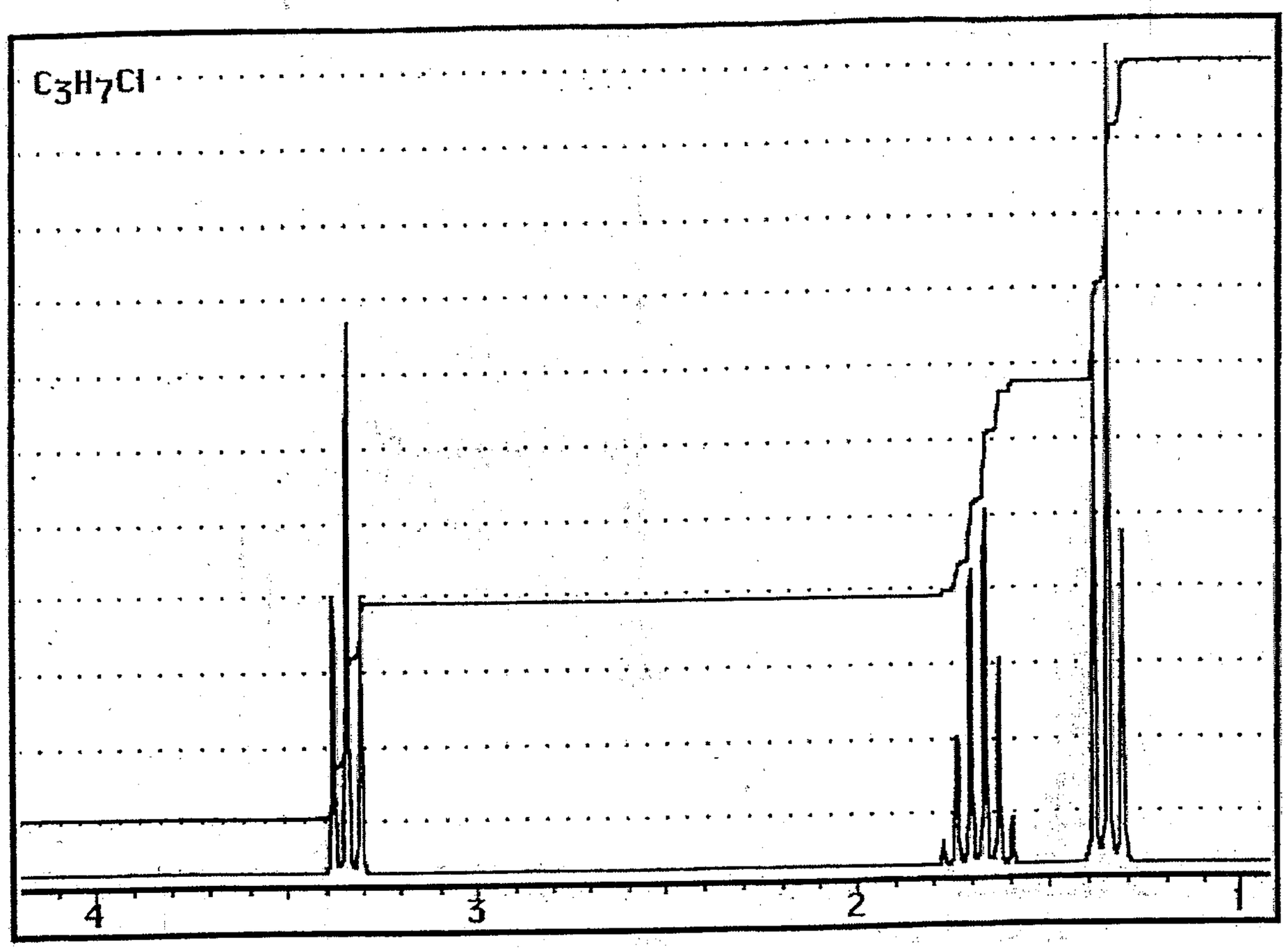
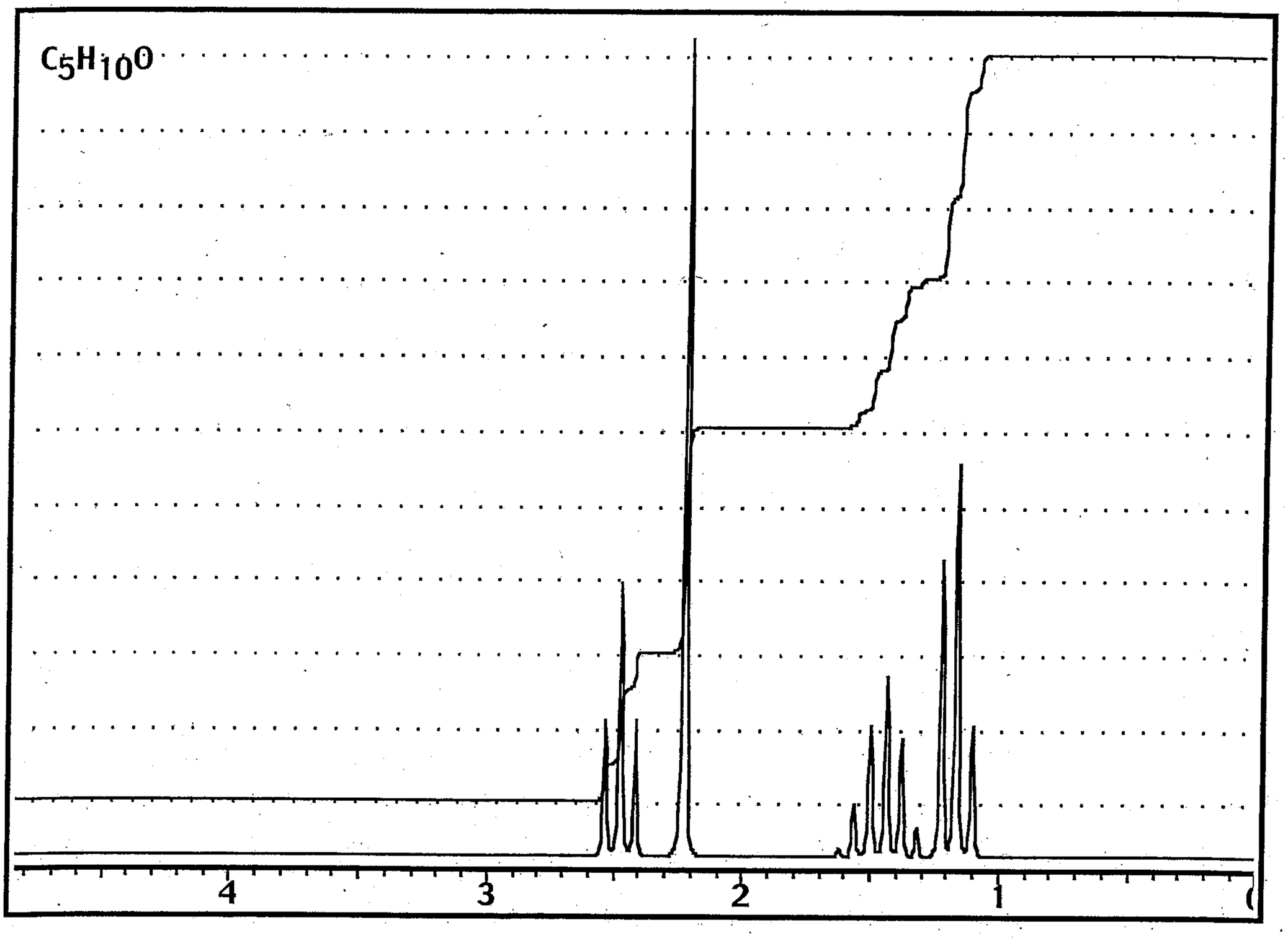
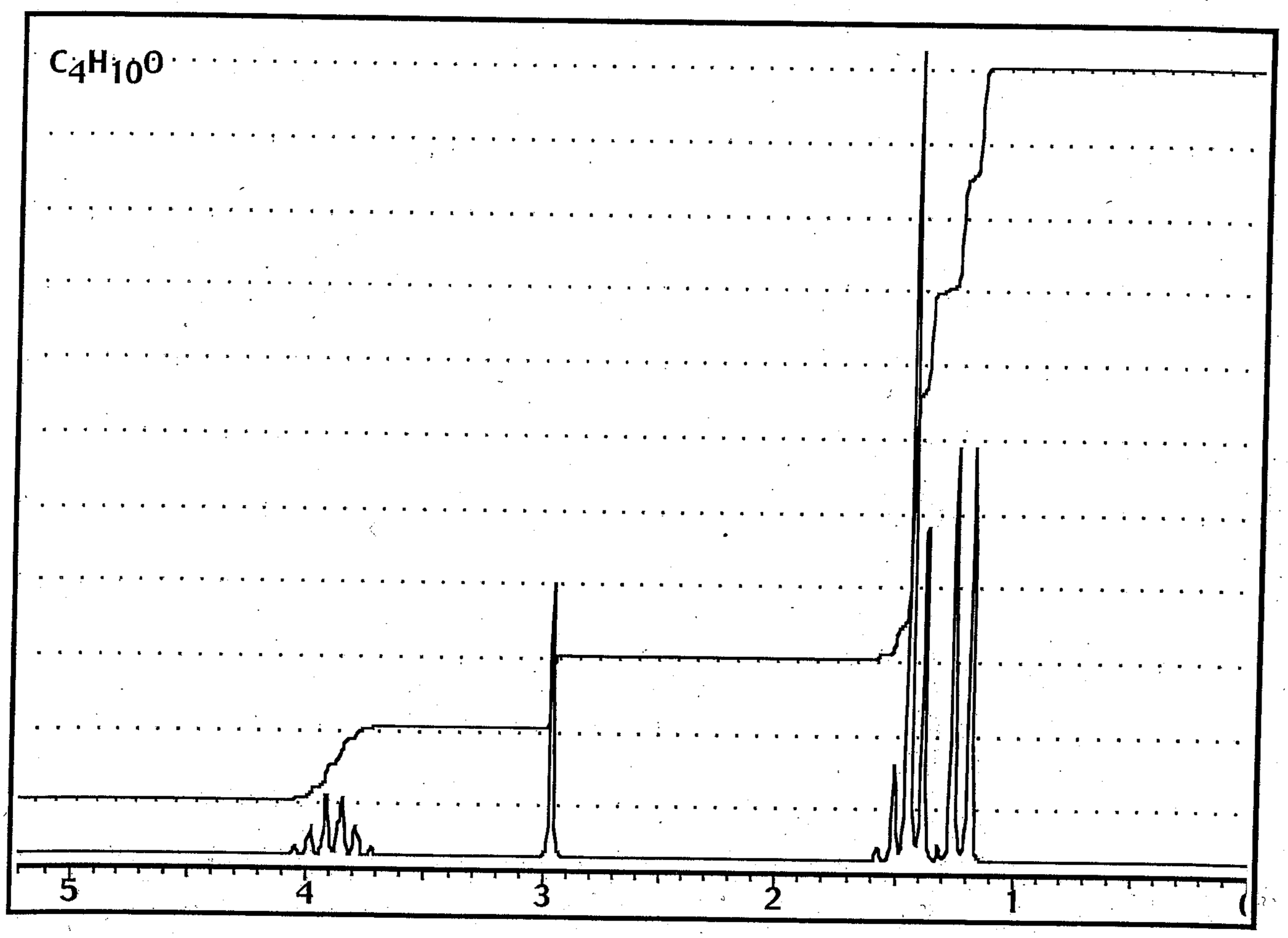
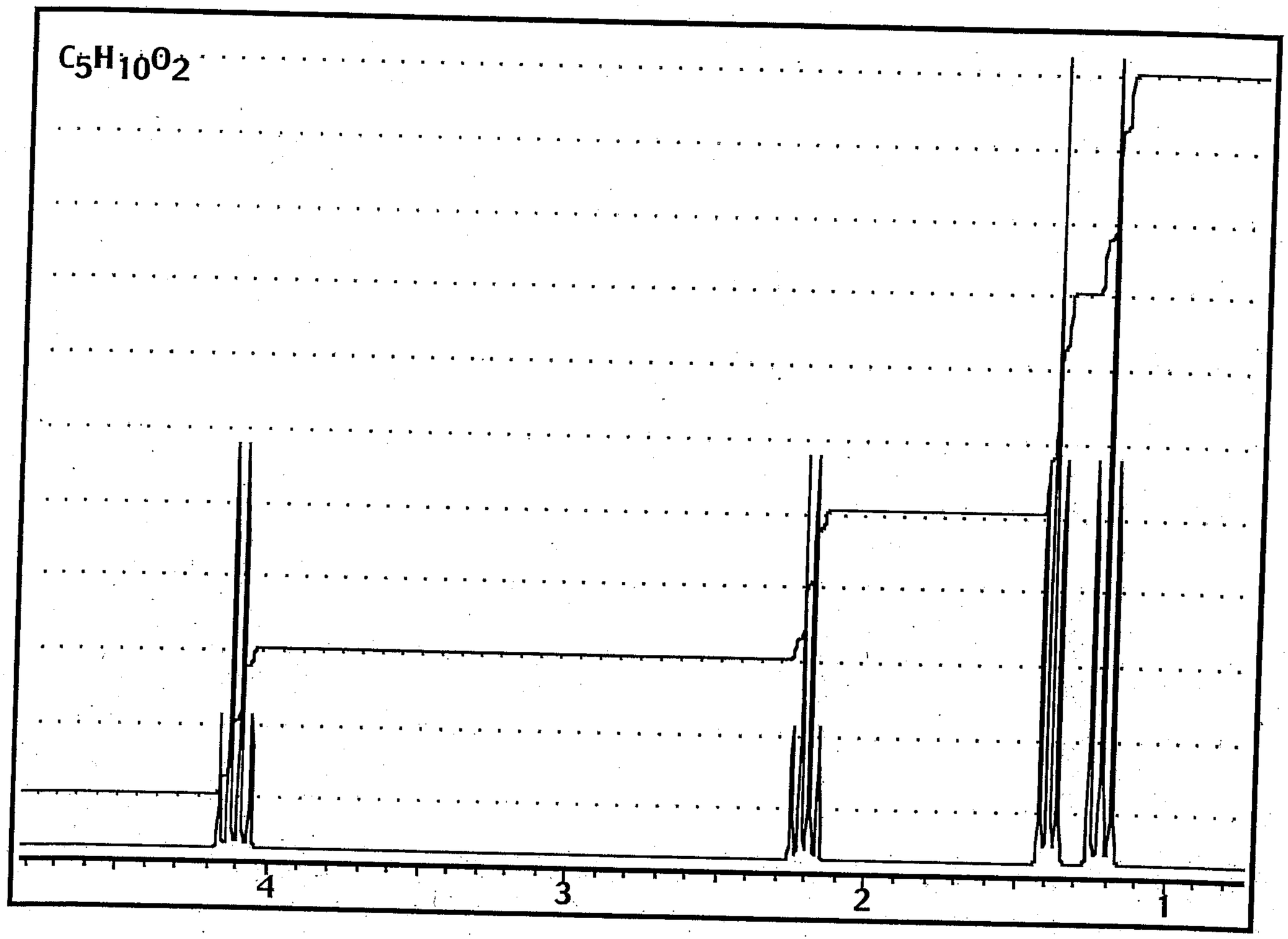
# Jasperse Chem 360 Spectroscopy Problems

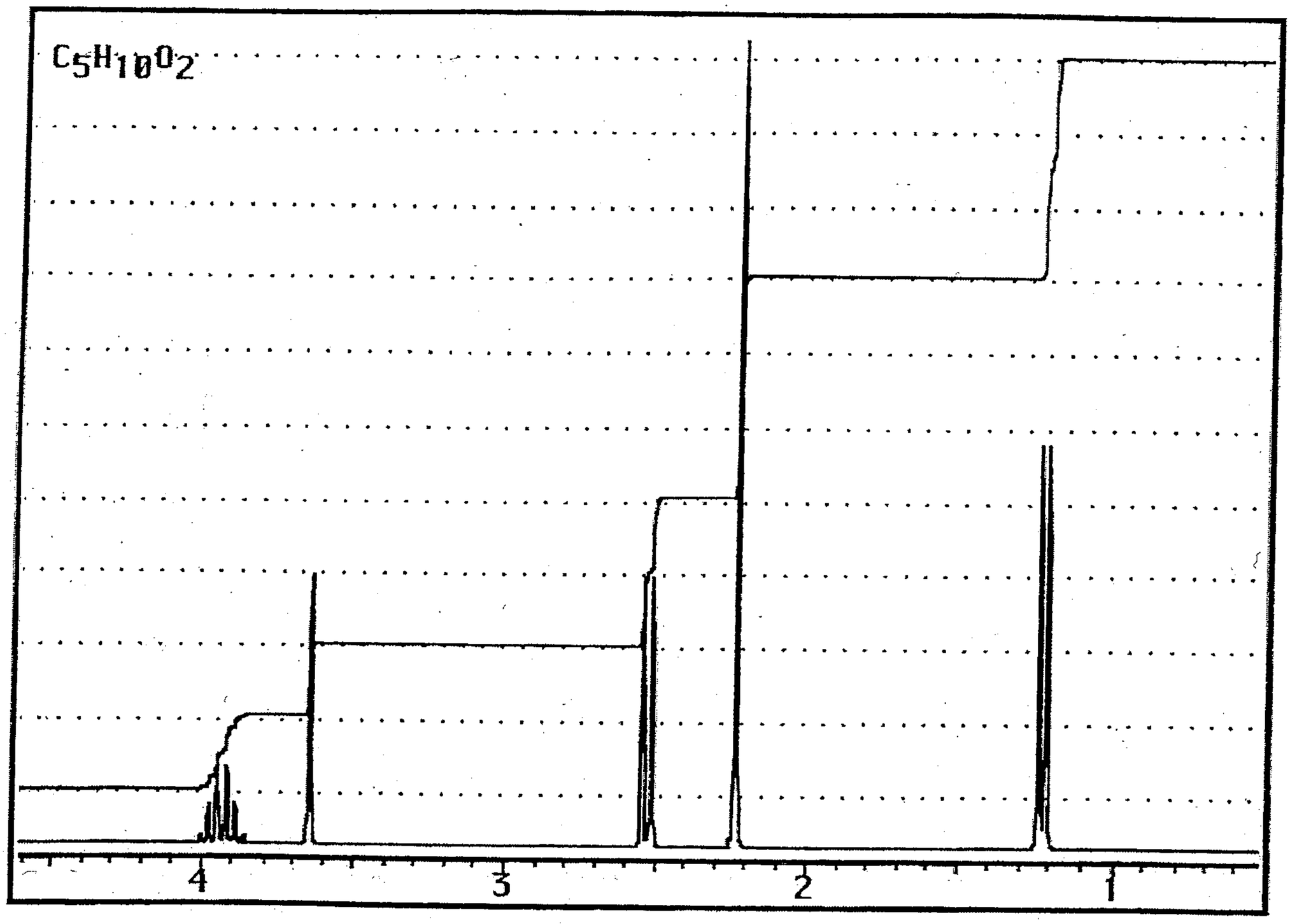


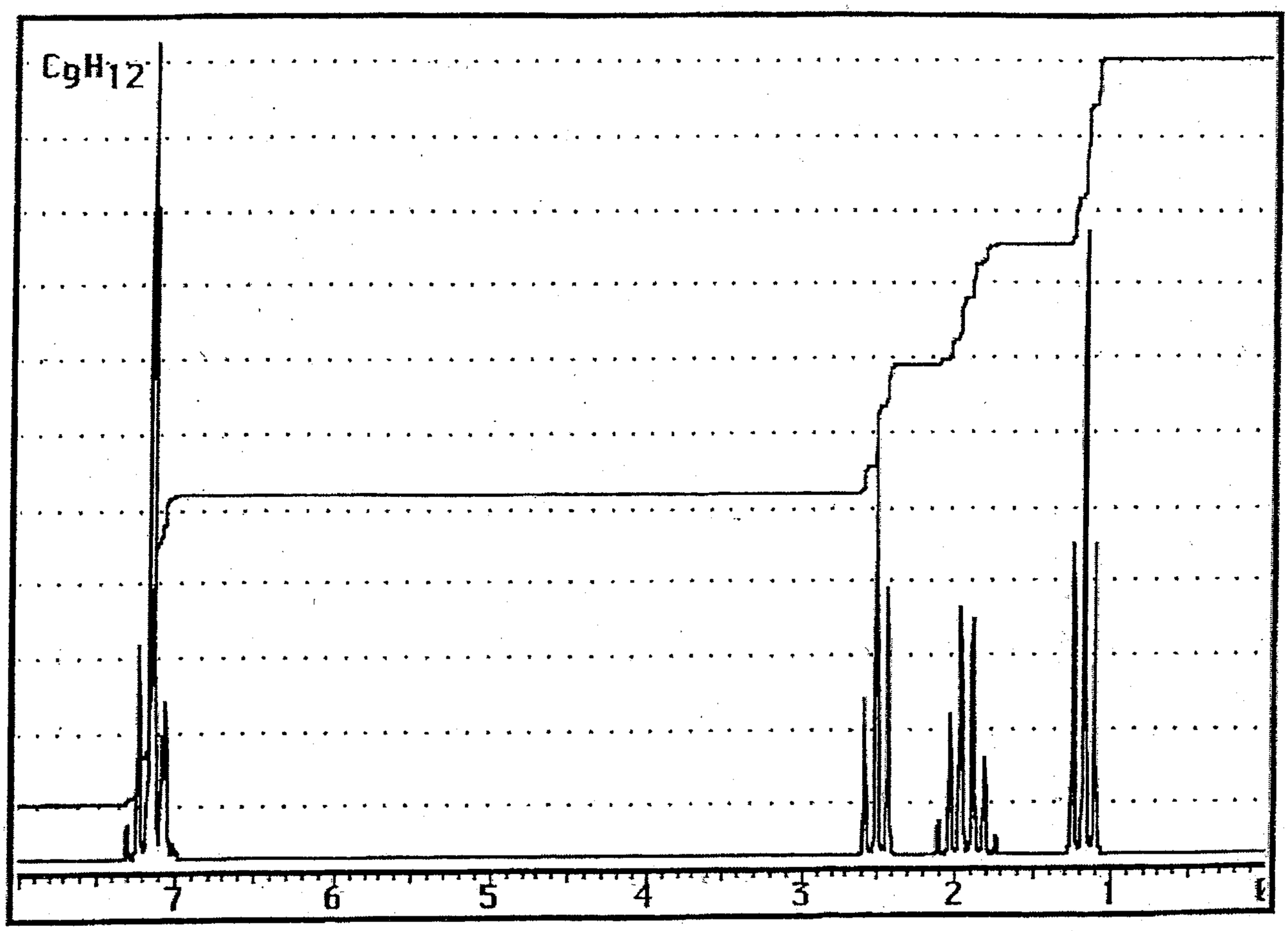

$C_5H_{10}O$
4
3
2
1

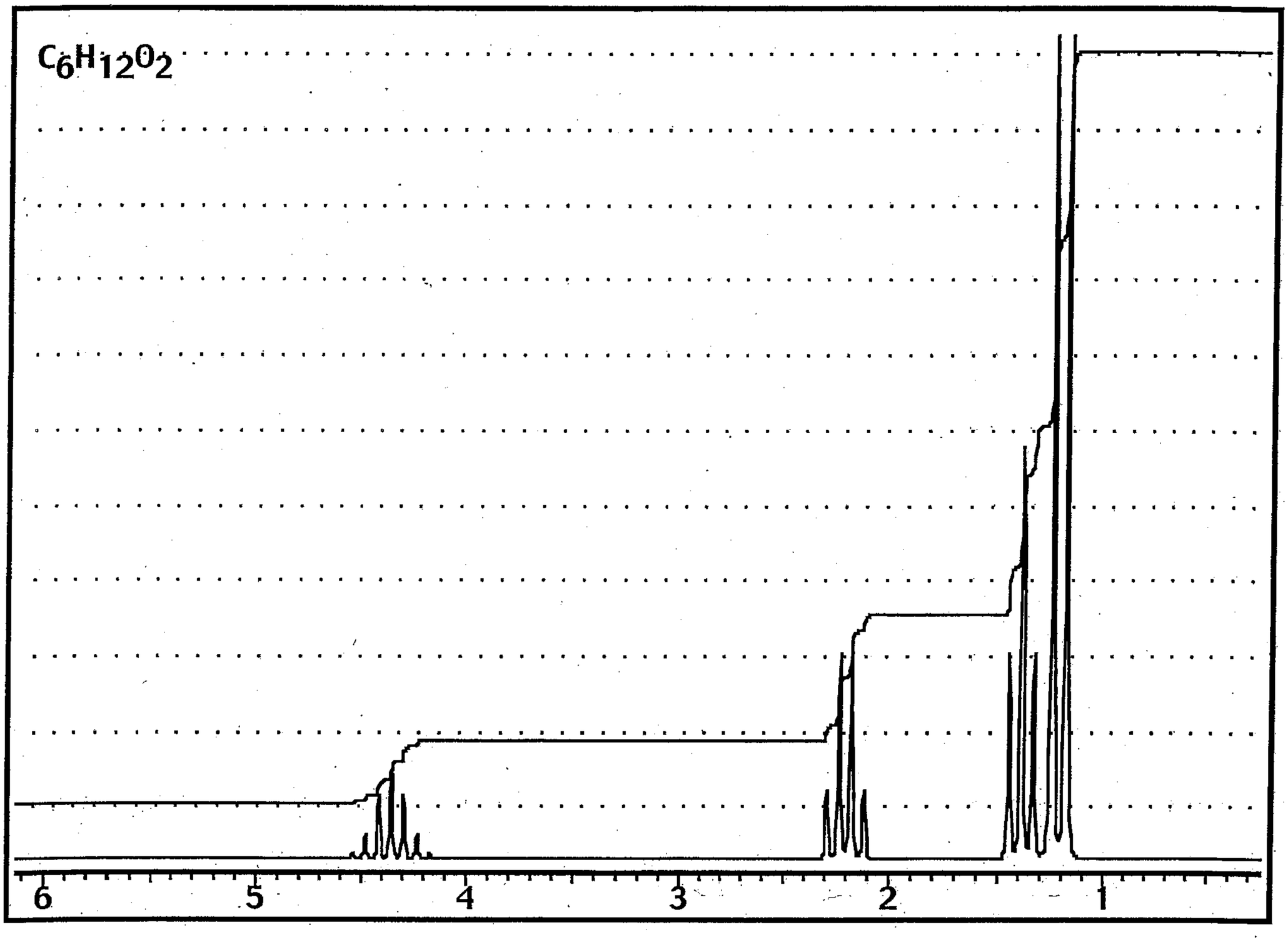

$C_4H_{10}O$
5
4
3
2
1

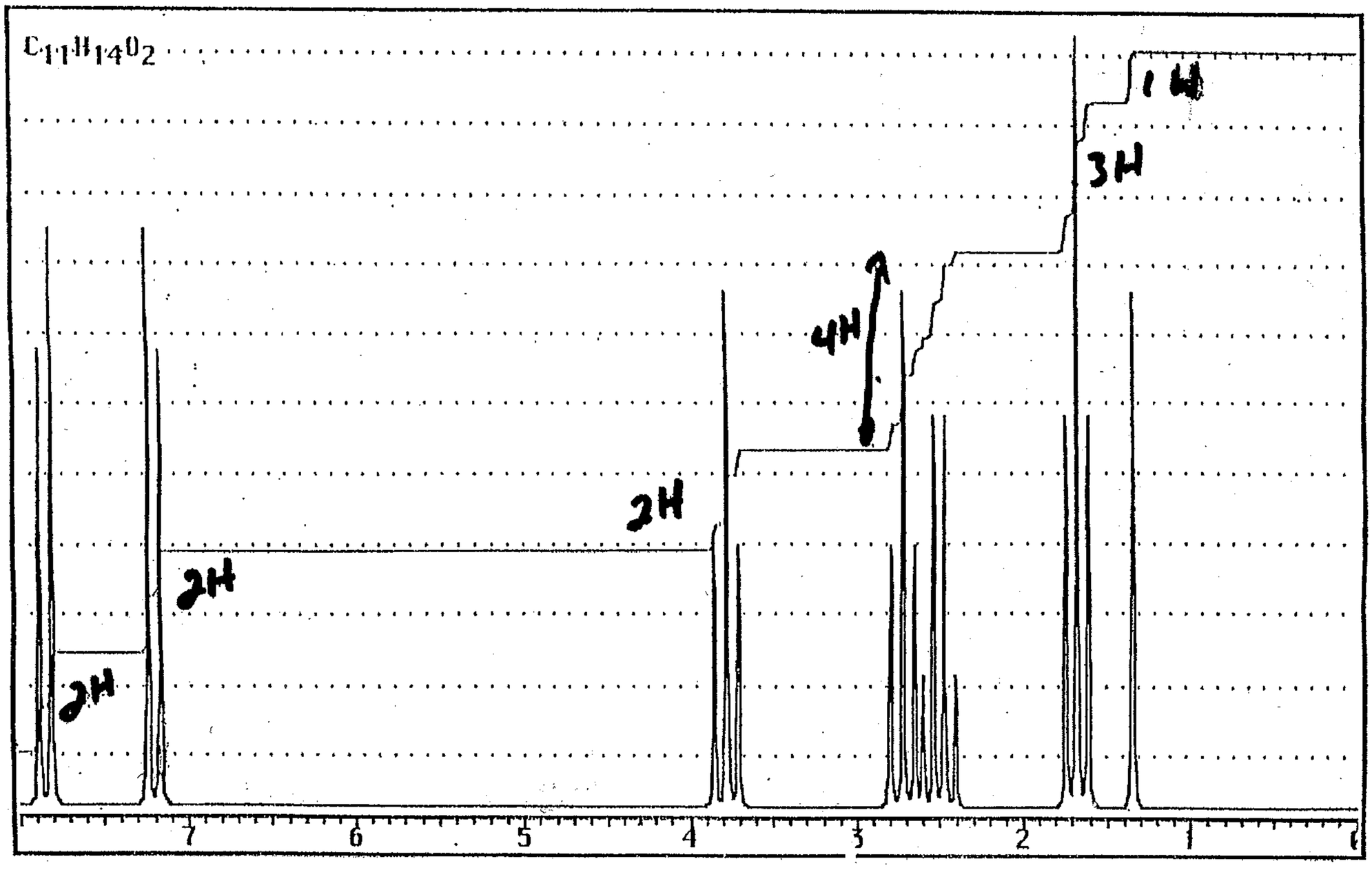

$C_5H_{10}O_2$
4
3
2
1

5




$C_9H_{12}$
7
6
5
4
3
2
1

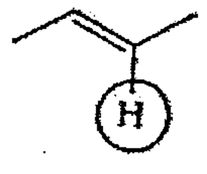

$C_6H_{12}O_2$
6
5
4
3
2
1


$C_{11}H_{14}O_2$
1H
3H
4H
2H
2H
2H
7
6
5
4
3
2
1

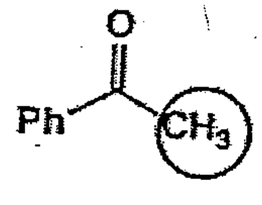
9

Match the circled proton or protons in the following compounds with the correct chemical shift.

Chemical Shifts

a. 

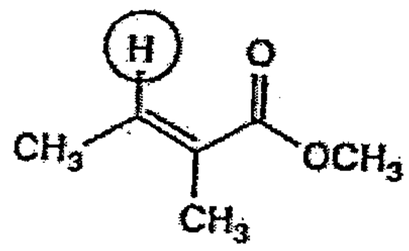

( ) 1.20

b. 

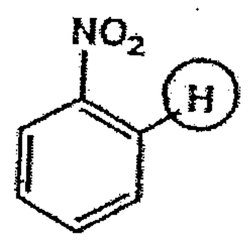

( ) 6.73

c. 


( ) 5.30

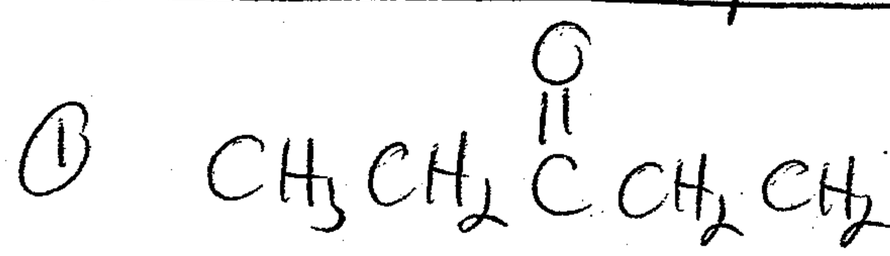
d. 

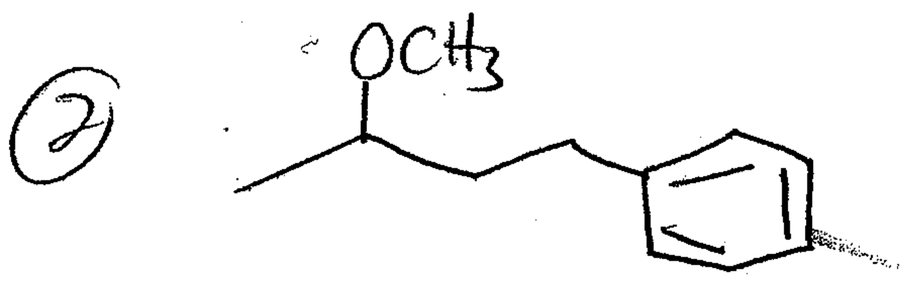

( ) 8.21

e. 


( ) 2.40

## Predict the Spectrum for:

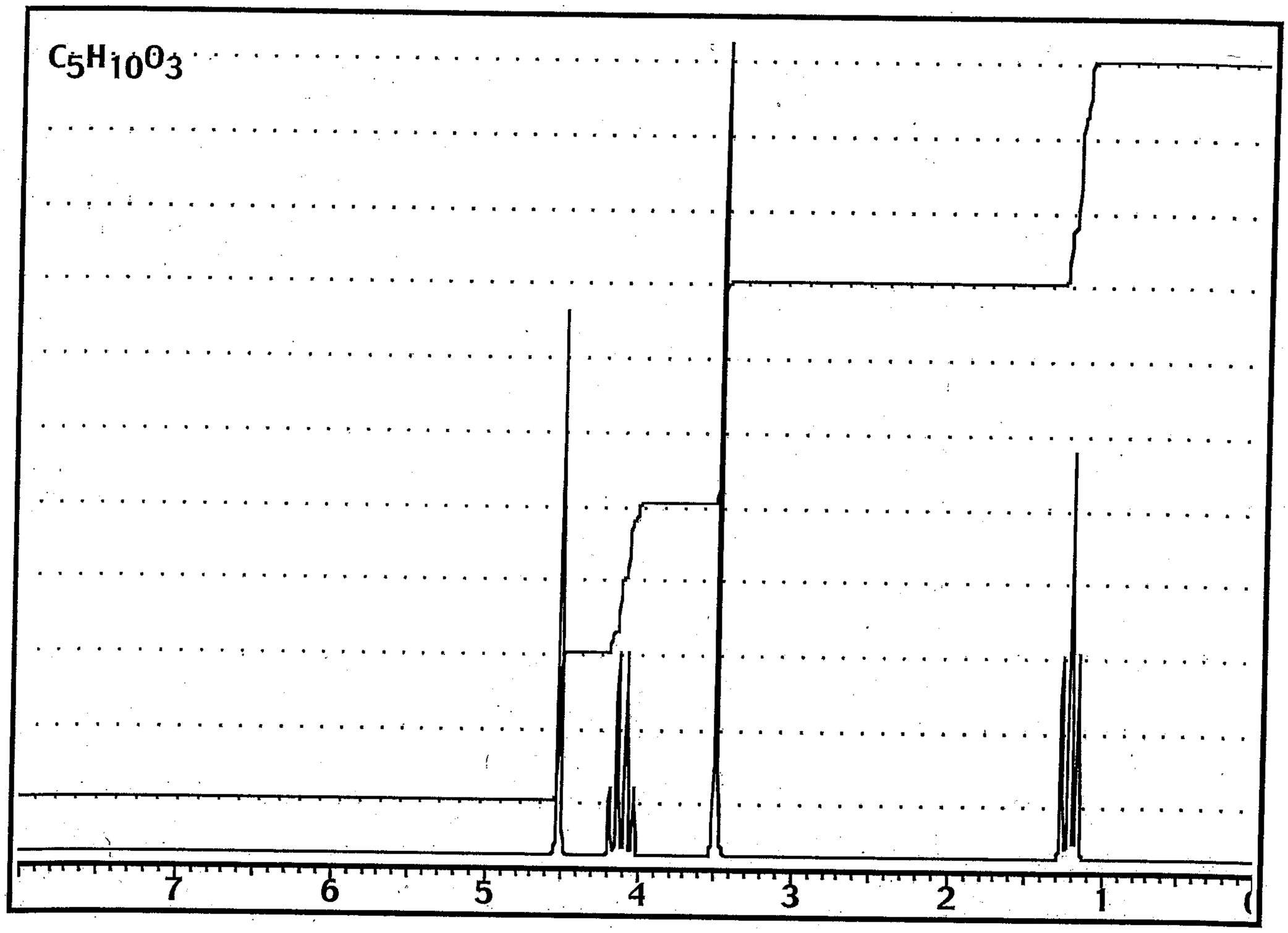
① 

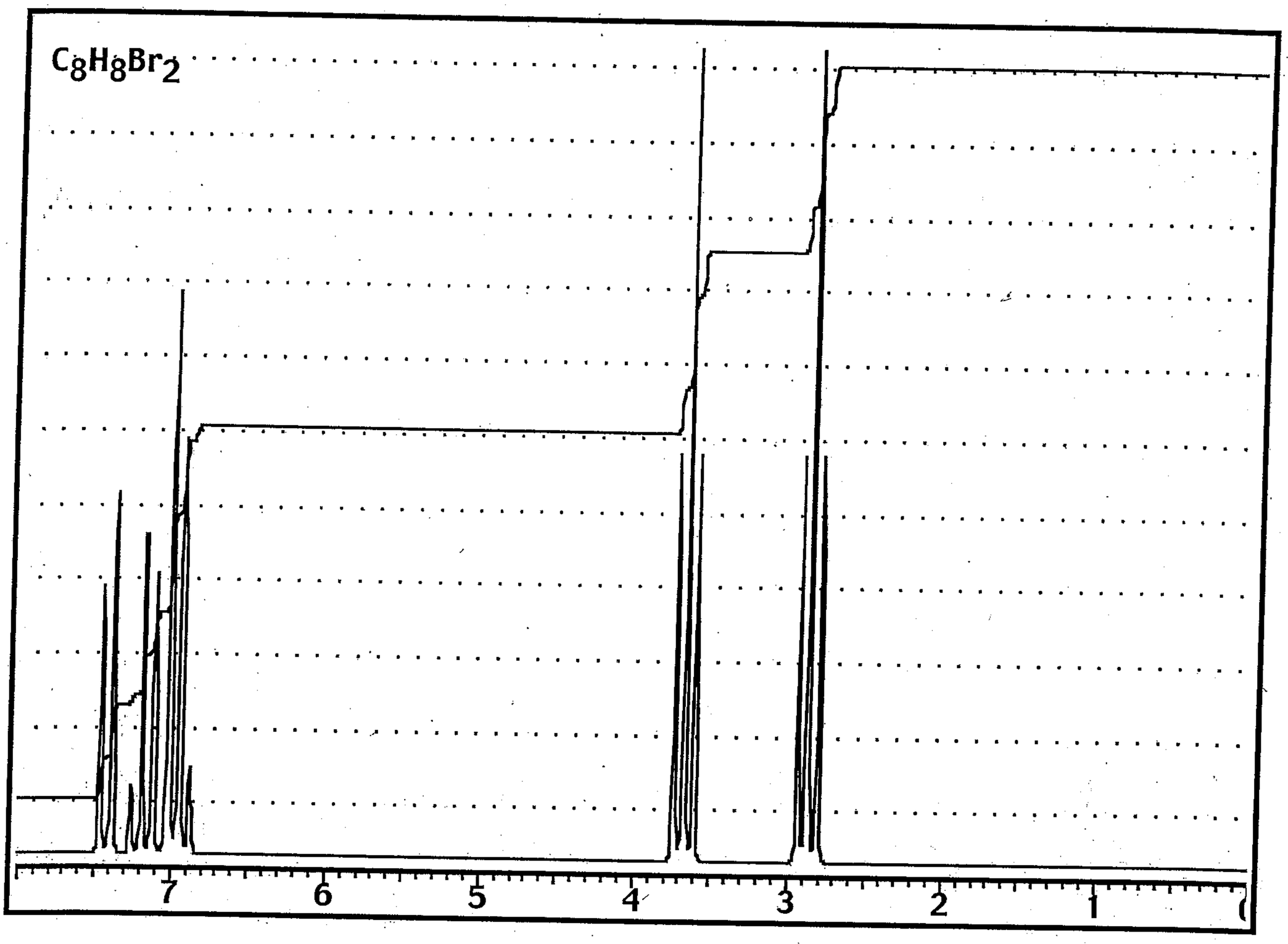
② 

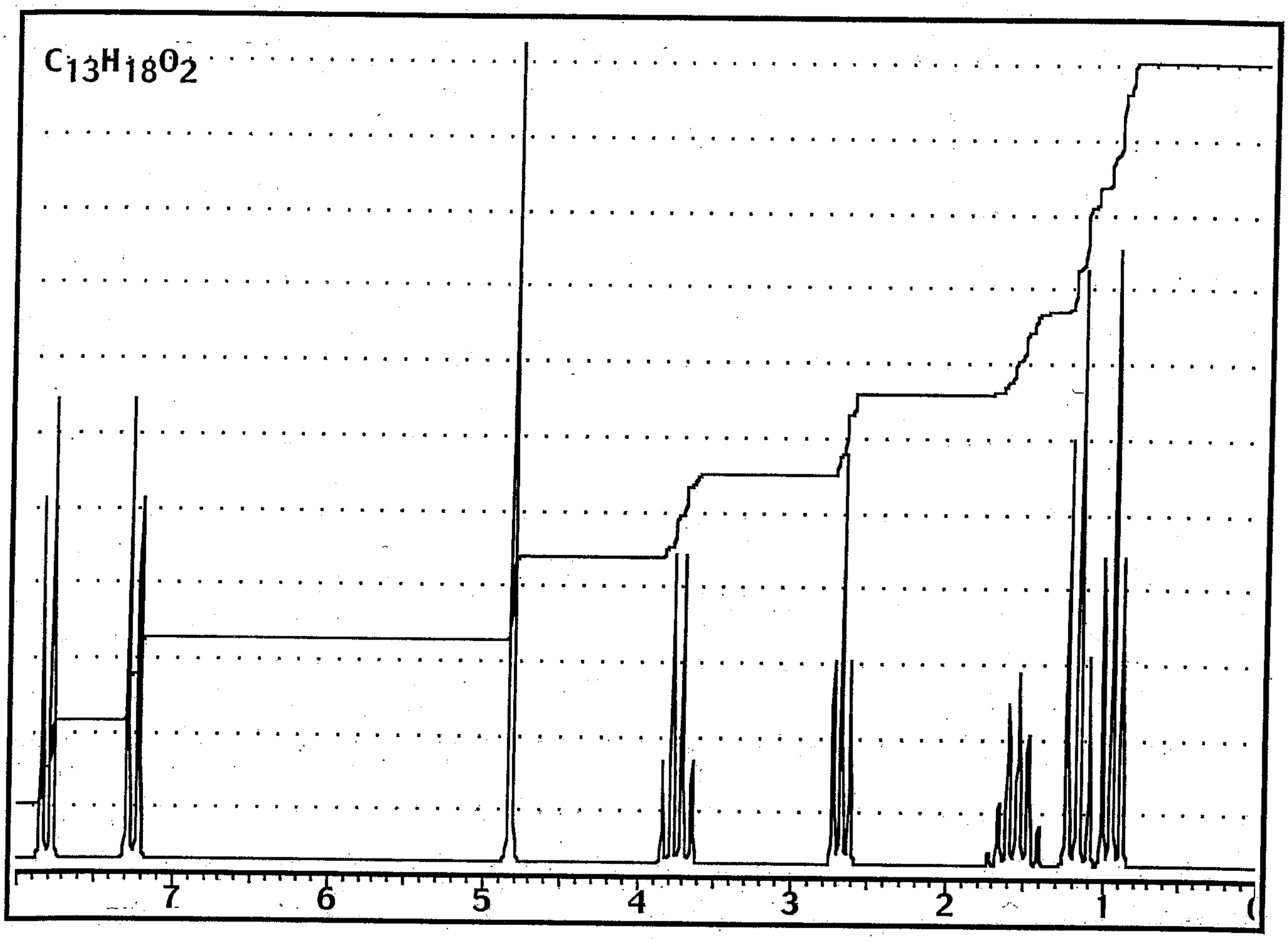
## ③ Identify Structure from Shorthand NMR (nongraphic)

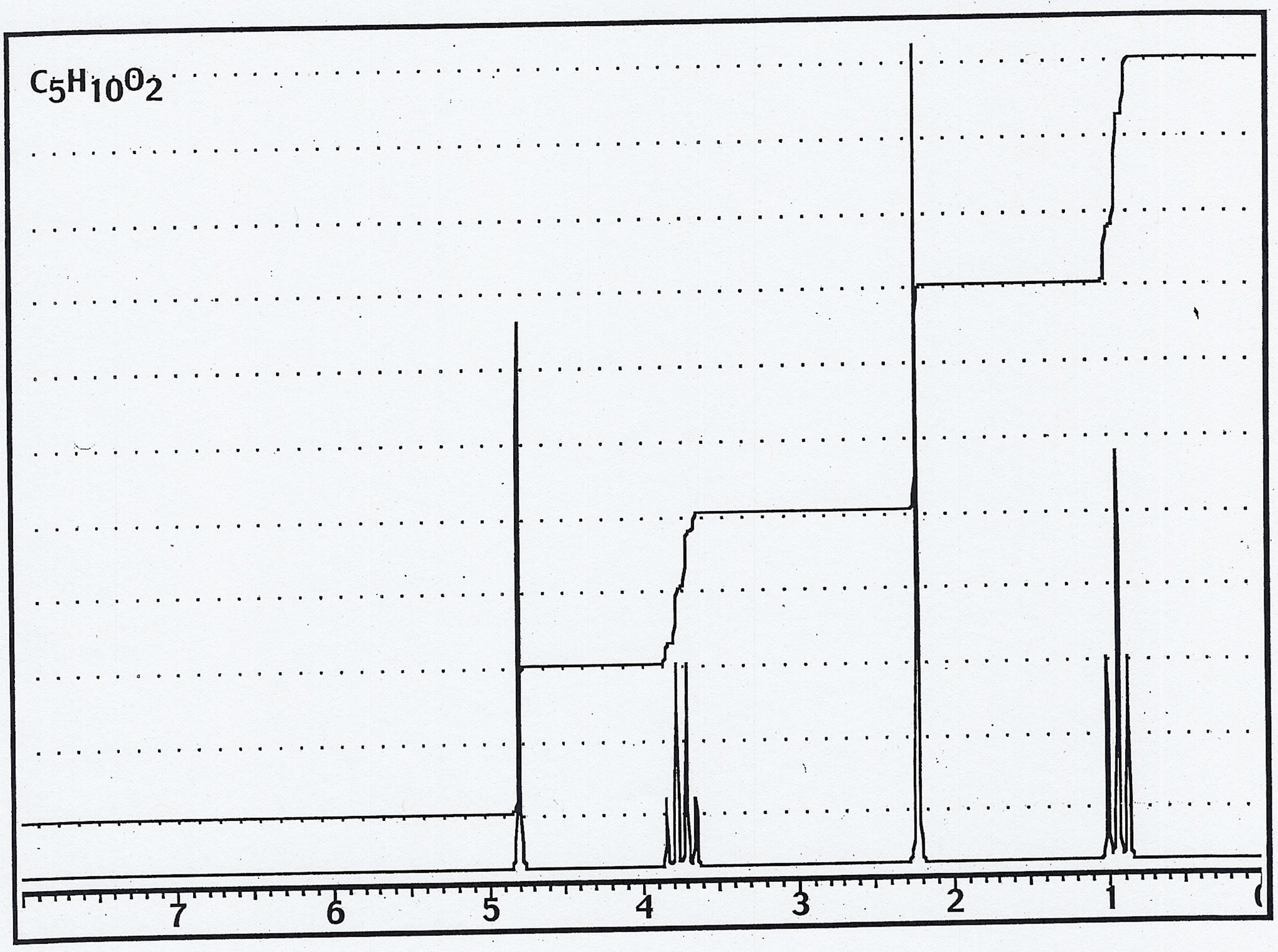
$C_4H_8O$

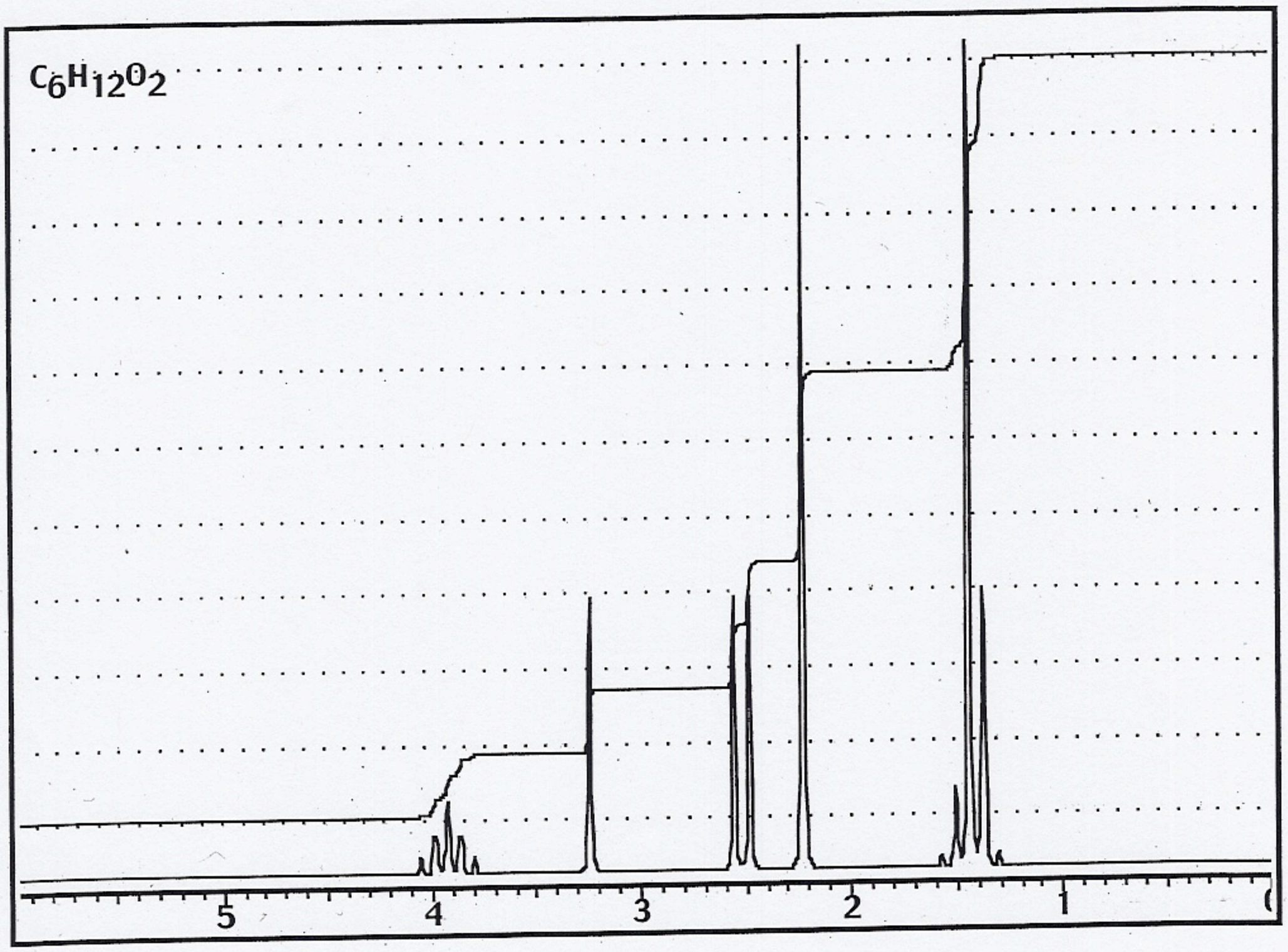
1.05 triplet 3H
2.13 singlet 3H
2.47 quartet 2H

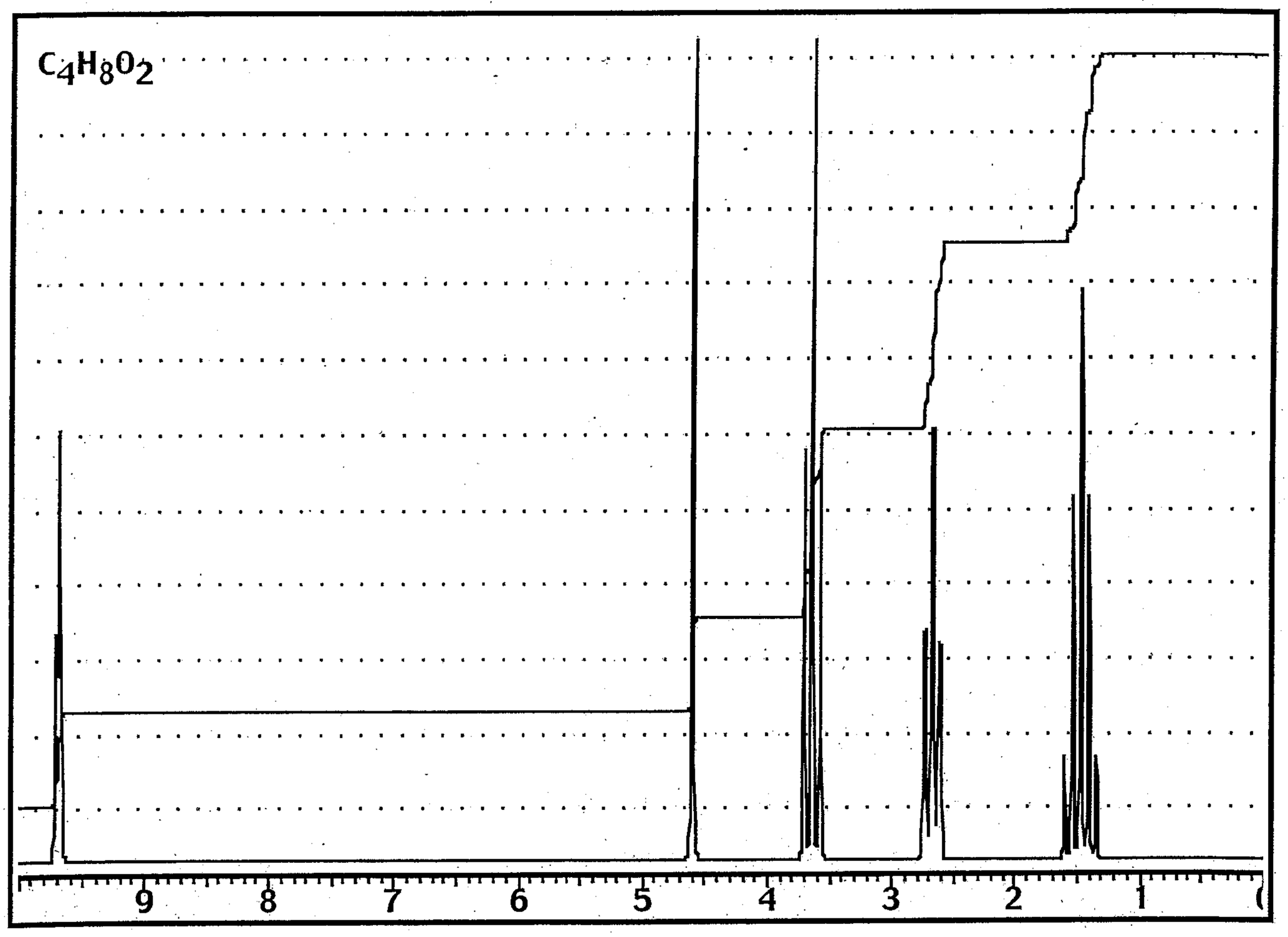

$C_5H_{10}O_3$
7
6
5
4
3
2
1

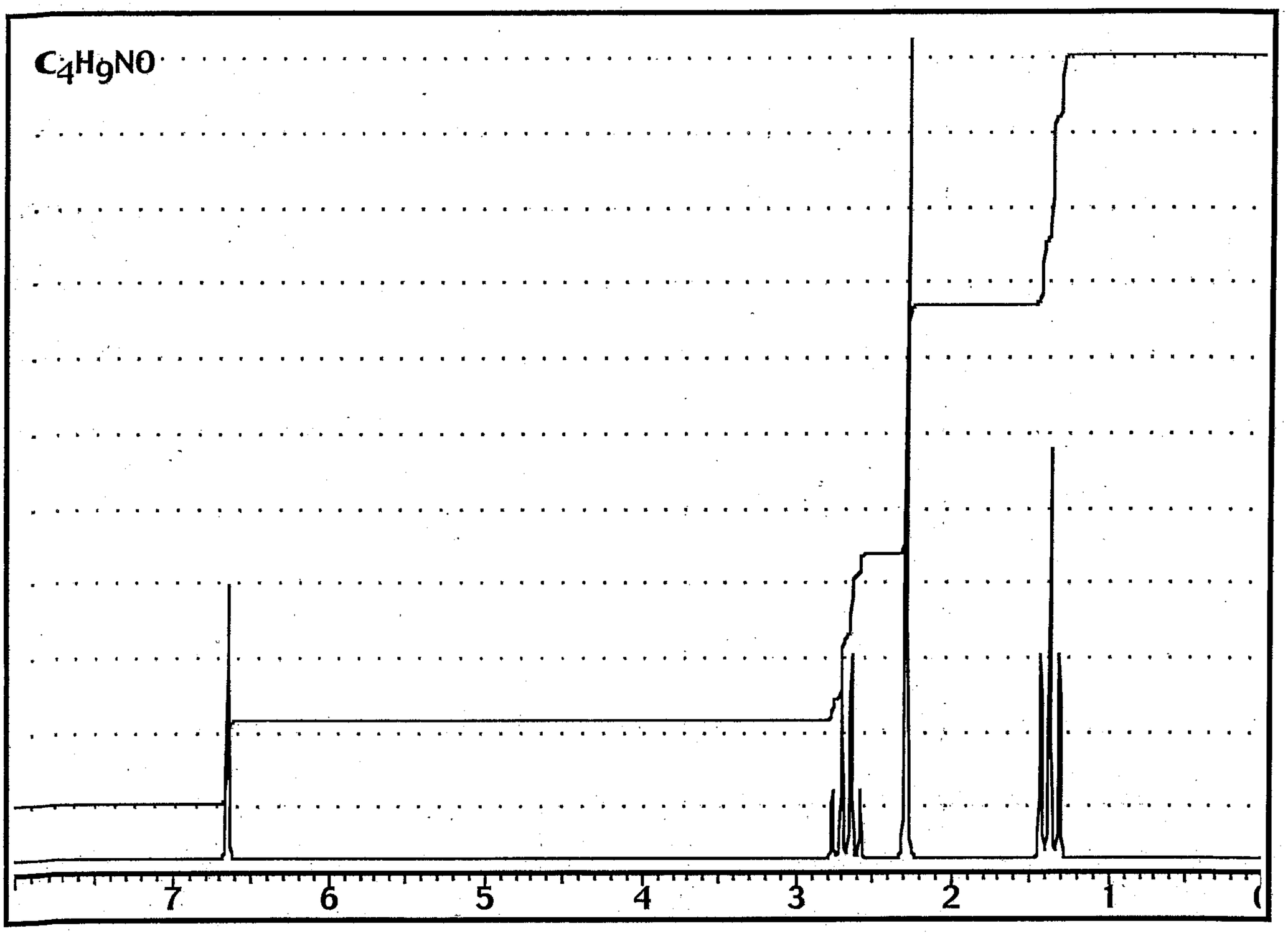

$C_8H_8Br_2$
7
6
5
4
3
2
1

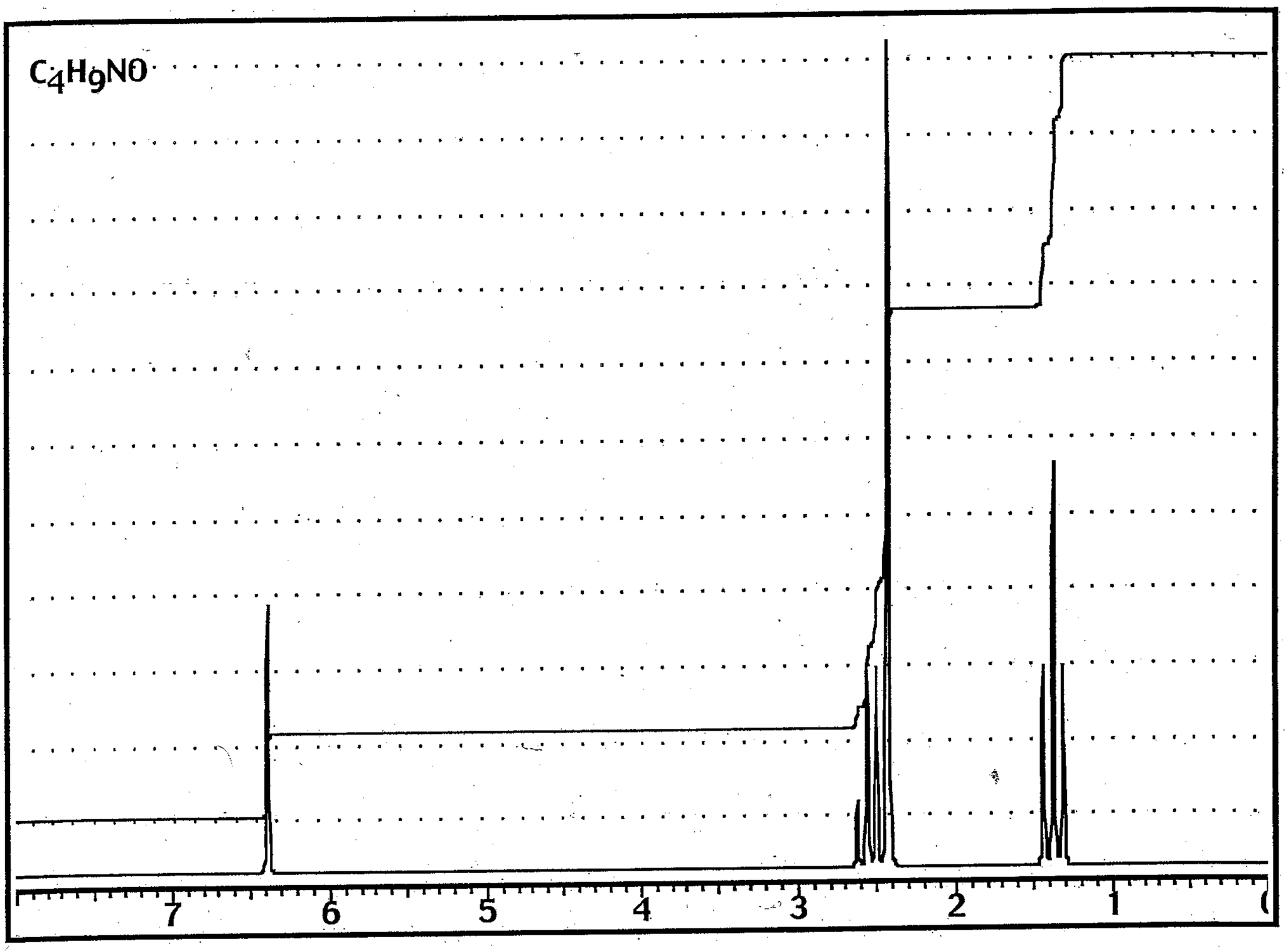

$C_{13}H_{18}O_2$
7
6
5
4
3
2
1

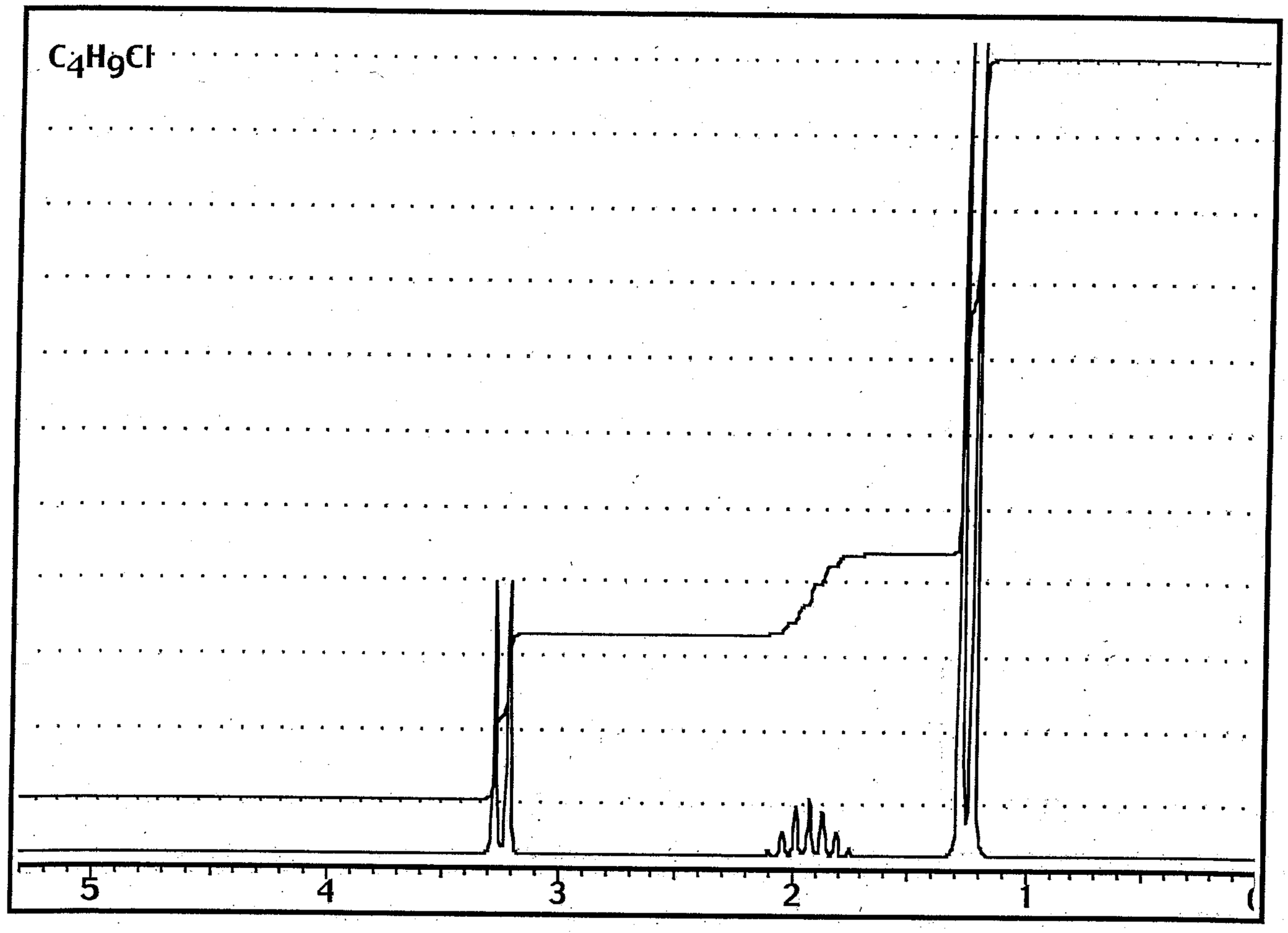

$C_5H_{10}O_2$
7
6
5
4
3
2
1

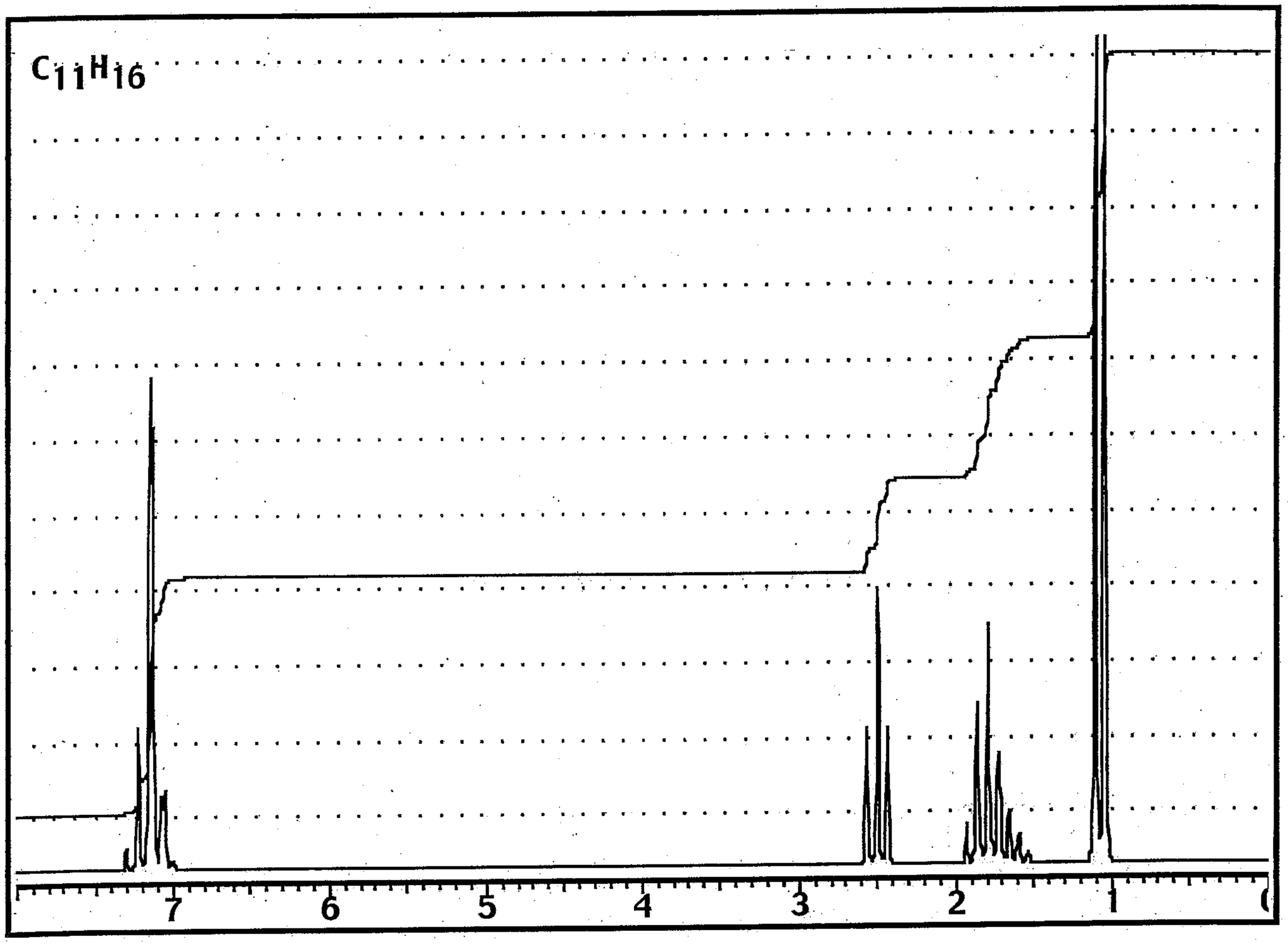

$C_6H_{12}O_2$
5
4
3
2
1


$C_4H_8O_2$
9
8
7
6
5
4
3
2
1


$C_4H_9NO$
7
6
5
4
3
2
1

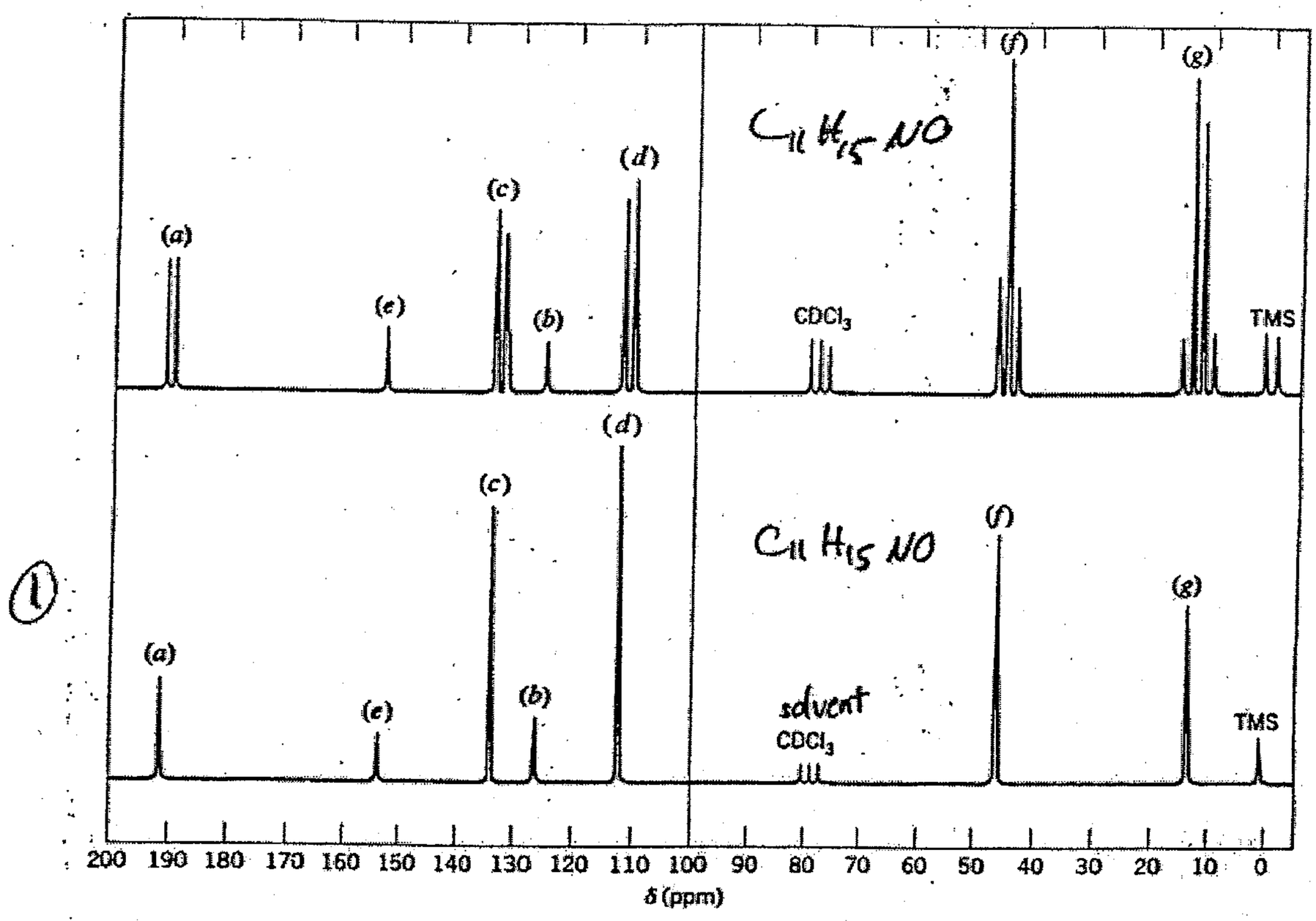

$C_4H_9NO$
7
6
5
4
3
2
1


$C_4H_9Cl$
5
4
3
2
1

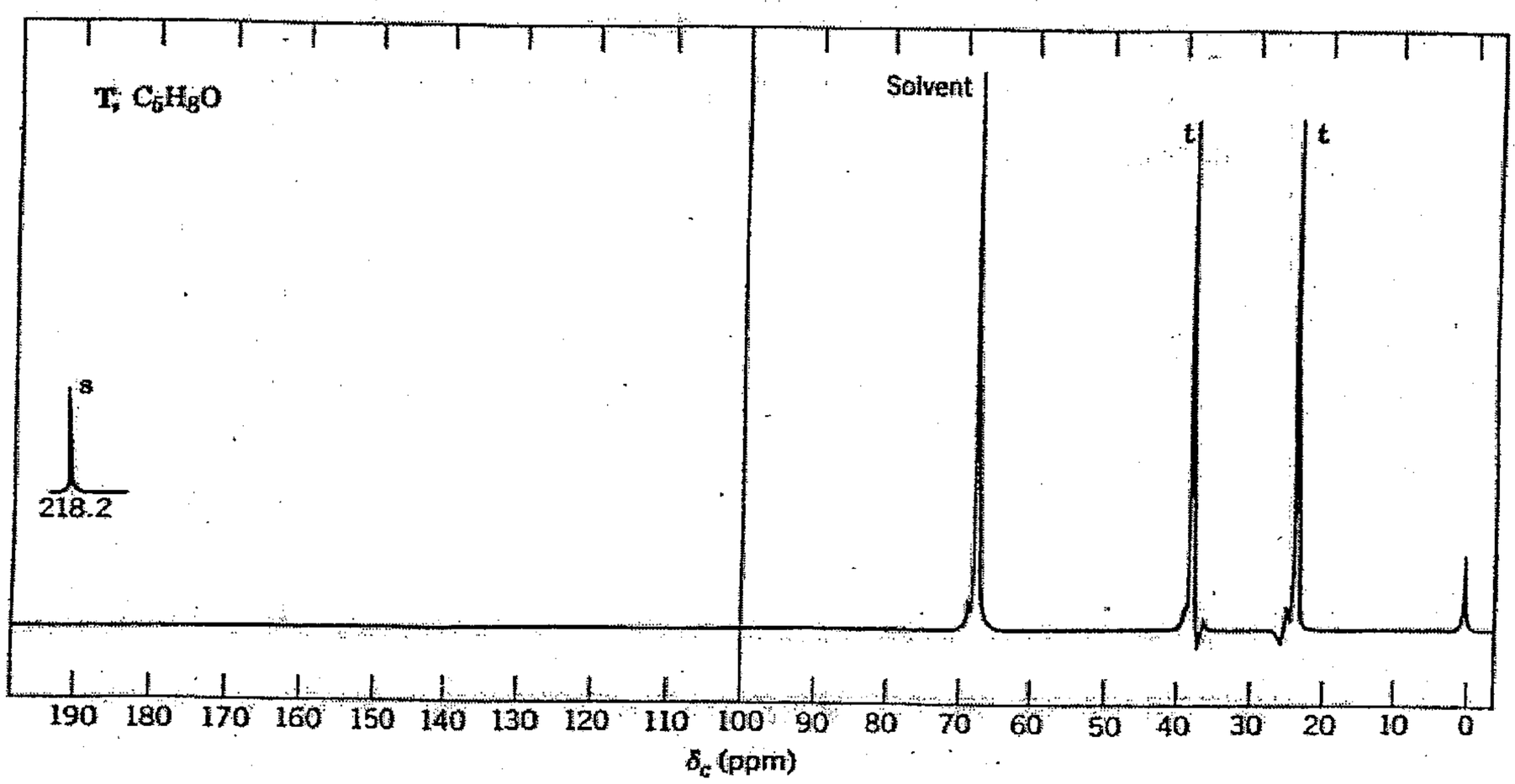

C11H16
7
6
5
4
3
2
1

21

$C^{13}$ – (1)


(a)
(e)
(c)
(b)
(d)
(f)
(g)
CDCl3
TMS
C11 H15 NO
(d)
(c)
(a)
(e)
(b)
(f)
(g)
solvent
CDCl3
TMS
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
δ (ppm)

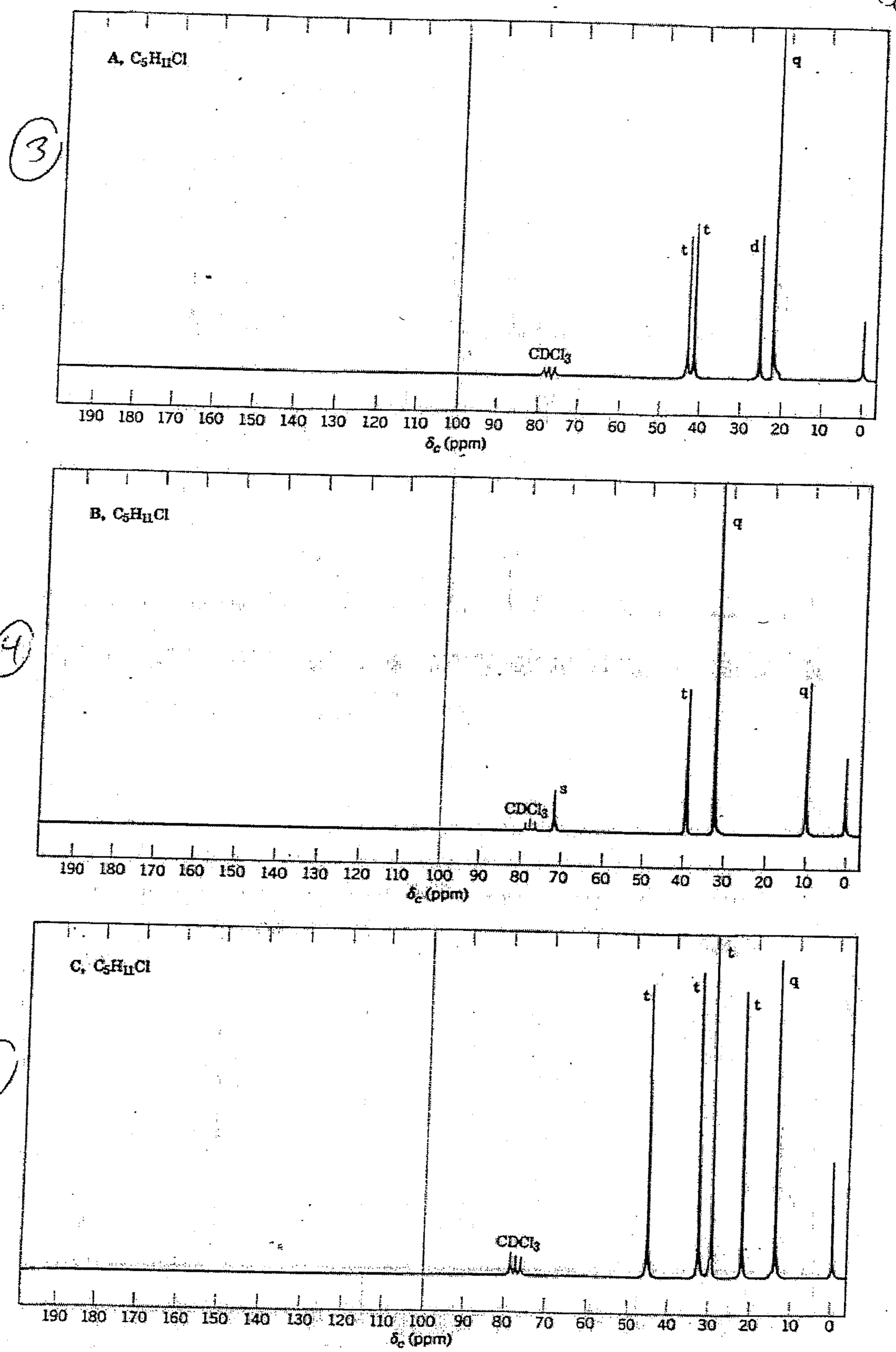
(1)


T; C6H8O
Solvent
t
t
s
218.2
190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0
δc (ppm)

(2)

22

13C - 2




3

4

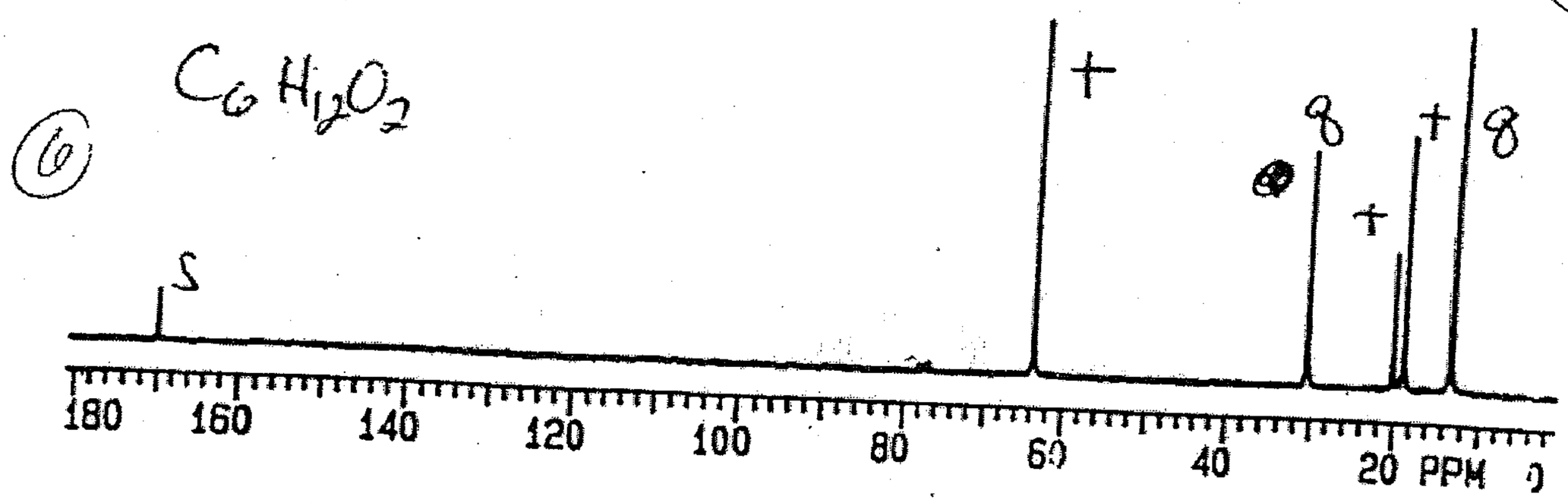
5



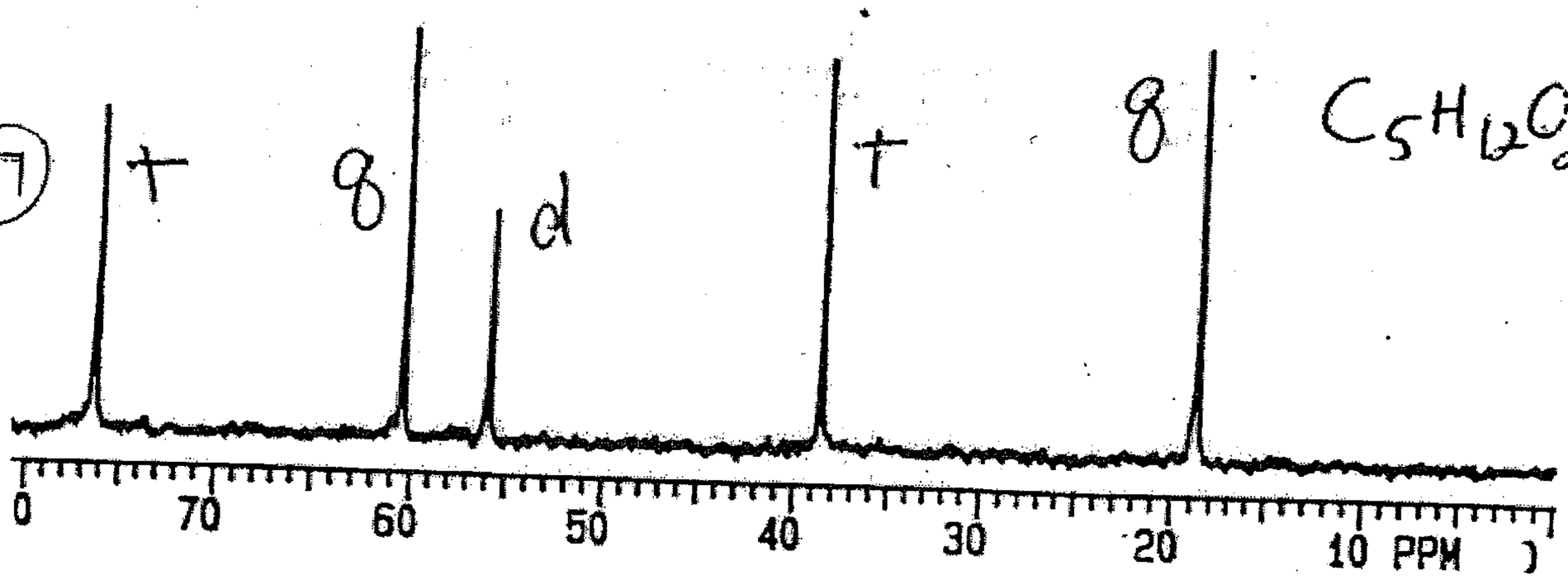
**FIGURE 14.37** 102

$^{13}C-$ (3)

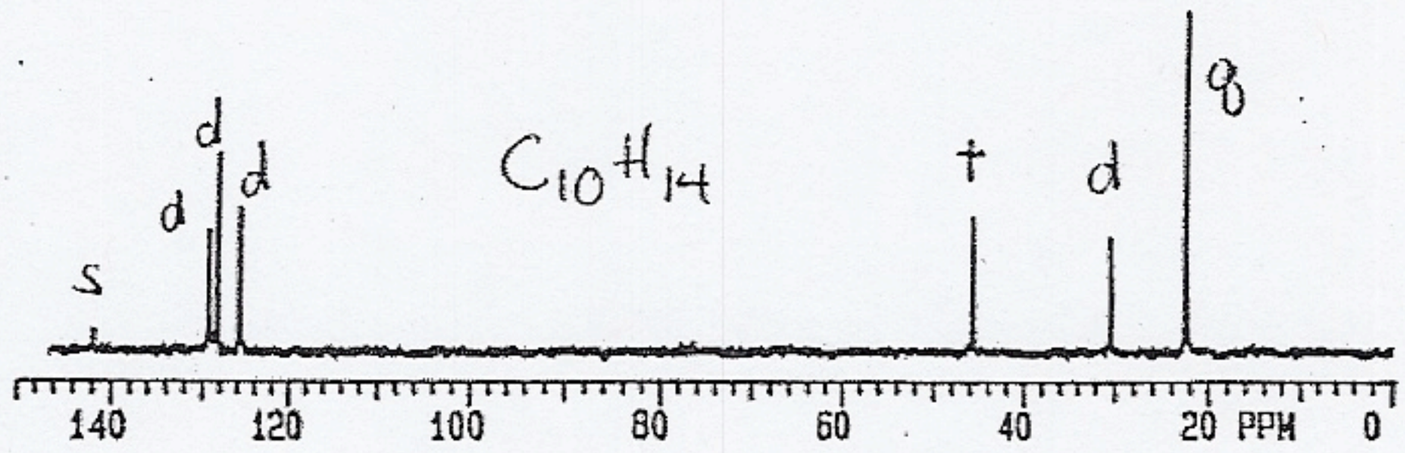
(6) $C_6H_{12}O_2$



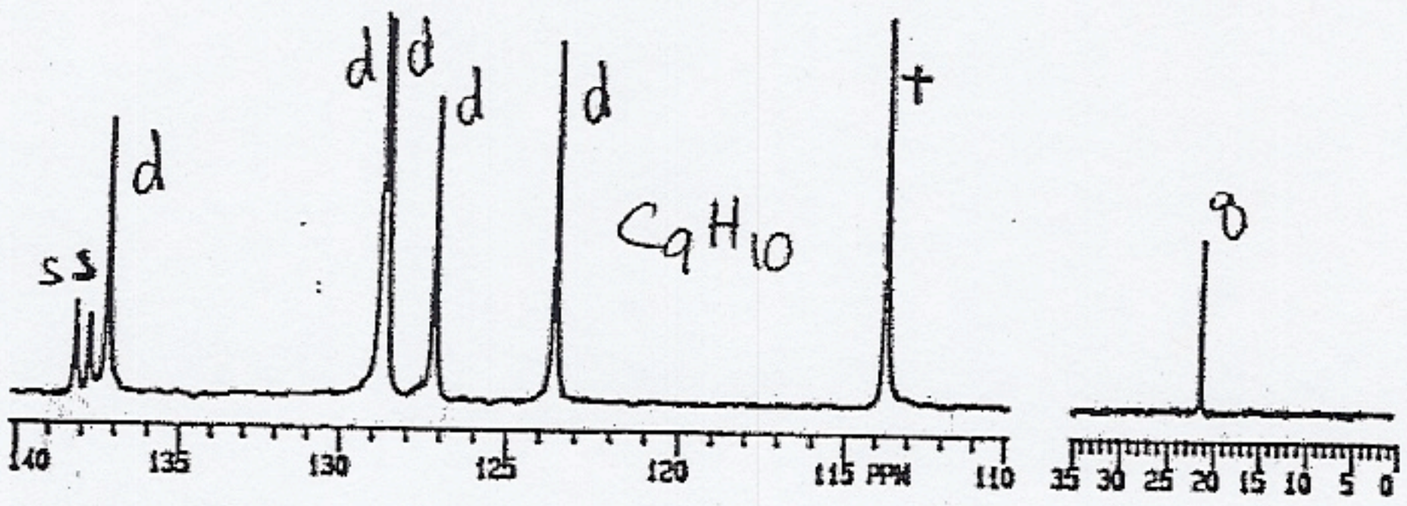

(7) $C_5H_{12}O_2$



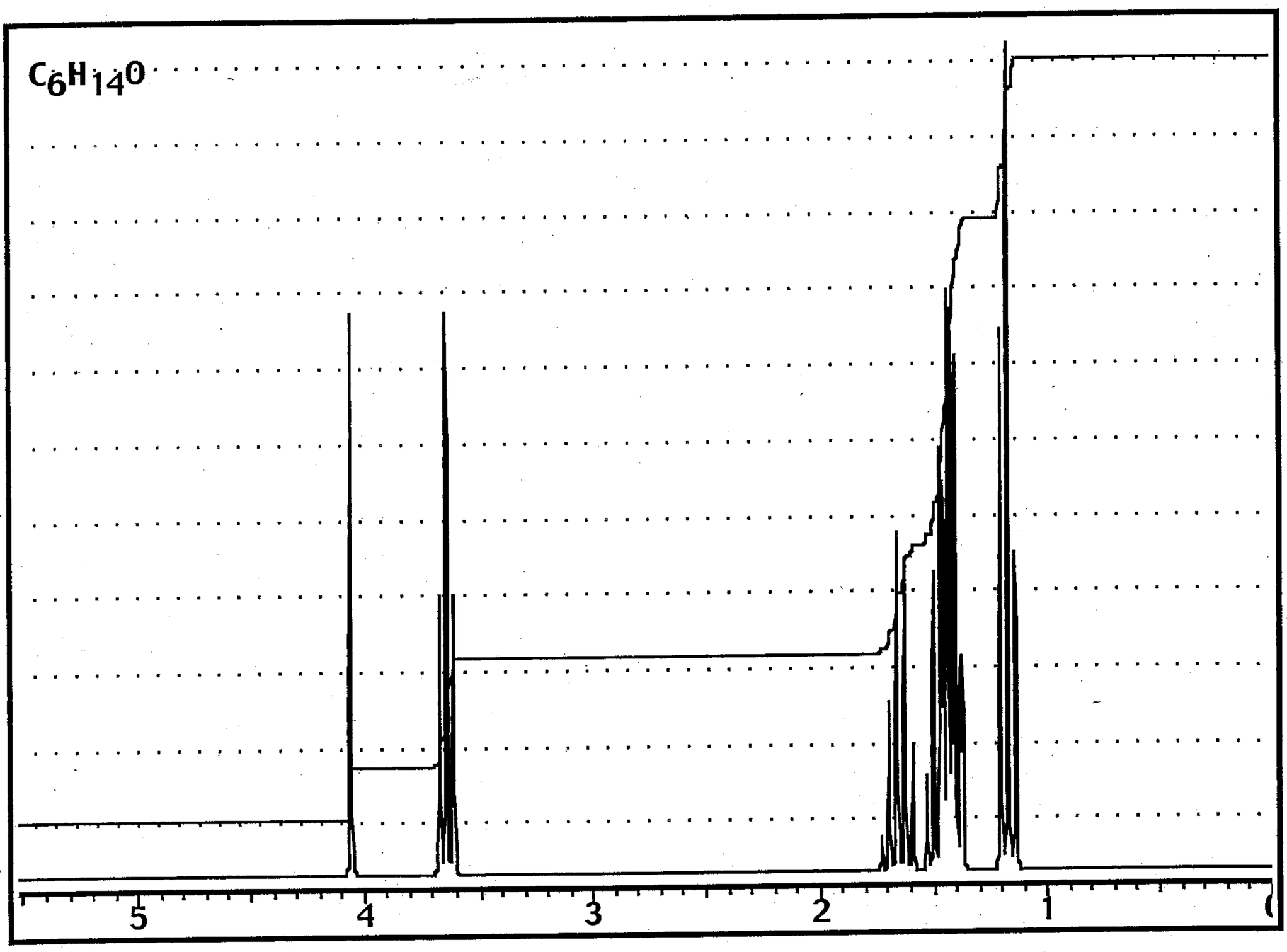
(8)

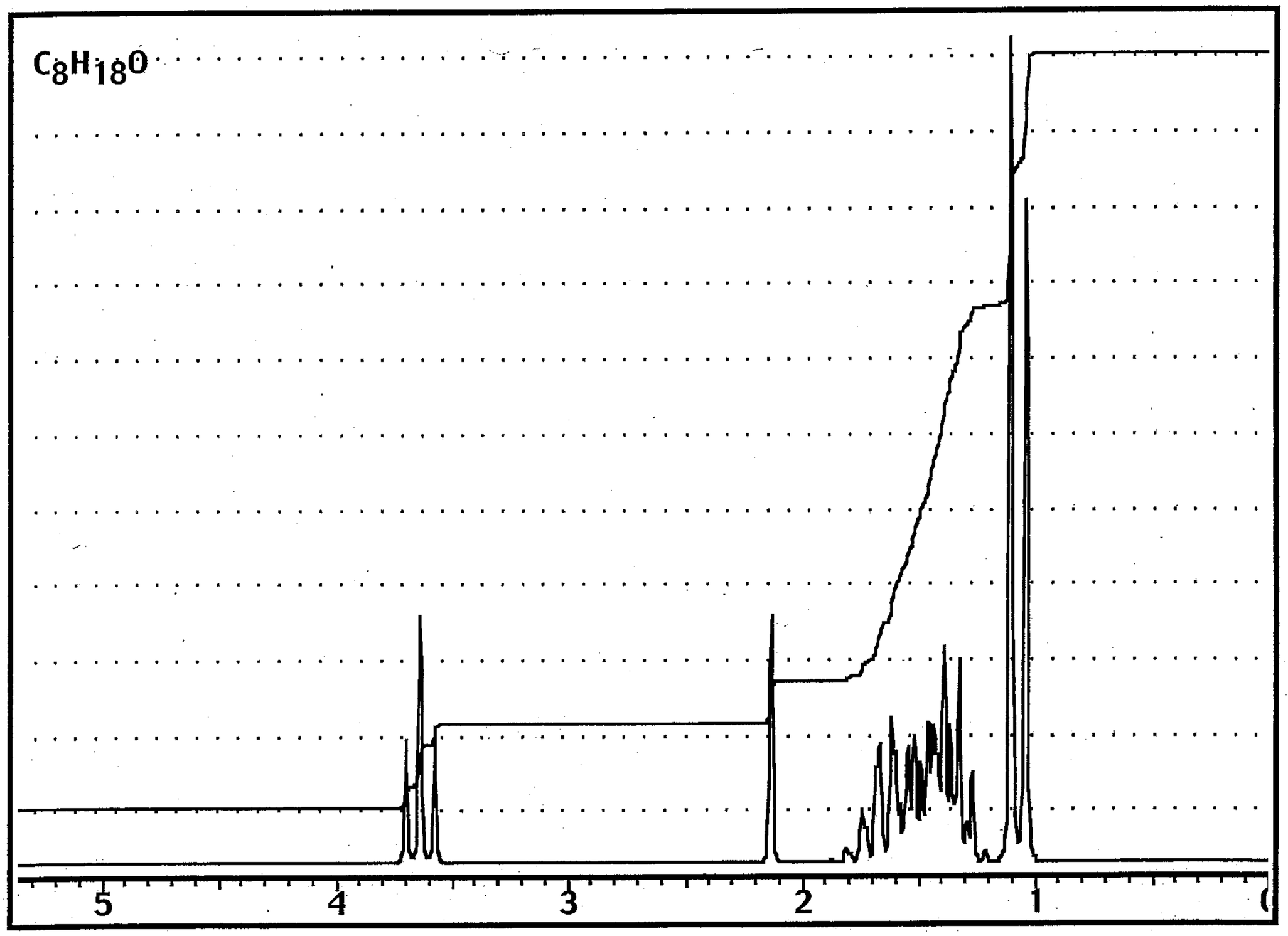



(9)




Carbon 13 NMR


$C_6H_{14}O$
5
4
3
2
1


$C_8H_{18}O$
5
4
3
2
1