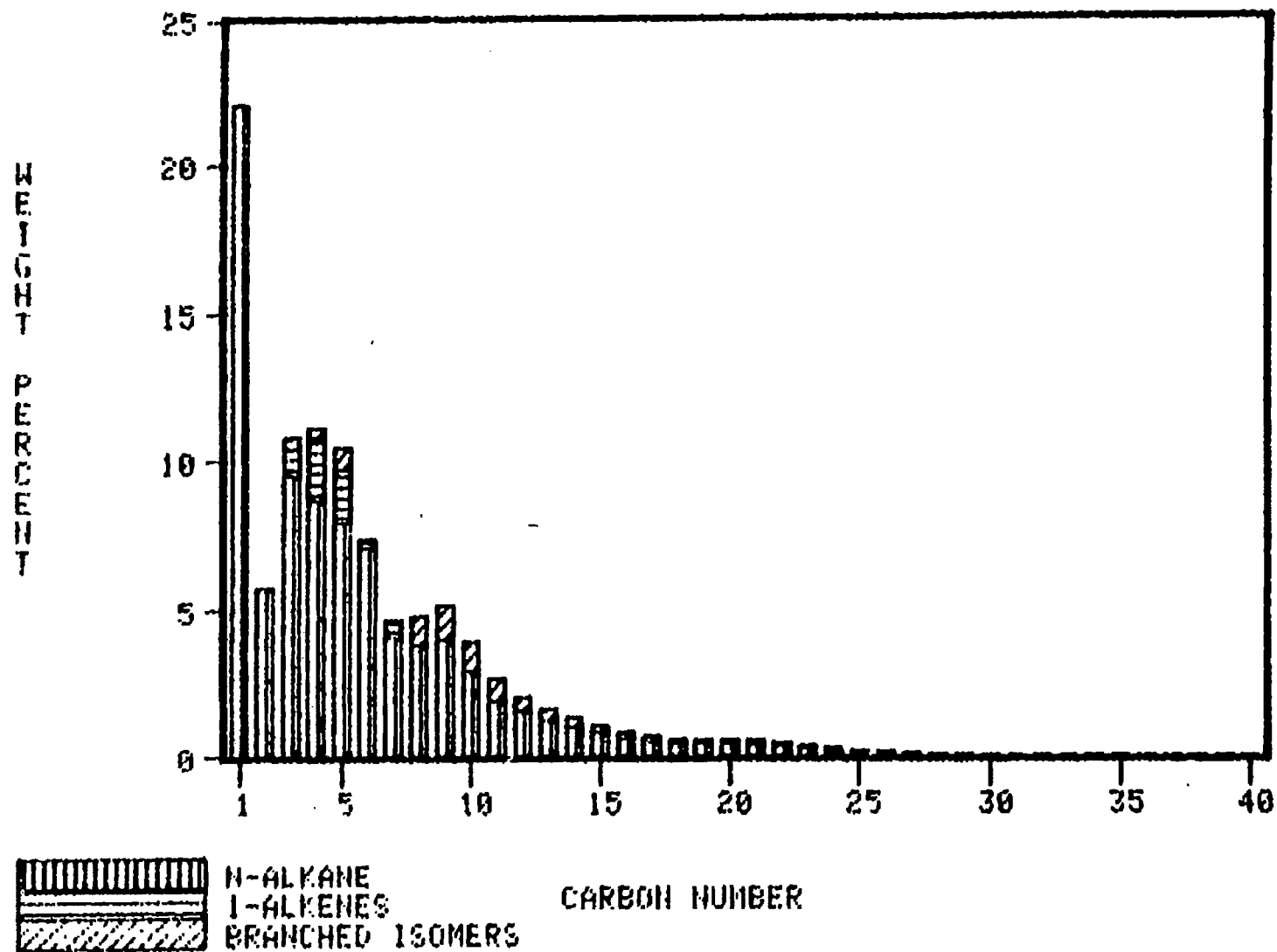
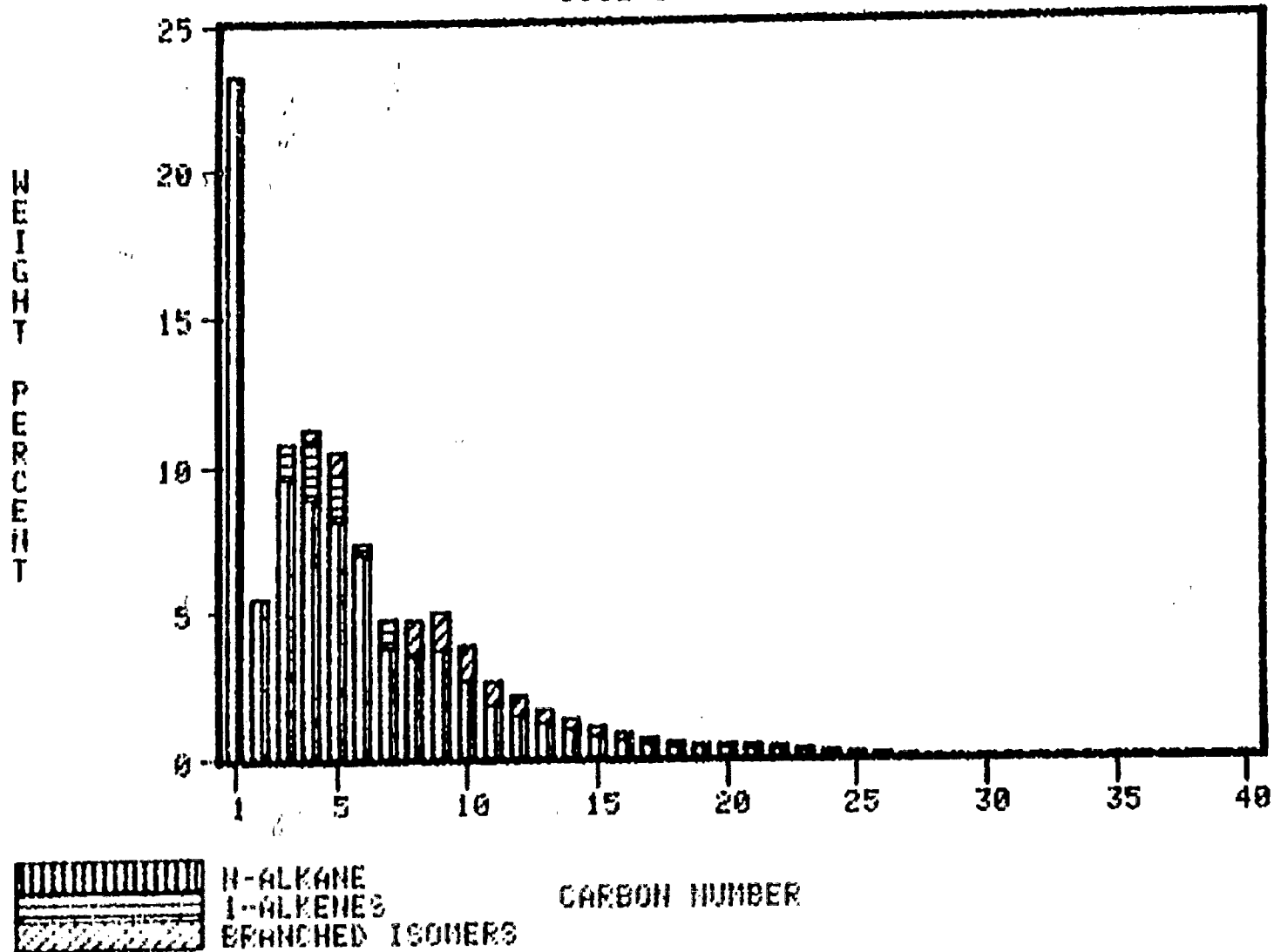


FIGURE 32

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-136



201



FIGURE 33

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-140

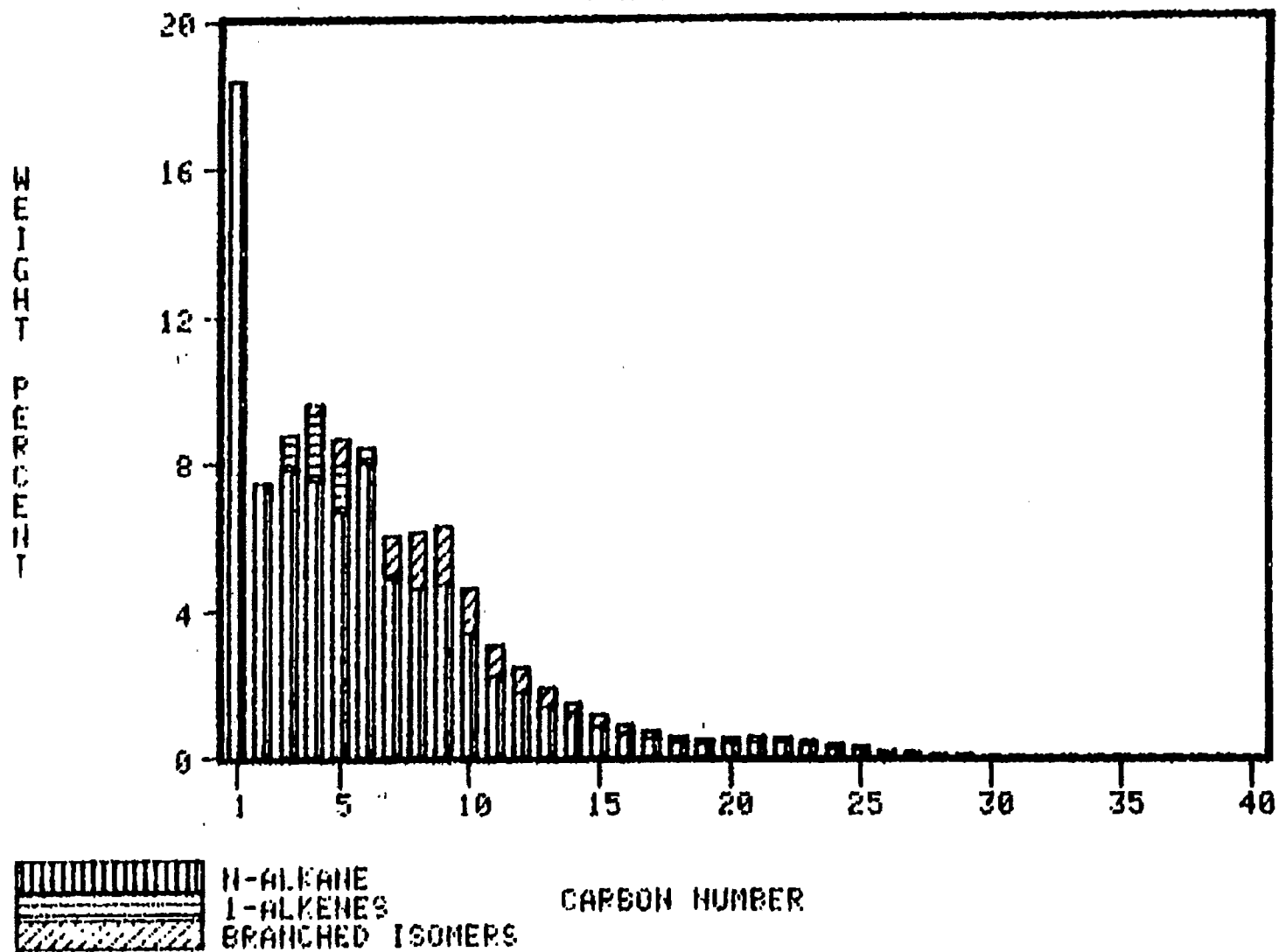


FIGURE 34

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-142

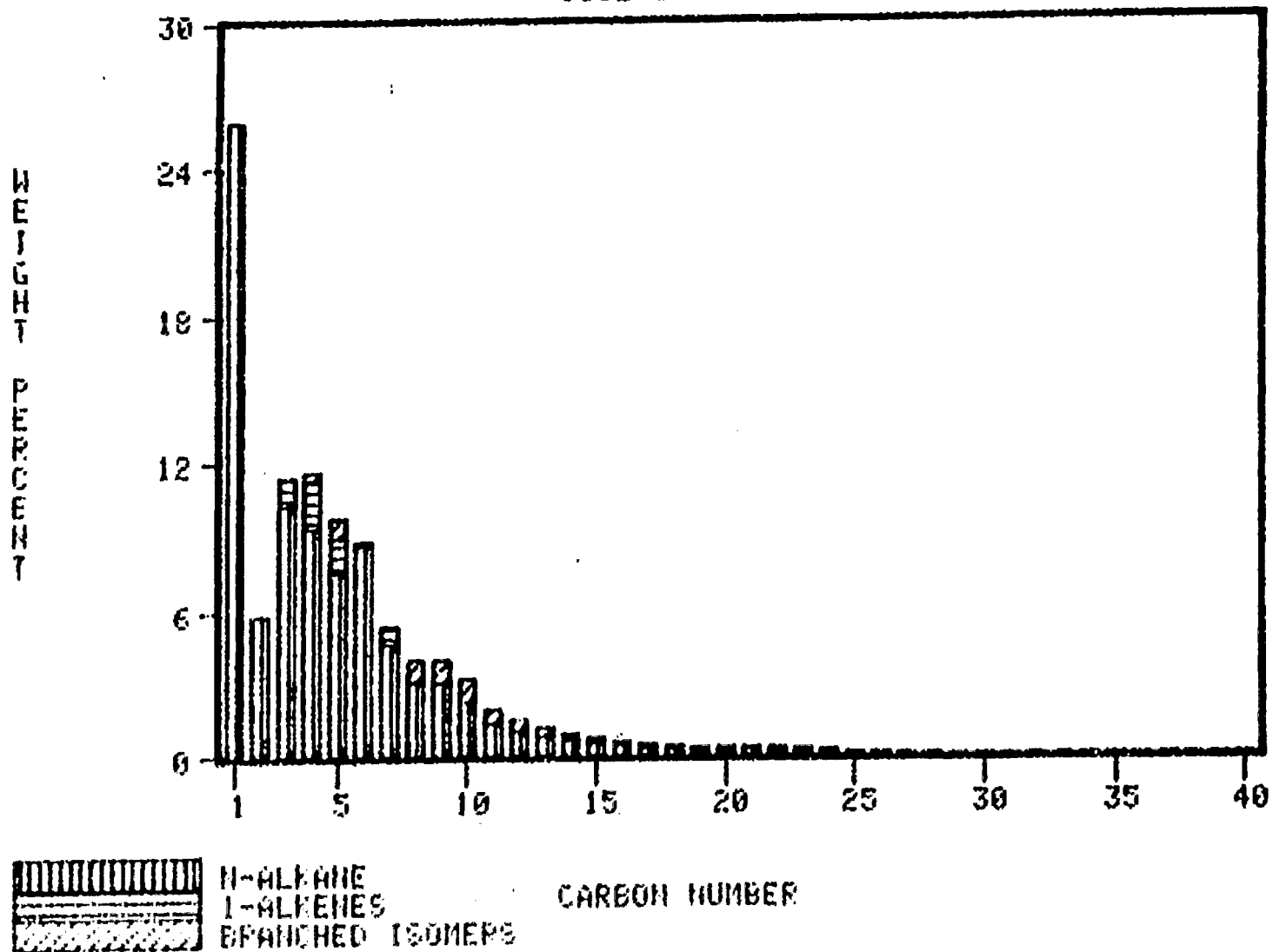


FIGURE 35

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-148

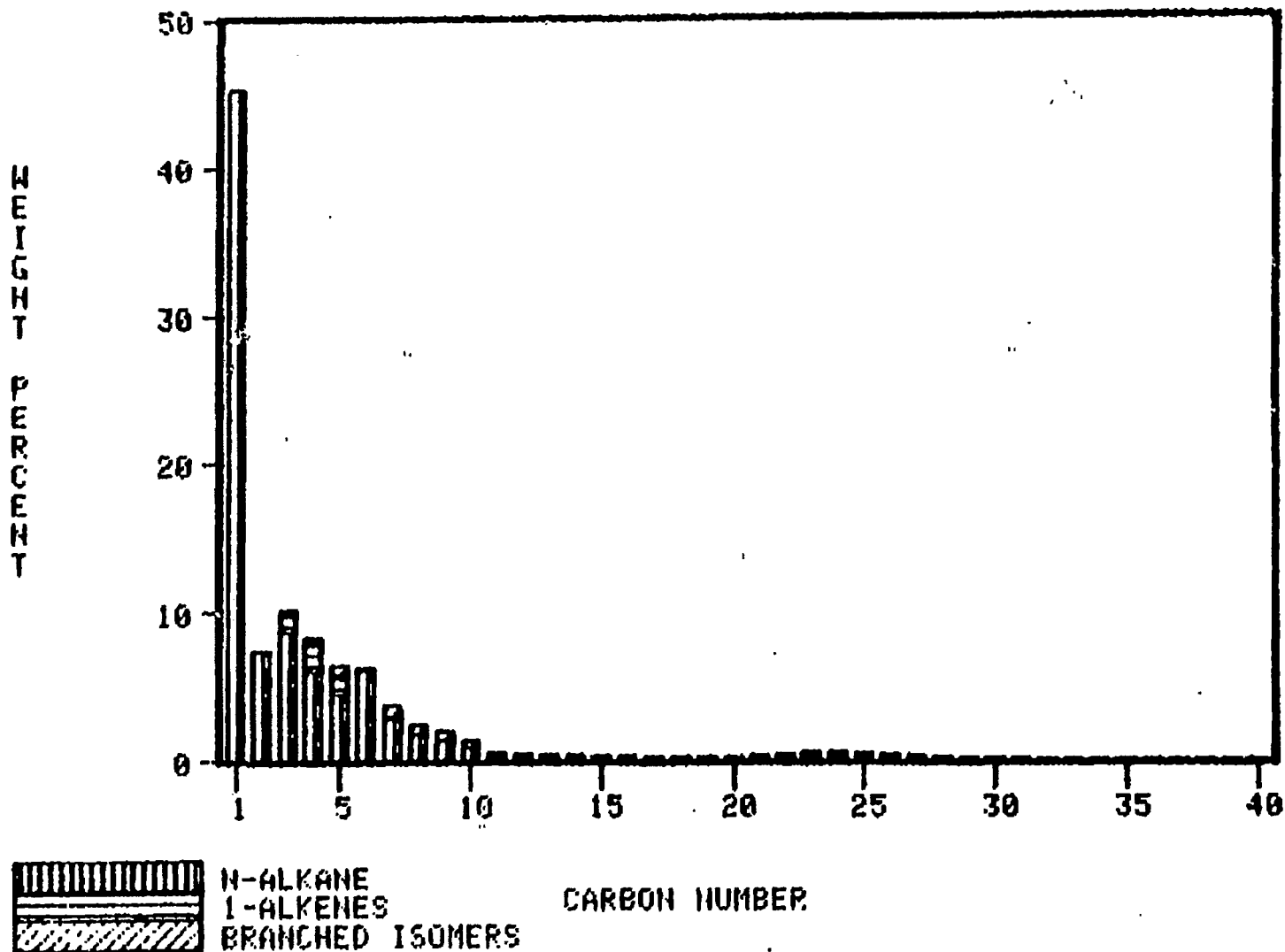


FIGURE 36

HYDROCARBON WEIGHT DISTRIBUTION

9862-1-31-151

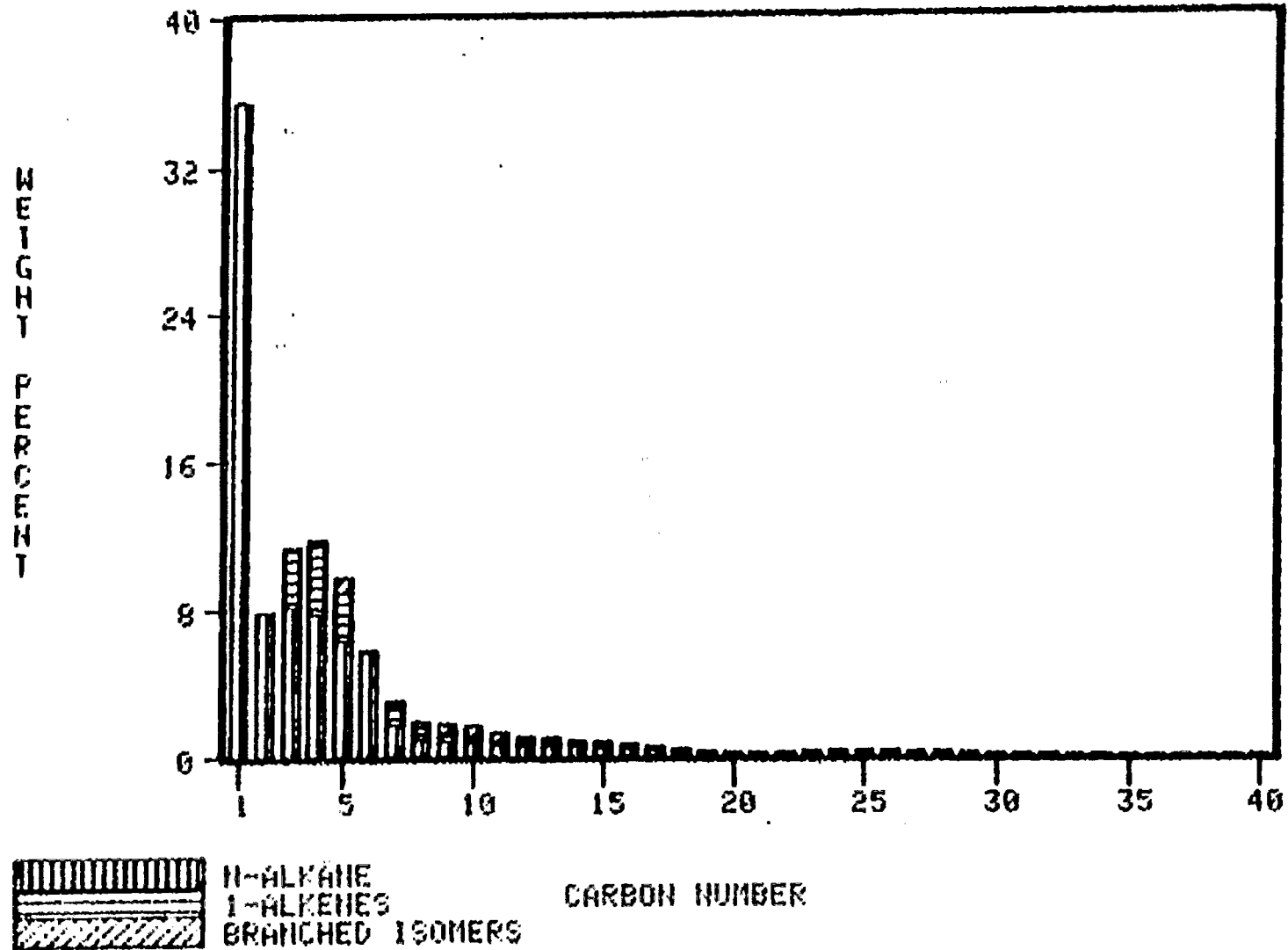


FIGURE 37

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-153

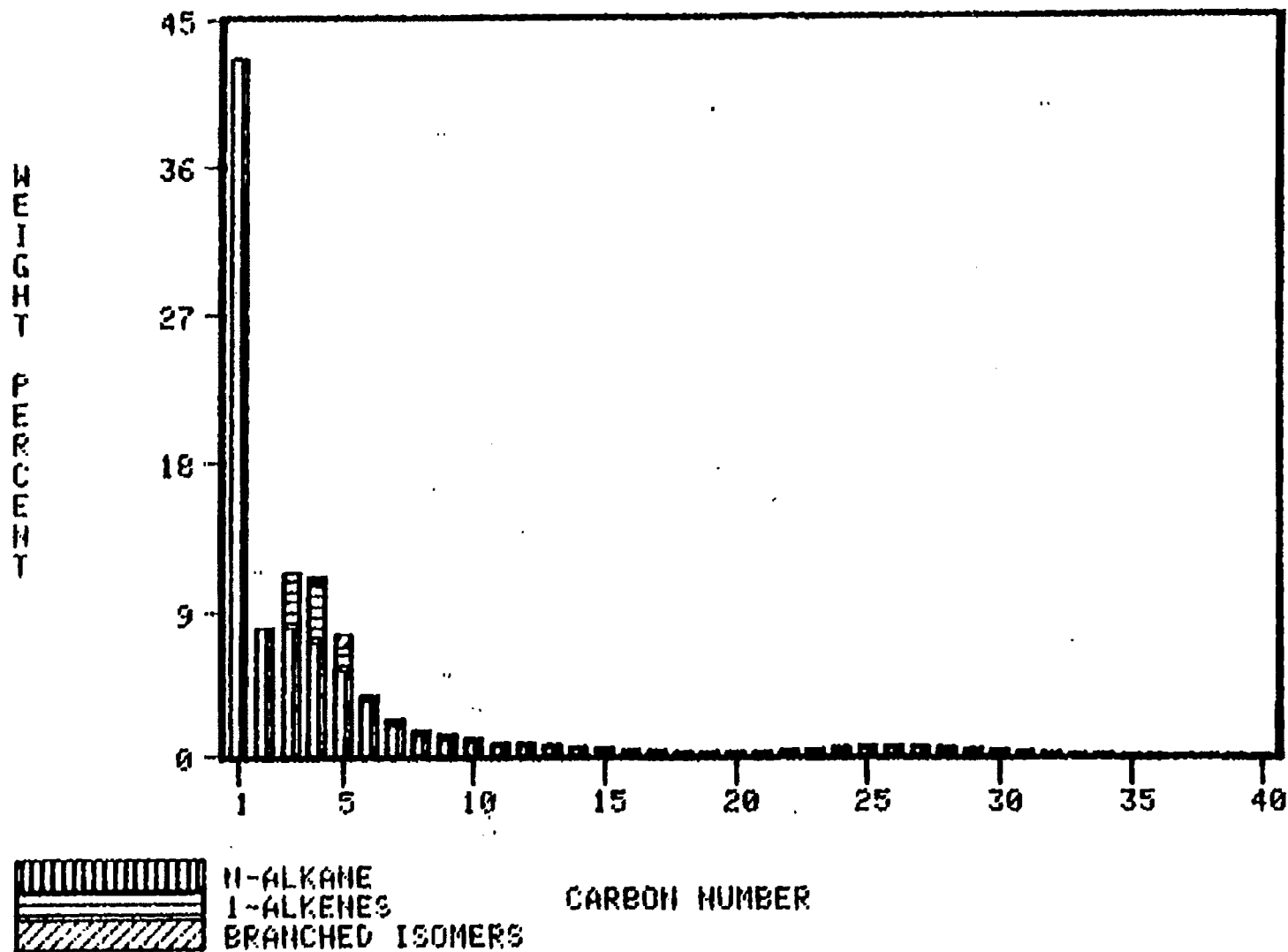


FIGURE 38

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-21-155

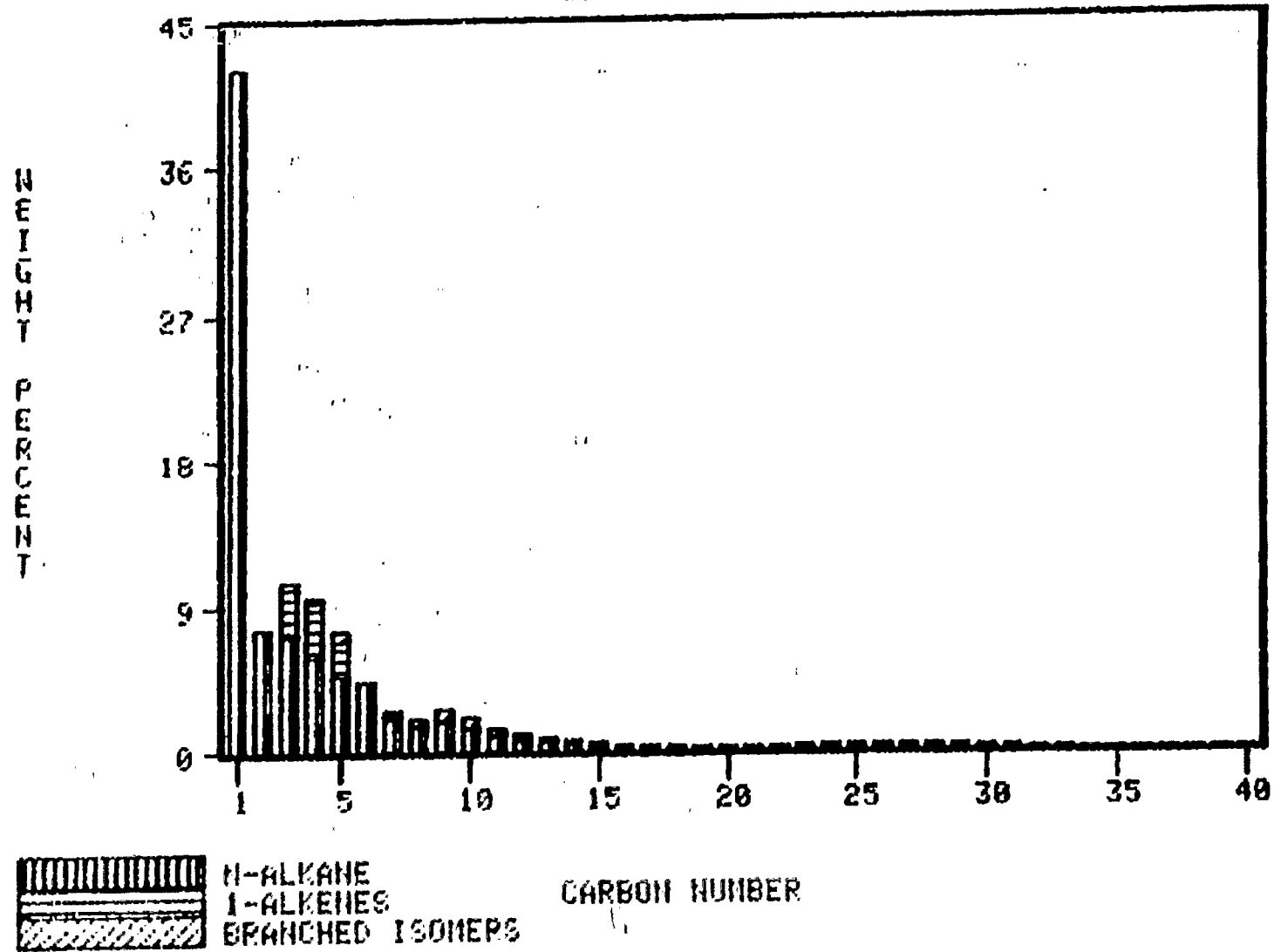


FIGURE 39

HYDROCARBON WEIGHT DISTRIBUTION

0062-1-31-150

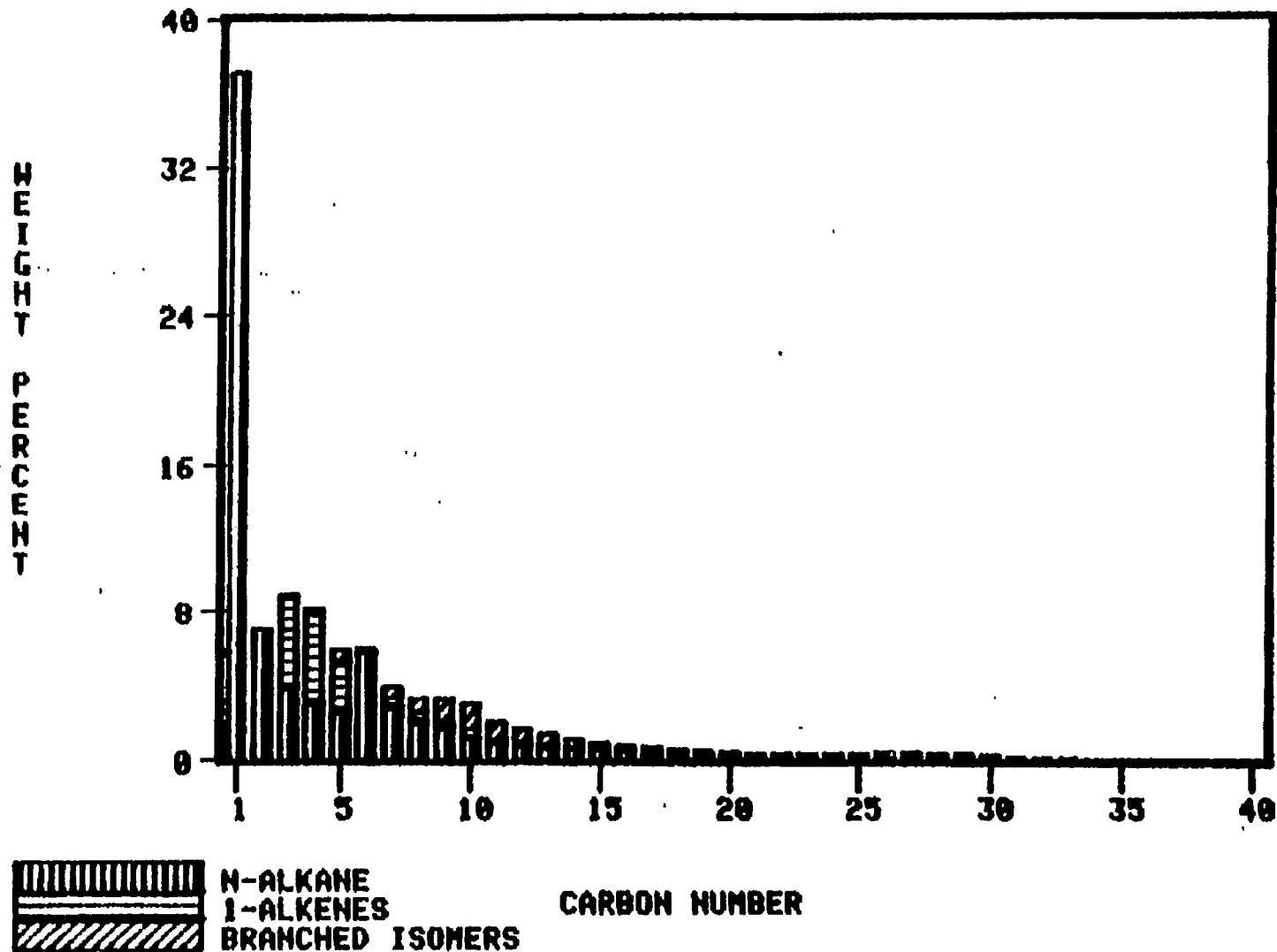


FIGURE 40

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-162

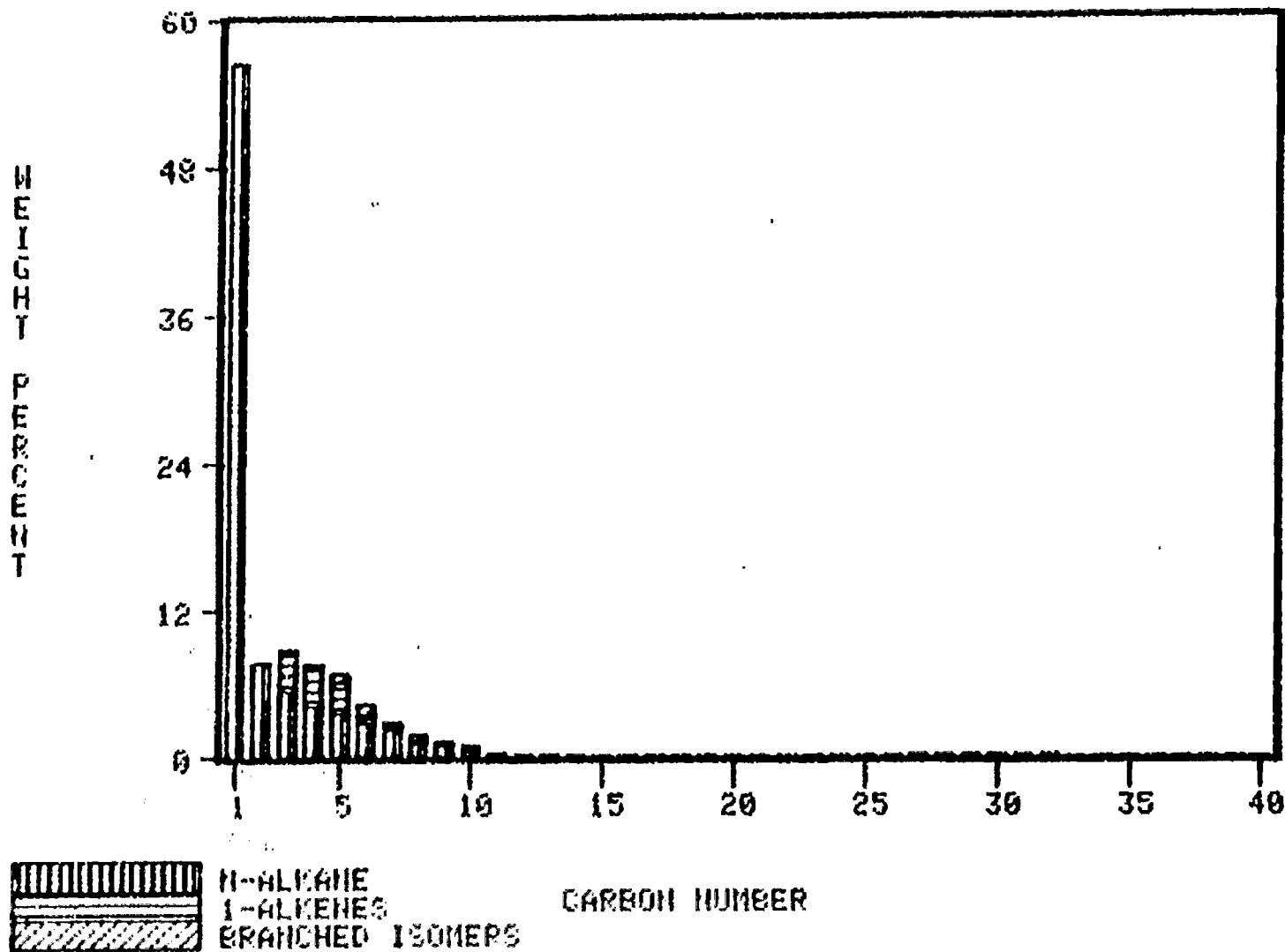




FIGURE 41

## HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-164

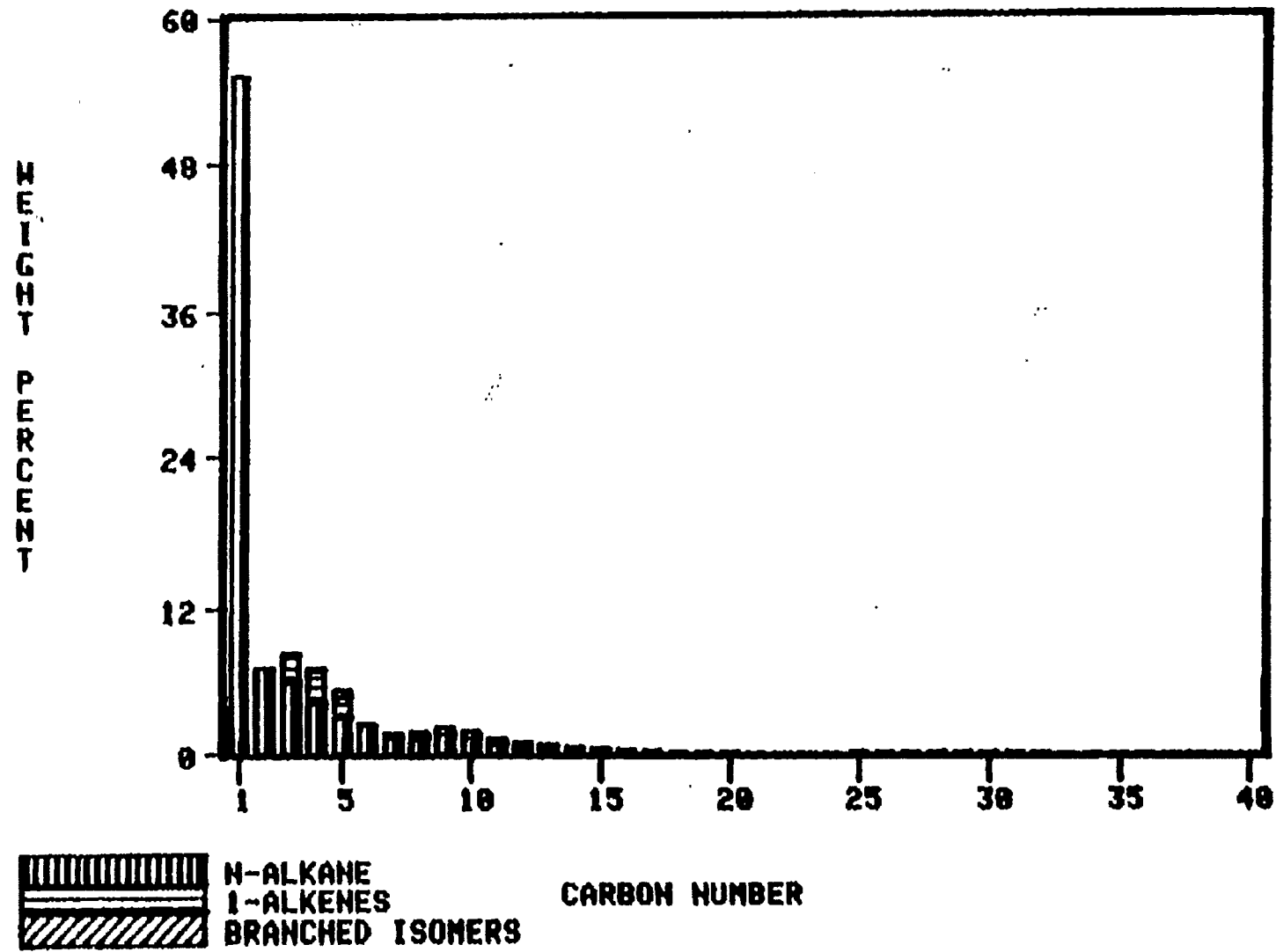


FIGURE 42

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-167

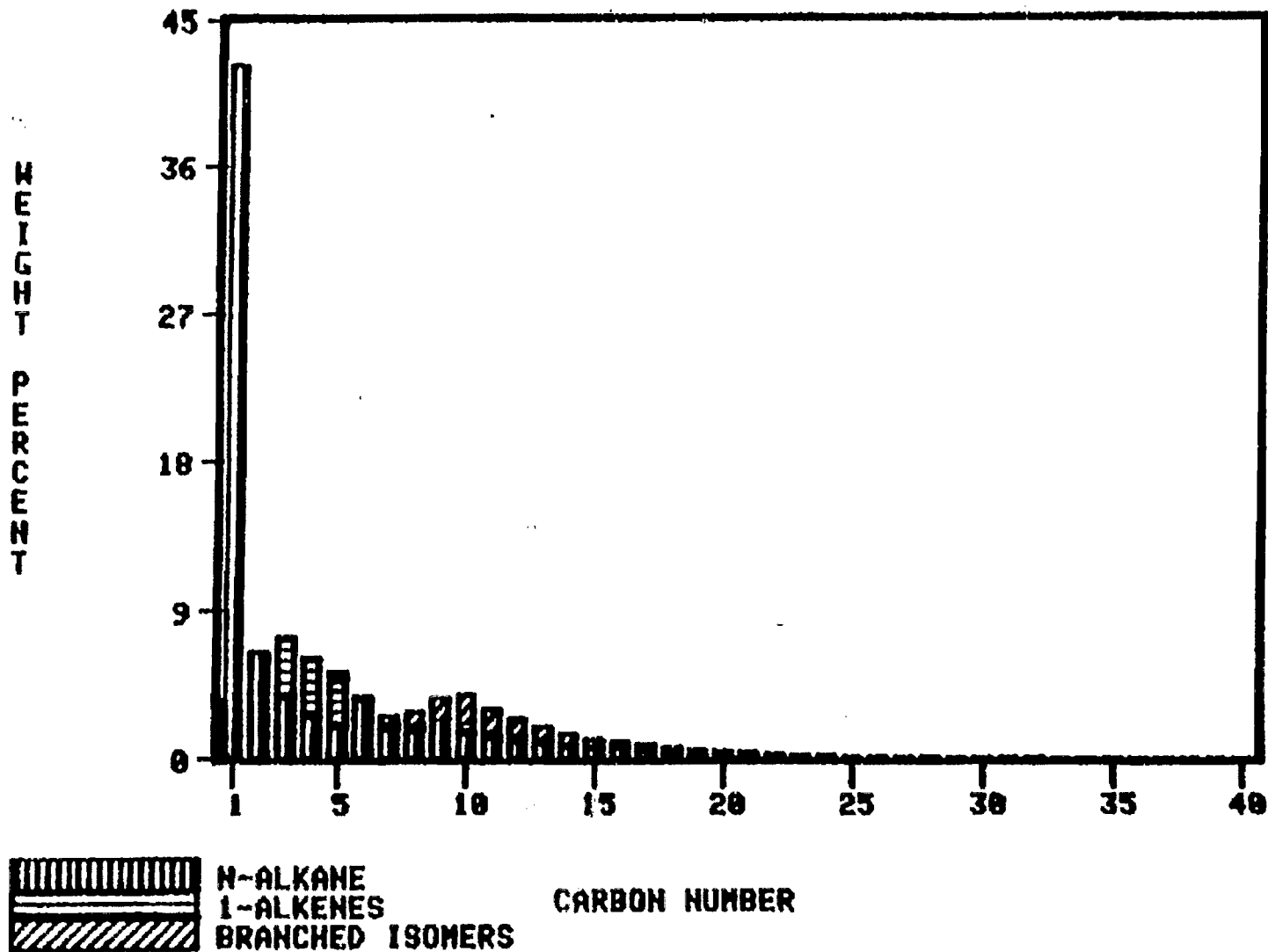


FIGURE 43

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-171

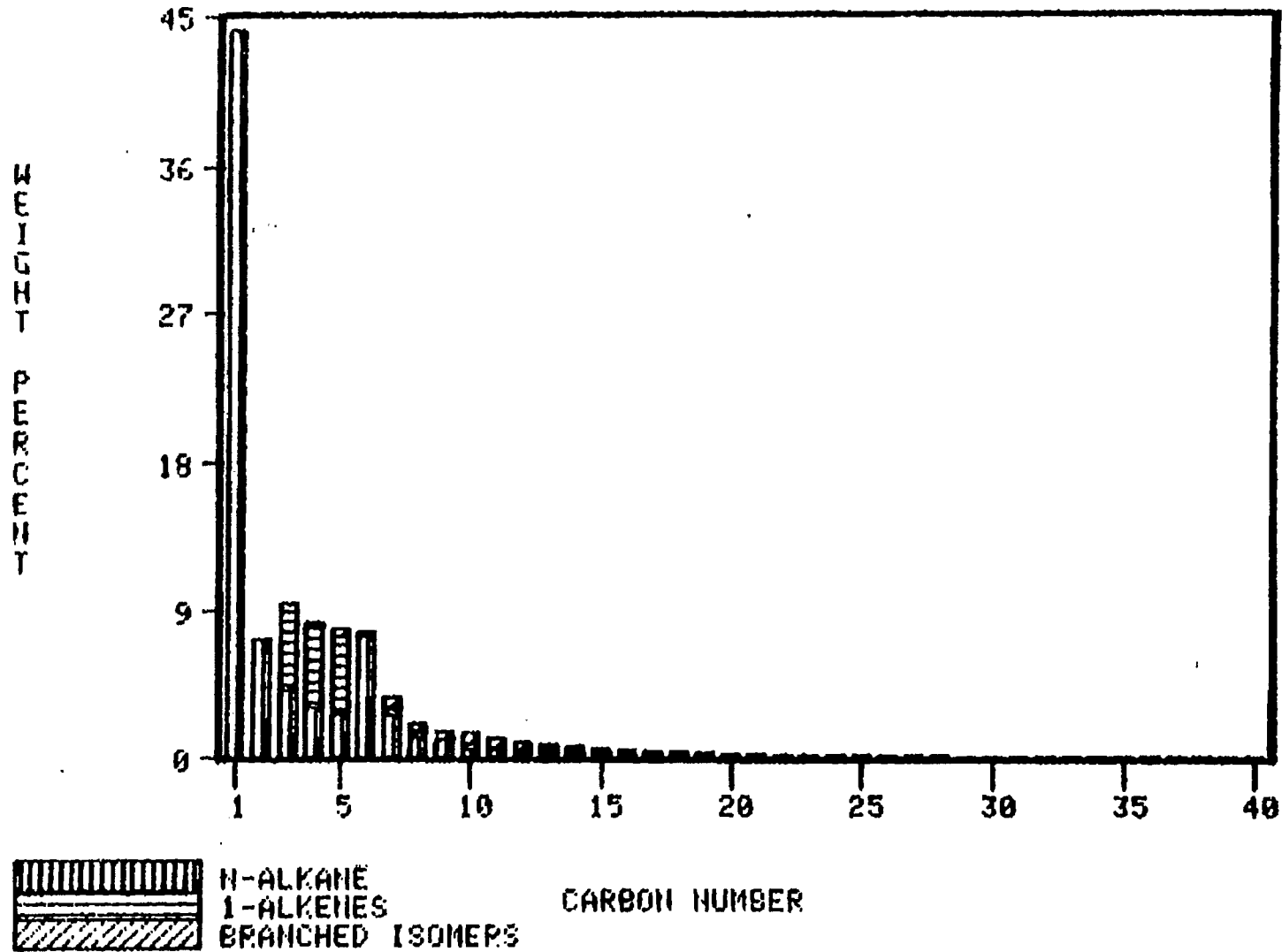


FIGURE 44

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-173

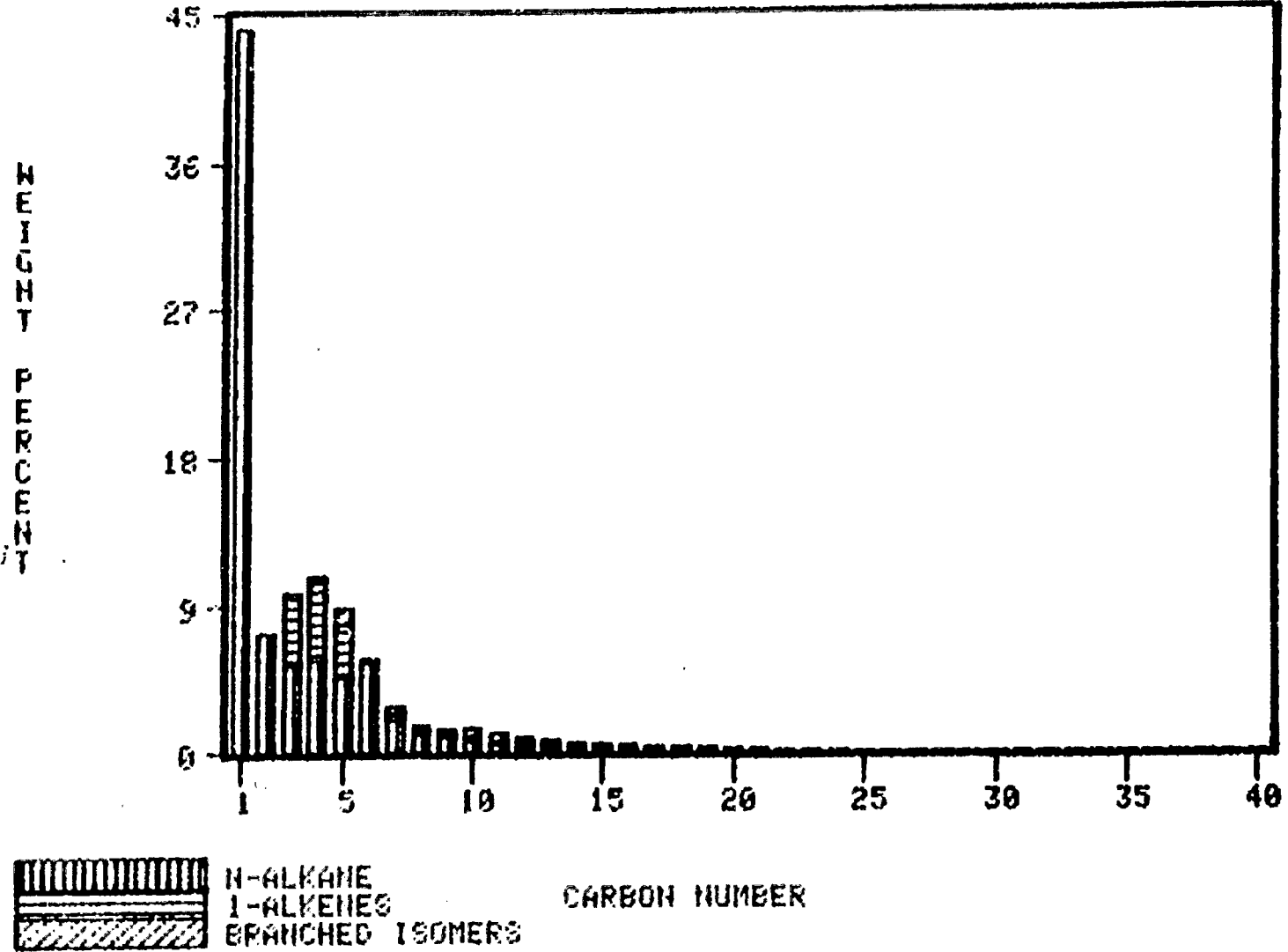


FIGURE 45

HYDROCARBON WEIGHT DISTRIBUTION

8862-1-31-176

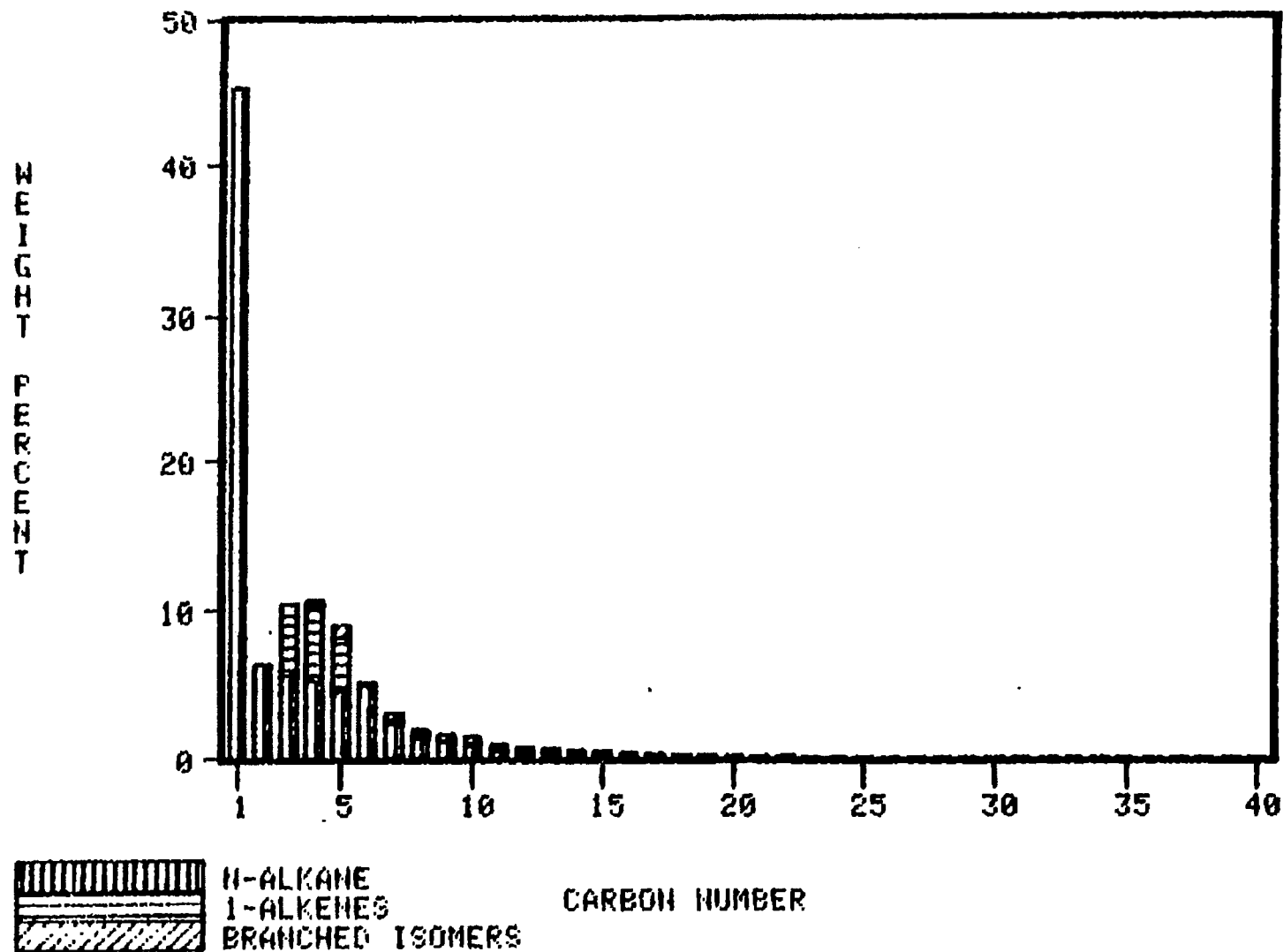


FIGURE 46

Bulk Activity Maintenance--Extended Slurry Test 8862-1-31  
Co/Zn/SiO<sub>2</sub>, 260 C, CO/H<sub>2</sub> = 1.0, 2.0 NL/g/hr, 300 psig

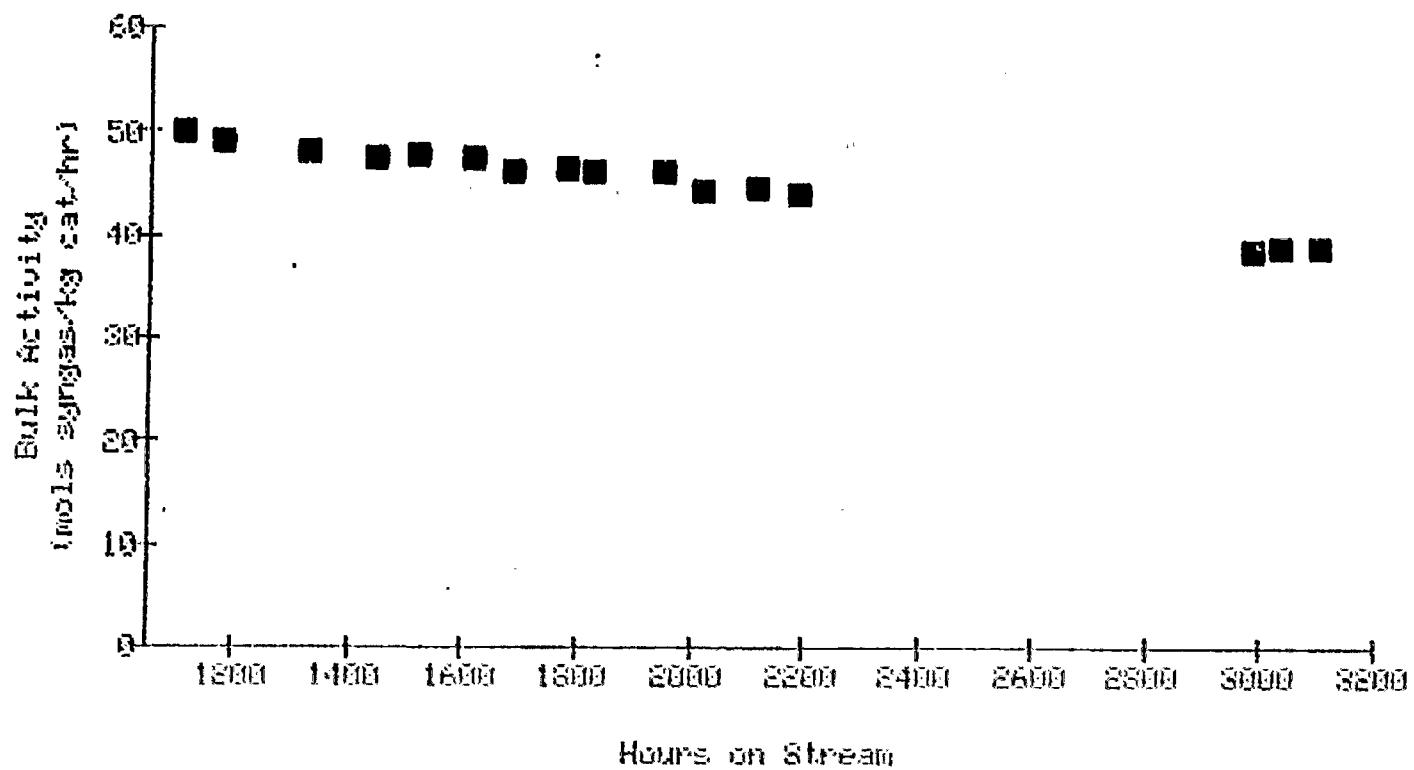


FIGURE 47

Linear Fit for Kinetic Model 1

Temperature = 260°C

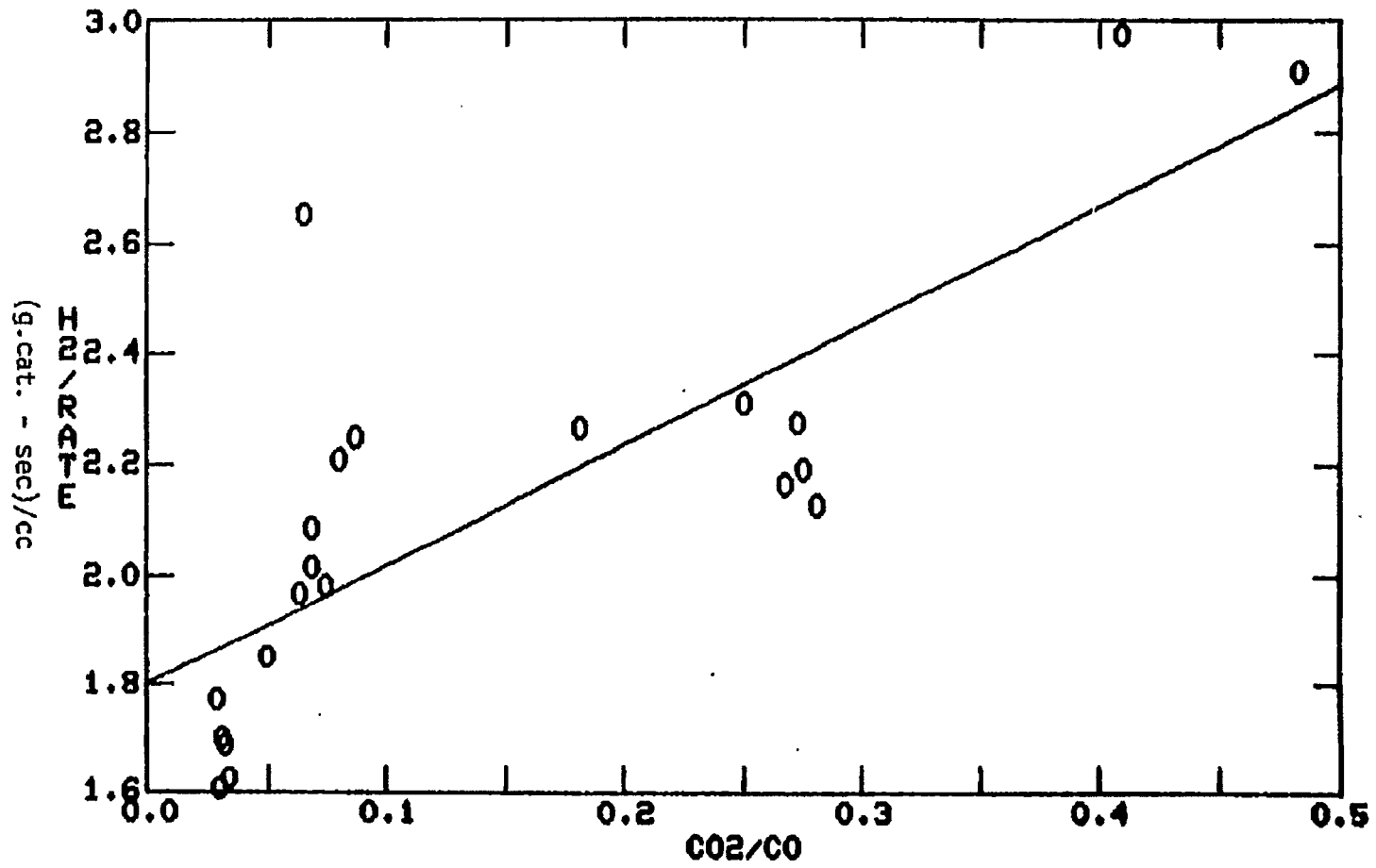


FIGURE 4B

Linear Fit for Kinetic Model 2

Temperature = 260°C

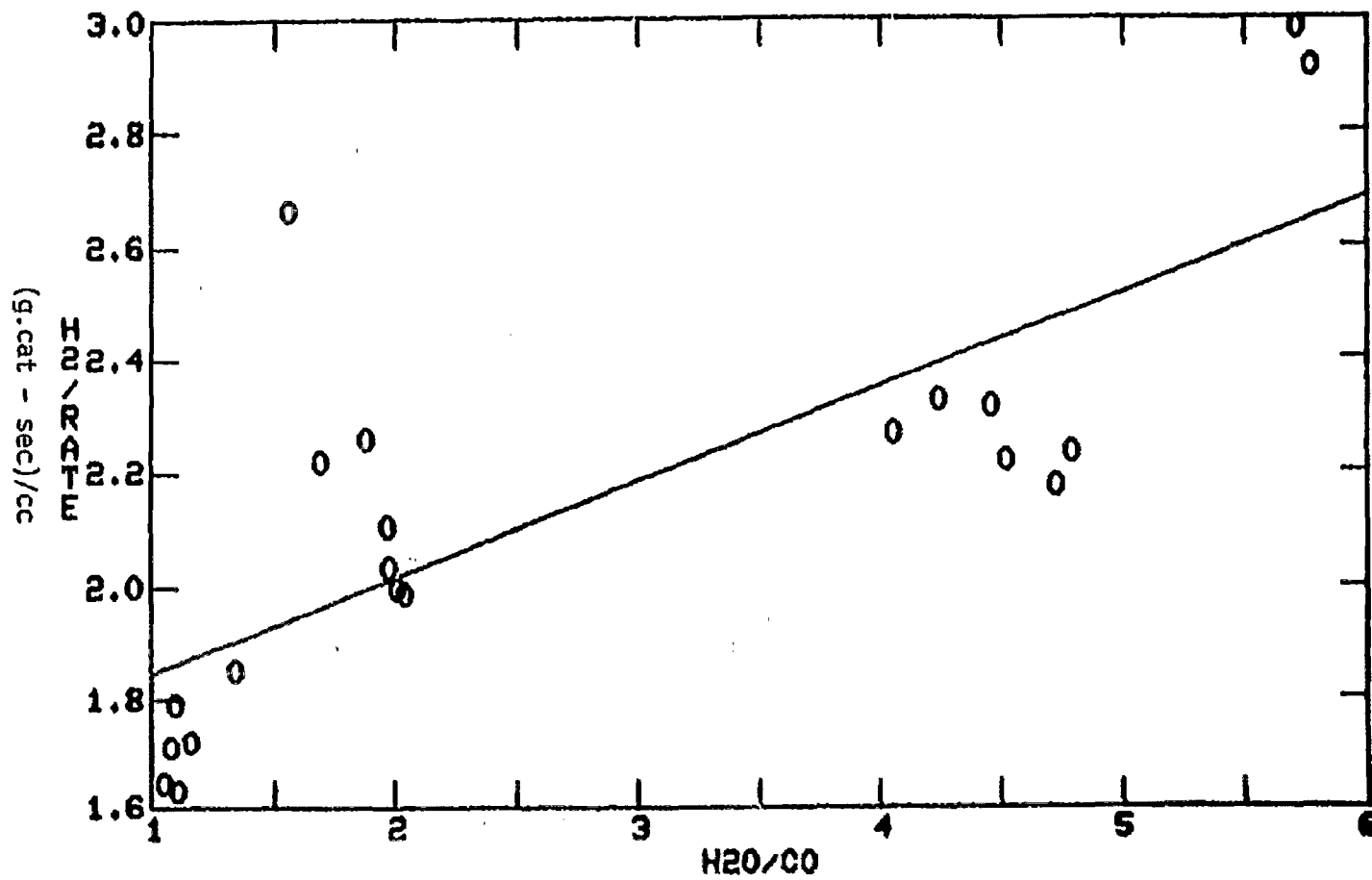




FIGURE 49

Linear Fit for Kinetic Model 4

Temperature = 260°C

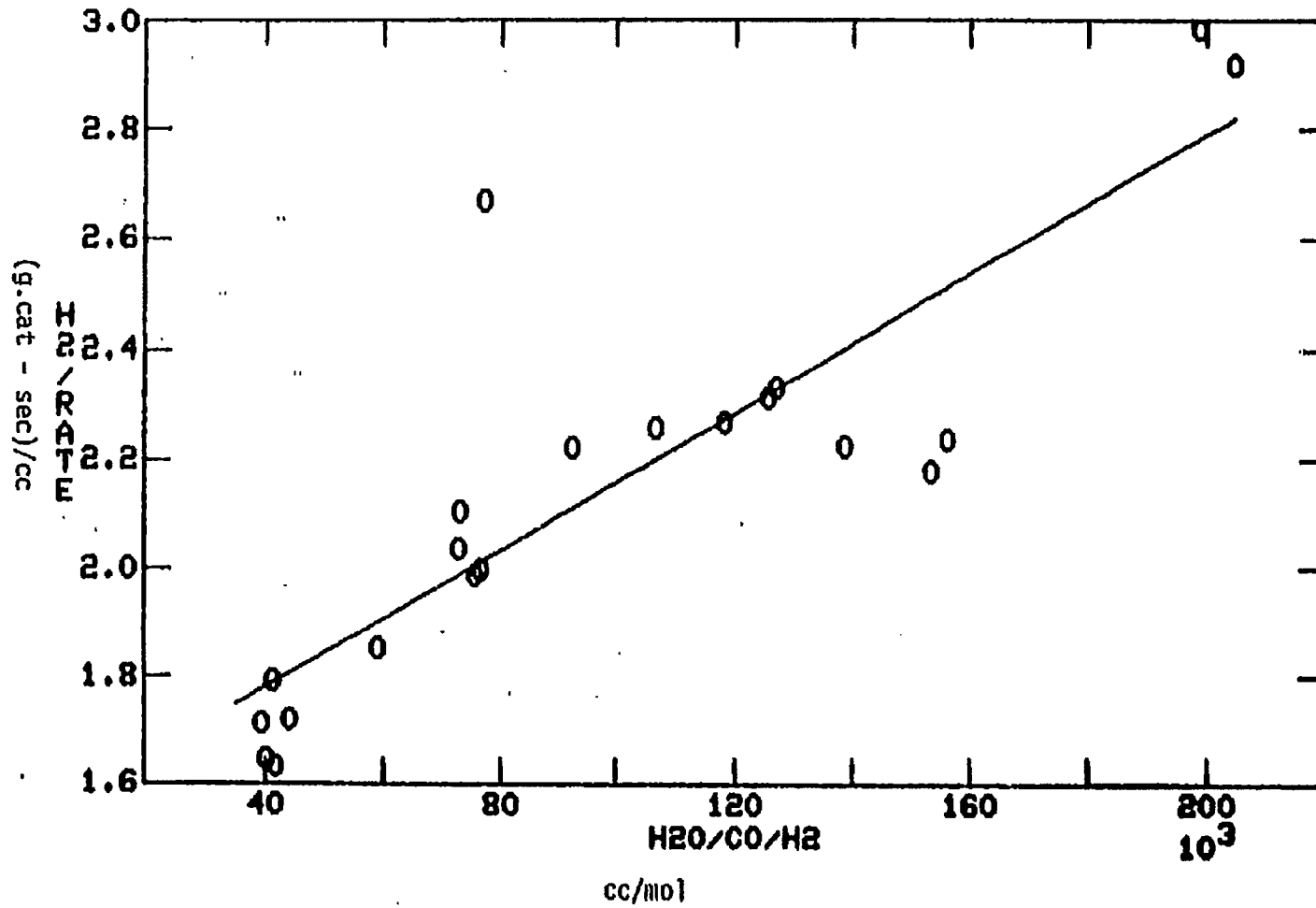


FIGURE 50

Parity Plot for Kinetic Model 1

Temperature = 260°C

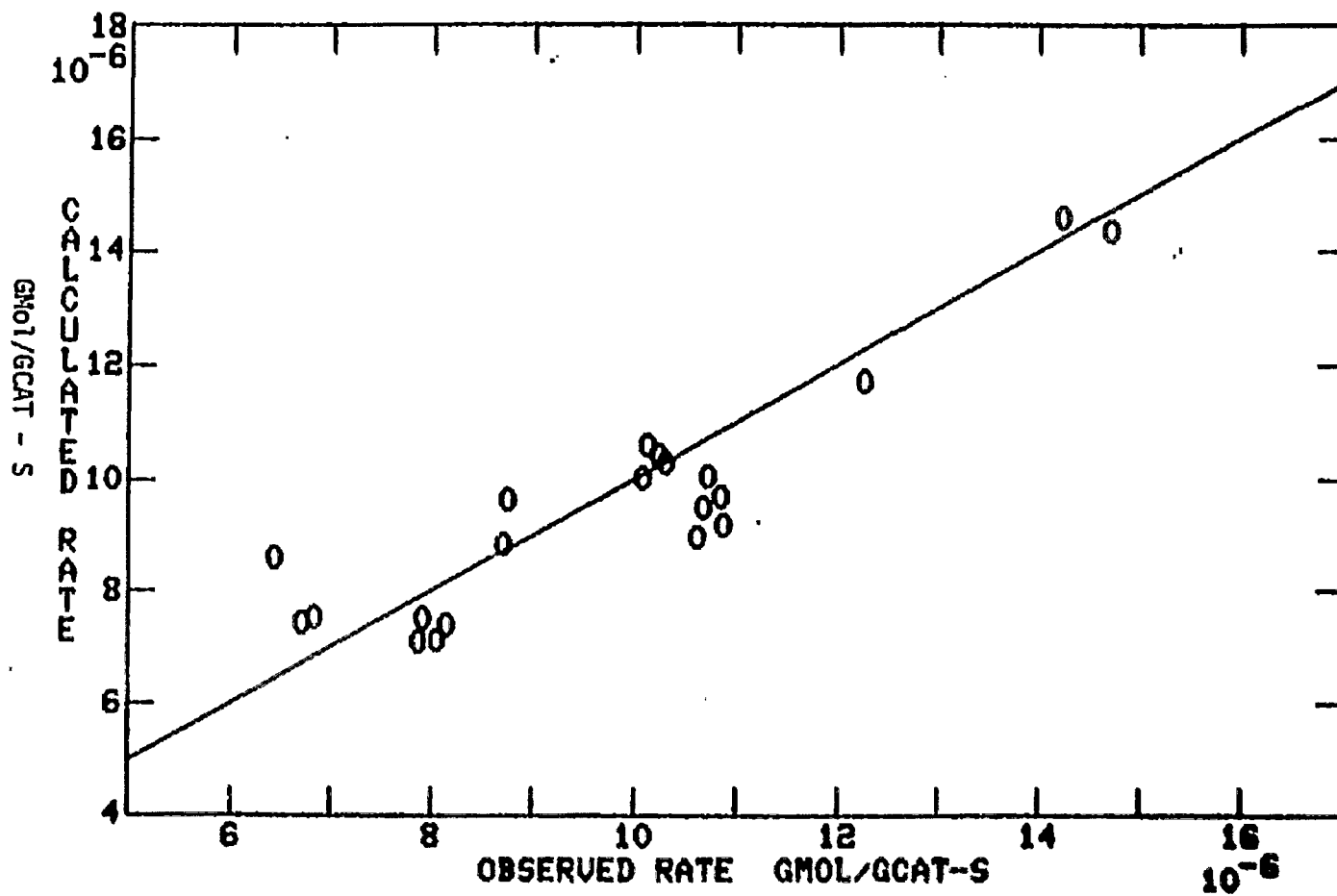


FIGURE 51

Parity Plot for Kinetic Model 2

Temperature 260°C

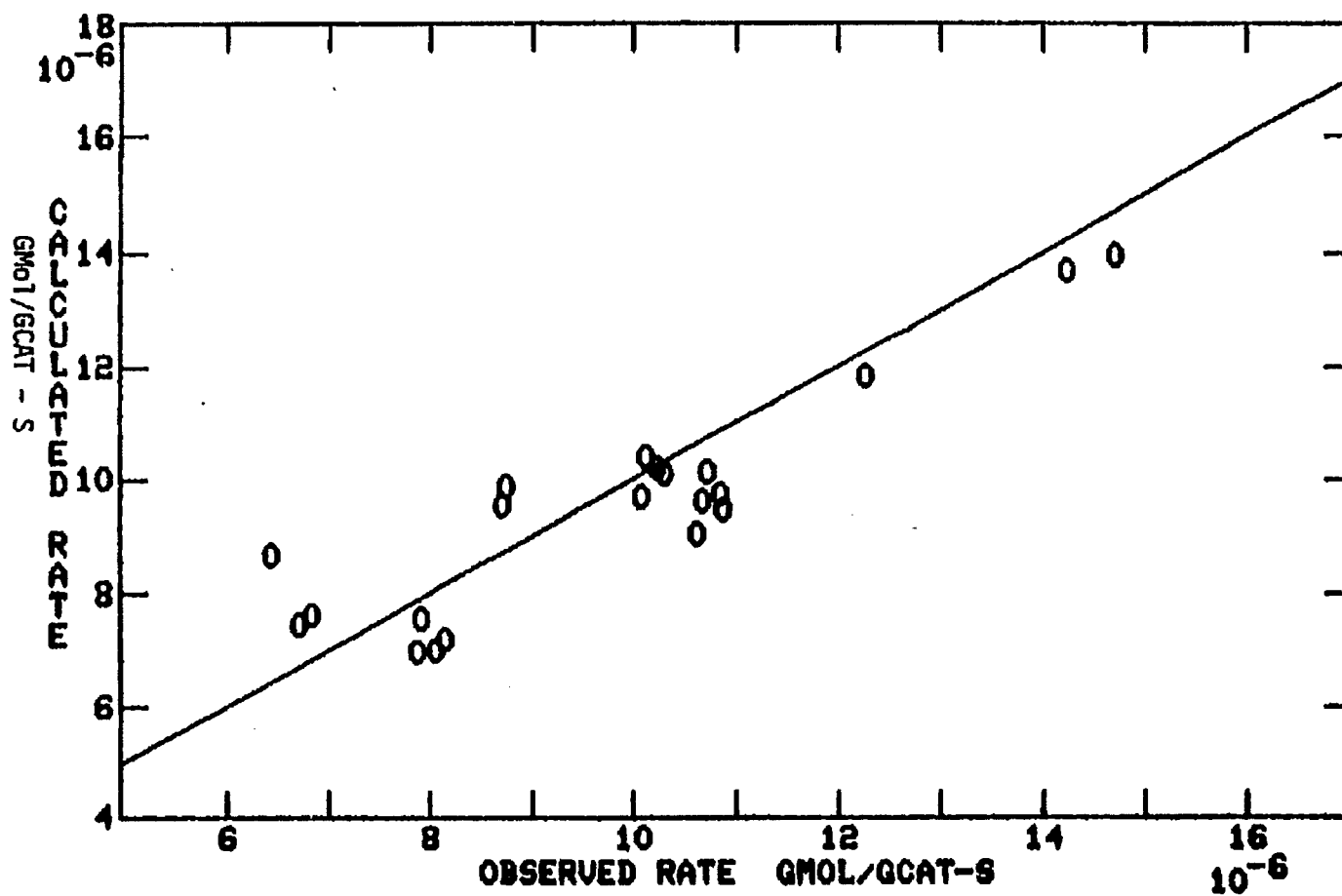


FIGURE 52

Parity Plot for Kinetic Model 4

Temperature = 260°C

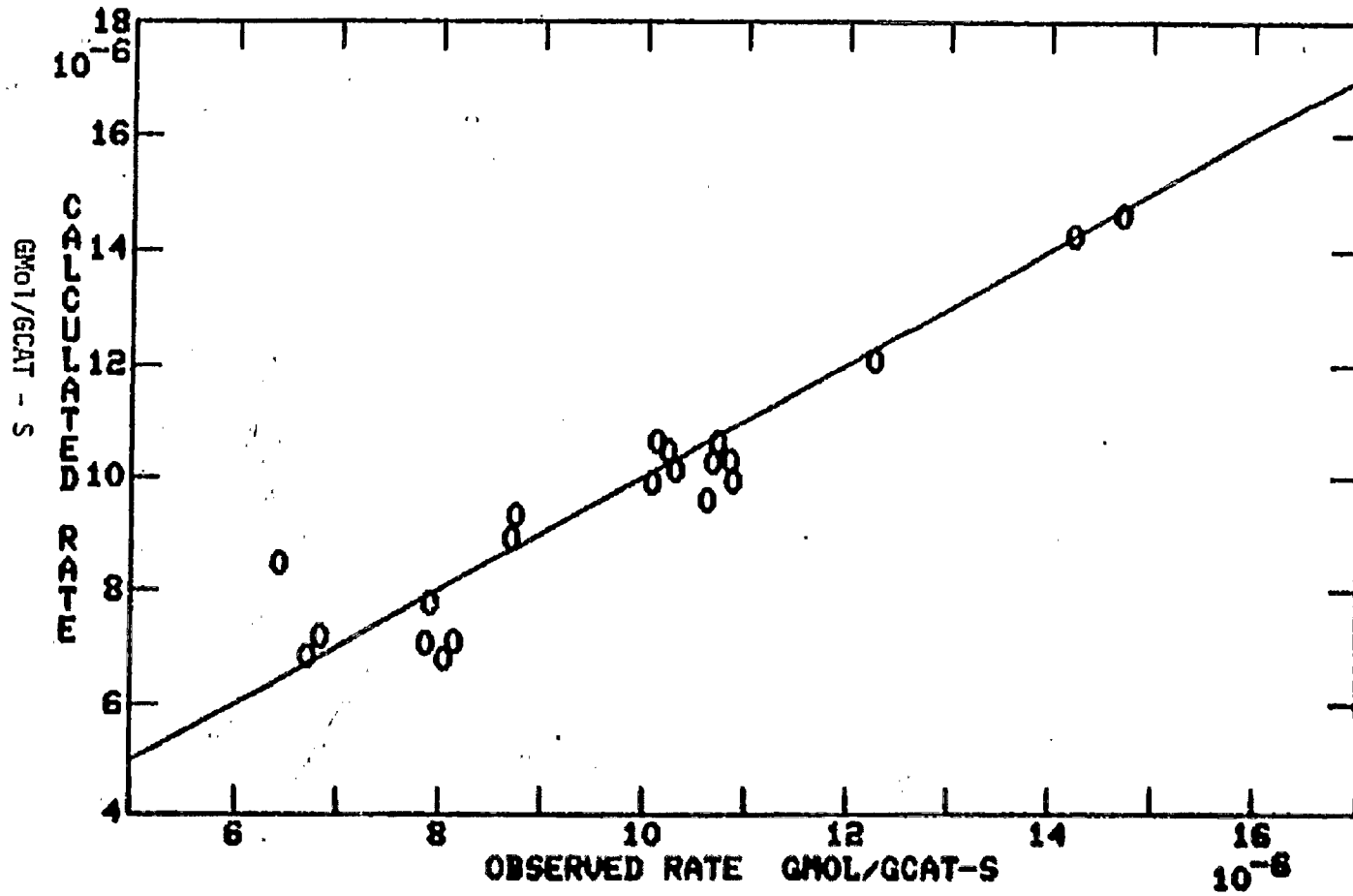
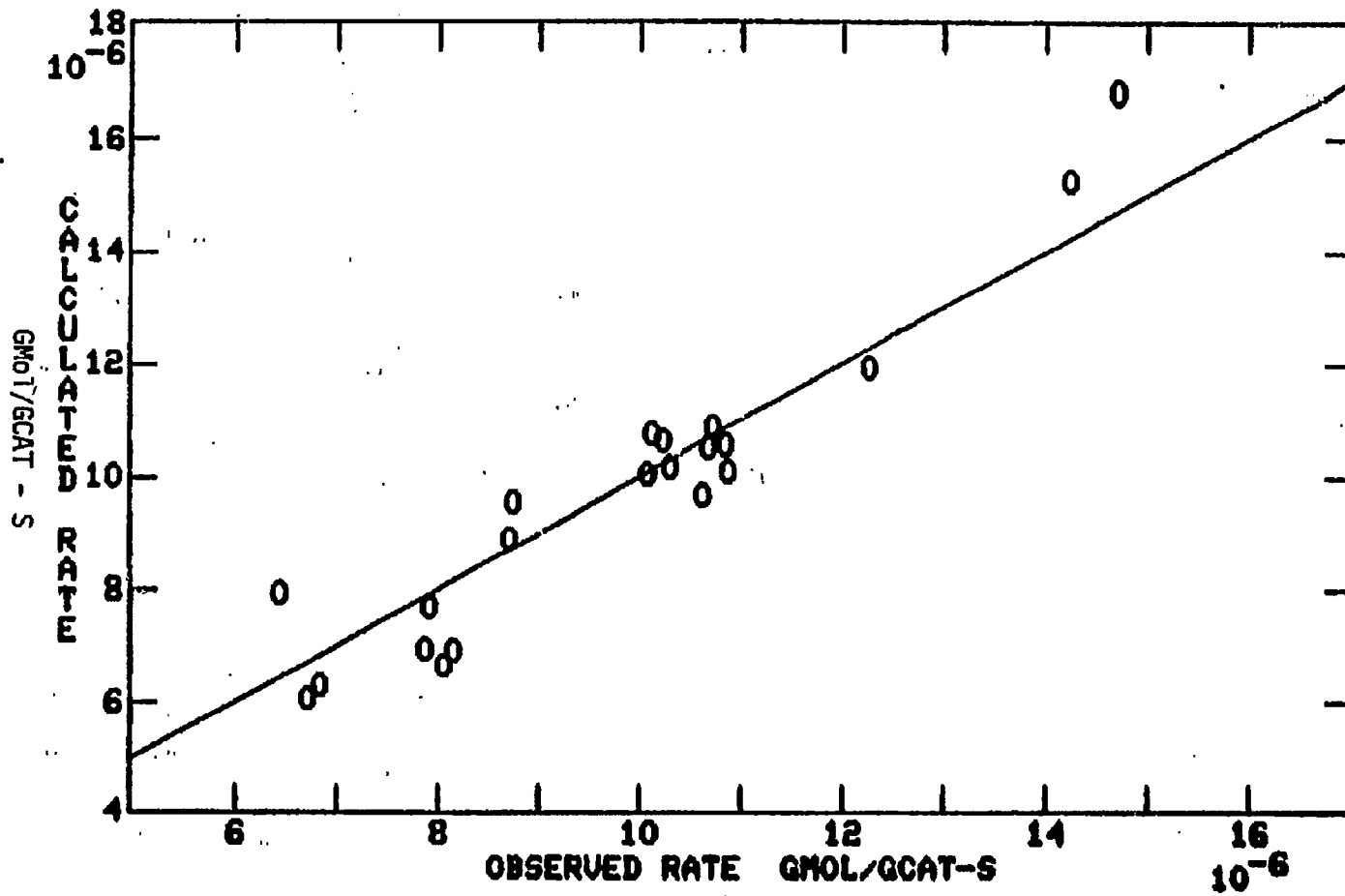


FIGURE 53

Parity Plot for Kinetic Model 5

Temperature = 260°C



**FIGURE 54**

Linear Fit for Kinetic Model 4

Temperature = 280°C

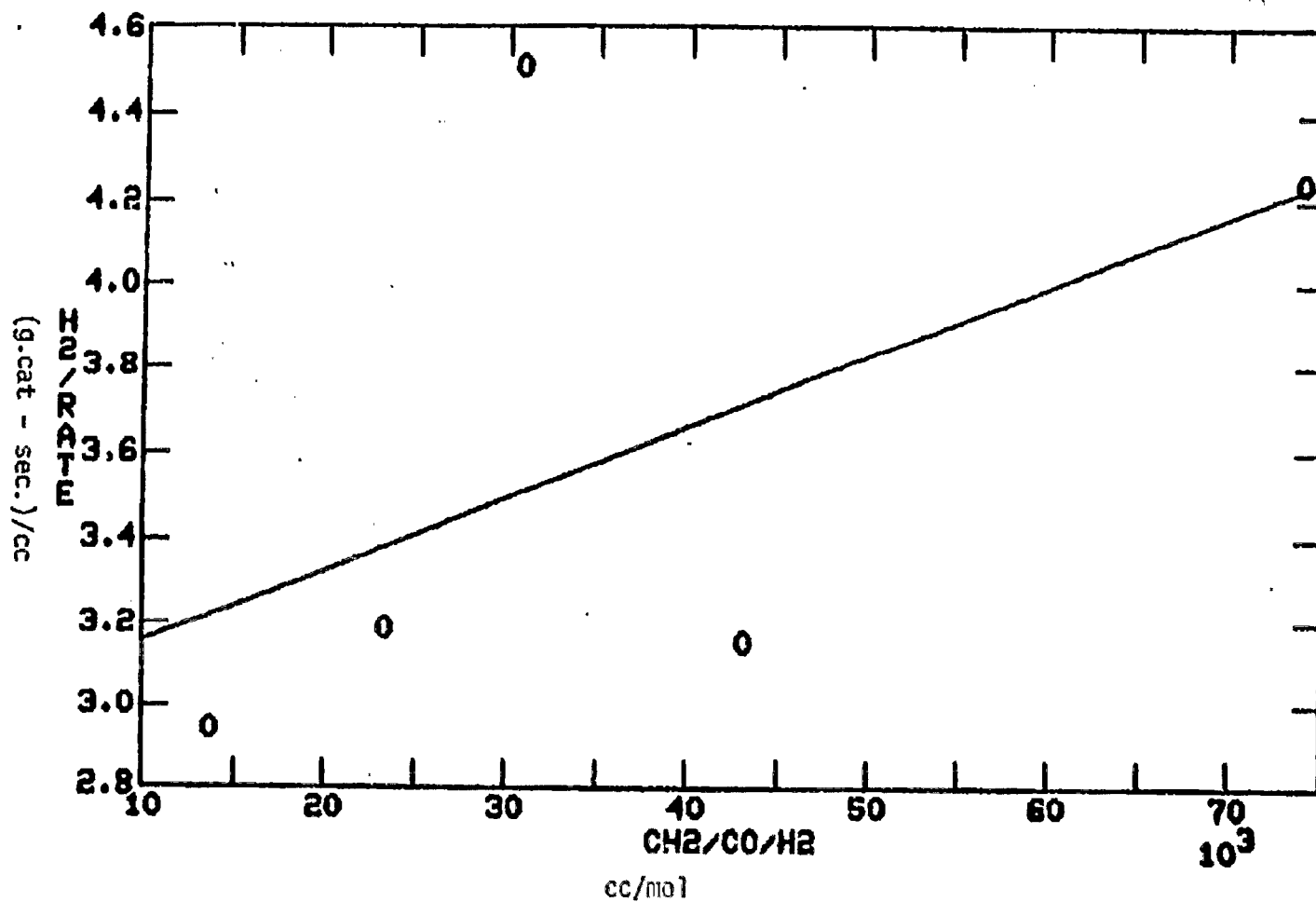
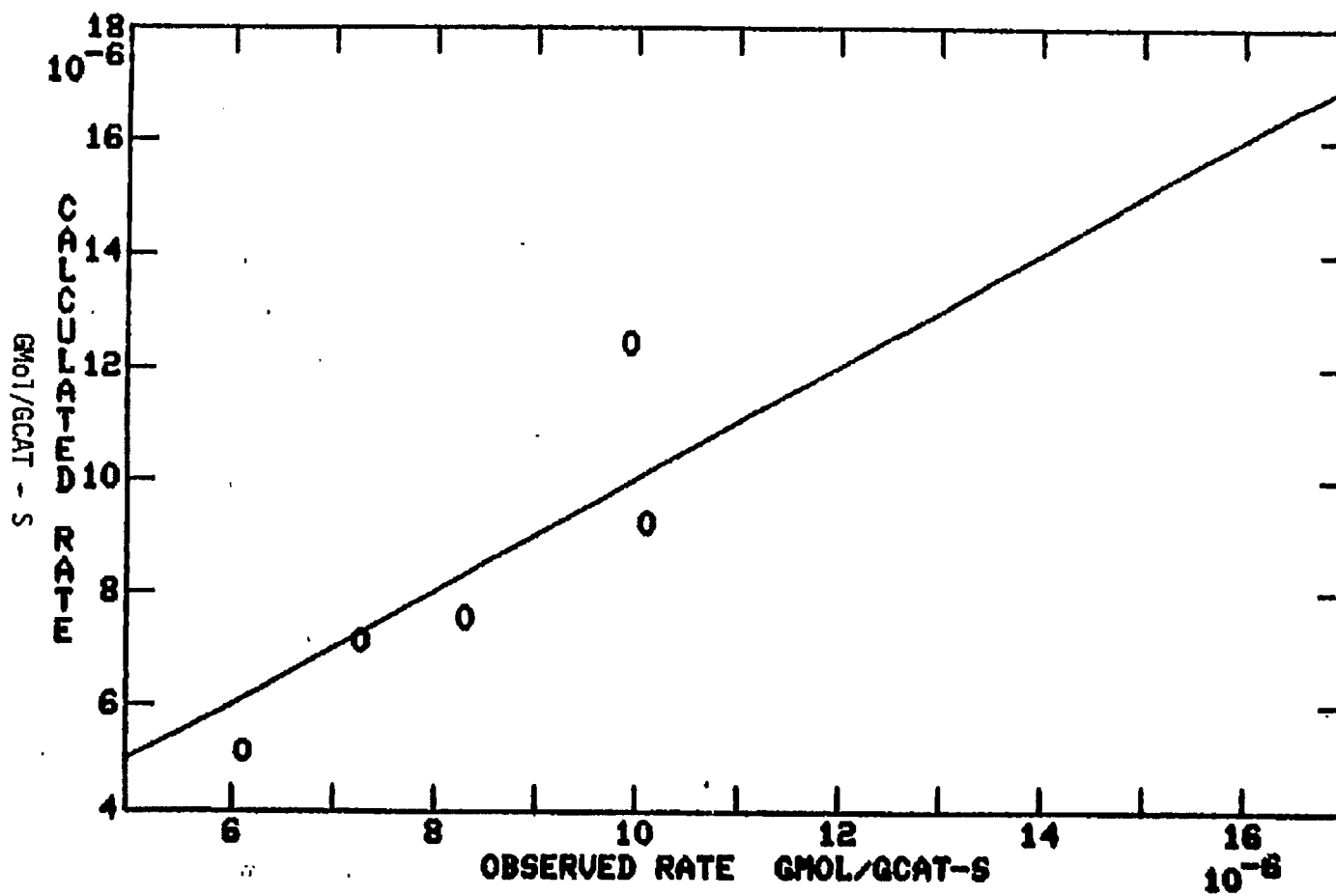


FIGURE 55

Parity Plot for Kinetic Model 4

Temperature = 280°C



**FIGURE 56**

Arrhenius Plot = Extended Slurry Test

#8862-1-31

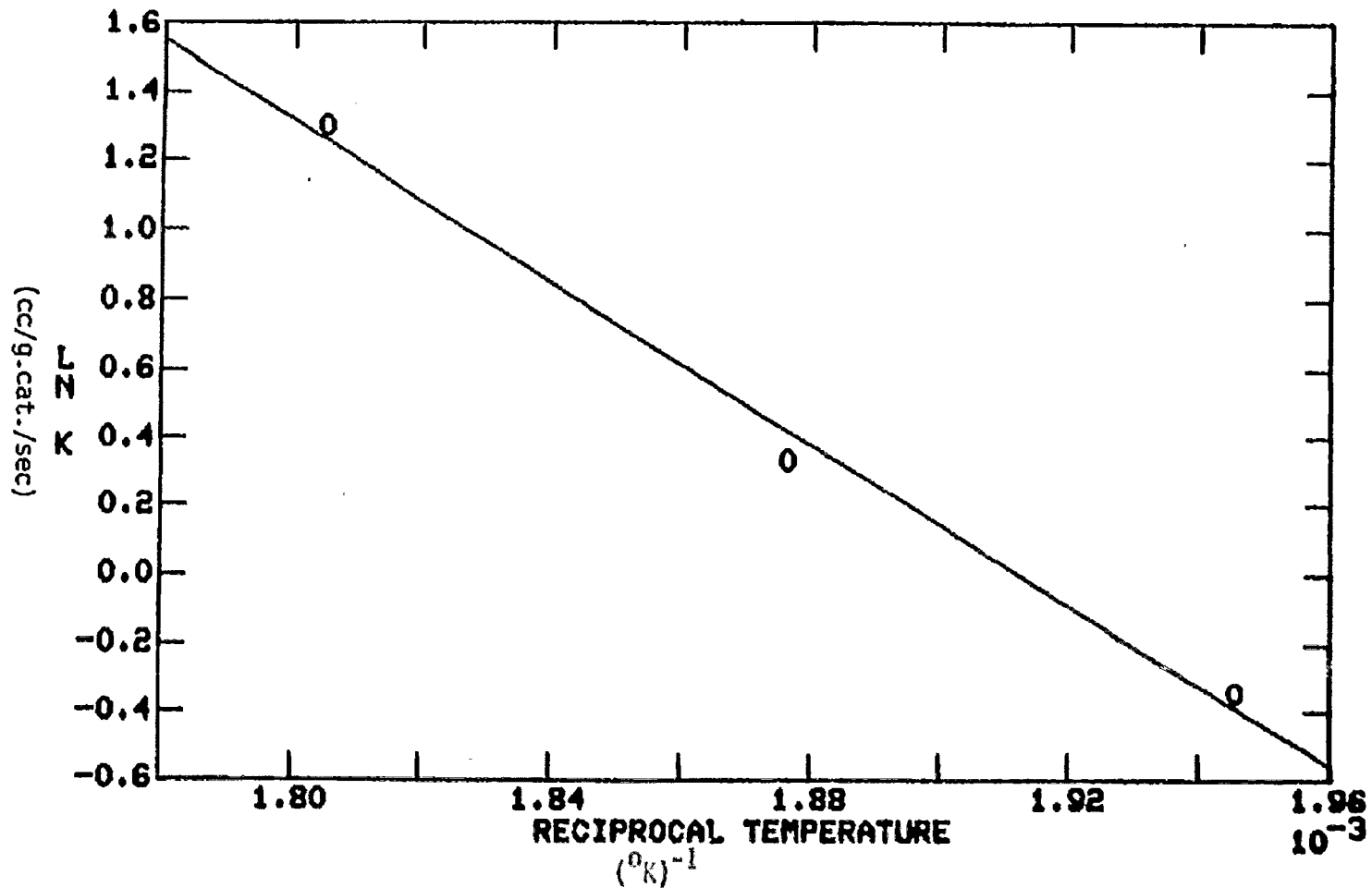
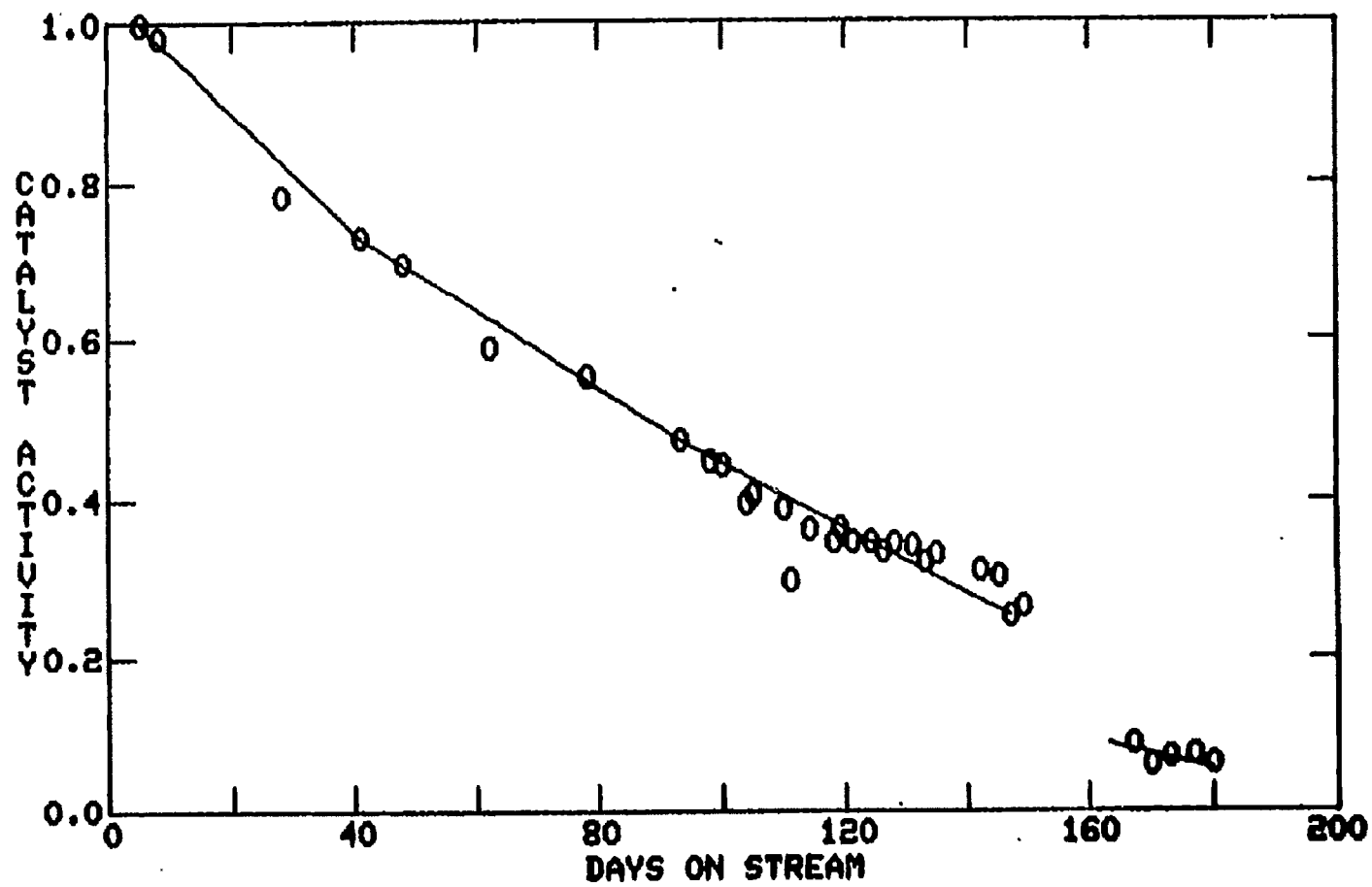




FIGURE 57

Catalyst Deactivation: Extended Slurry Test

#8862-1-31



APPENDIX

Energy Input from Impeller vs. Gas Expansion

a) Calculation of impeller energy input: (Reference 5)

The energy equation is  $P = \frac{N_p \rho N^3 D_a^5}{g_c}$

where  $D_a$  = Impeller diameter = 1.25 in.  
 $g_c$  = Gravitational constant  
 $N$  = Impeller rotation = 800 rpm  
 $\rho$  = Slurry density = 62.4 lb/ft<sup>3</sup> (assumed)  
 $\mu$  = Slurry viscosity = 1 cp (assumed)

$N_p$  is an empirical number based on Reynold's number from a graph also in Reference 5. For this case,  $N_{Re} = \frac{D_a^2 N \rho}{\mu} = 13,000$ .  $N_p$  is not sensitive to reasonable variations in  $N_{Re}$  in this range so the  $\rho$  and  $\mu$  assumptions are not critical.

The power calculation yields the following:

rpm	Hp
800	500 · 10 <sup>-6</sup>
1600	4000 · 10 <sup>-6</sup>

b) Calculation of isentropic expansion of gas: (Reference 6)

$$W = \frac{k P_1 V_1}{k-1} \left[ 1 - \left( \frac{P_2}{P_1} \right)^{\frac{k-1}{k}} \right]$$

which transforms to Power =  $\frac{W}{t} = \frac{k Q R T_1}{k-1} \left[ 1 - \left( \frac{P_2}{P_1} \right)^{\frac{k-1}{k}} \right]$

Where  $k = \frac{C_p}{C_v} = 1.4$  for diatomic gases

$P_1$  &  $P_2$  = Inlet and outlet gas pressure = 320 psia & 290 psia\*

$Q$  = Gas flow rate = 3000 sccm

$R$  = Gas constant

$T_1$  = Inlet gas temperature = 533°K

$t$  = Time

$w$  = Work

Substitution of the above values yields:

$\Delta p$ (psi)	Power (Hp)
30	1300 · 10 <sup>-6</sup>
10	420 · 10 <sup>-6</sup>

\* No differential pressure gauge was available and the individual inlet and outlet gauges were not sufficiently accurate to measure differentials. A sensitivity to this variable is shown above.

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