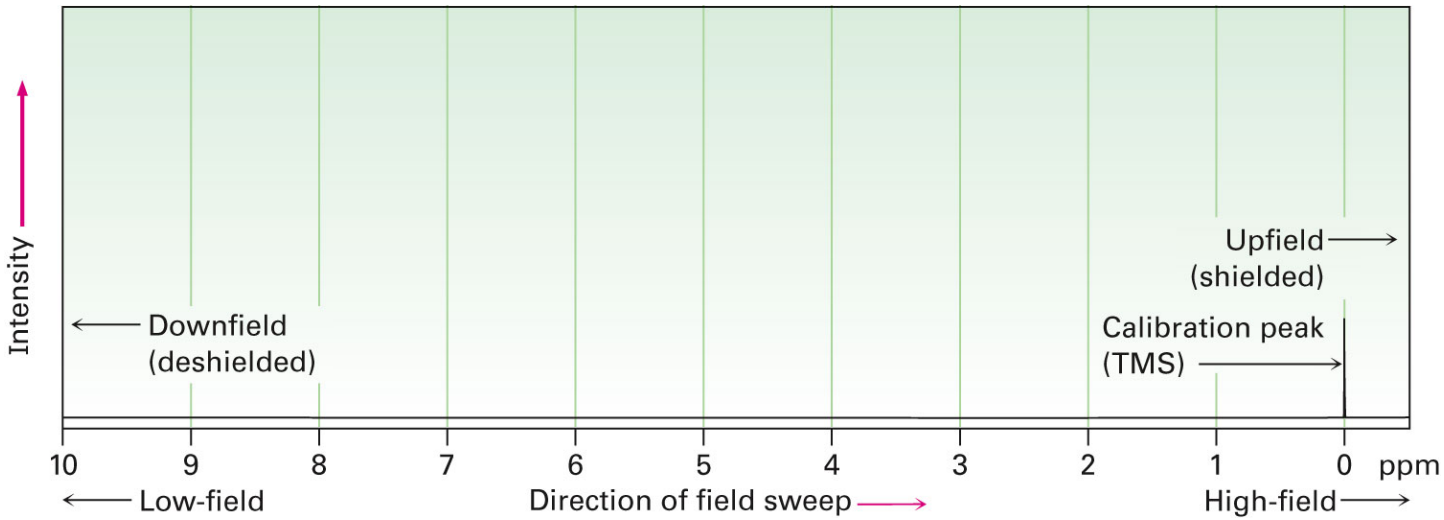
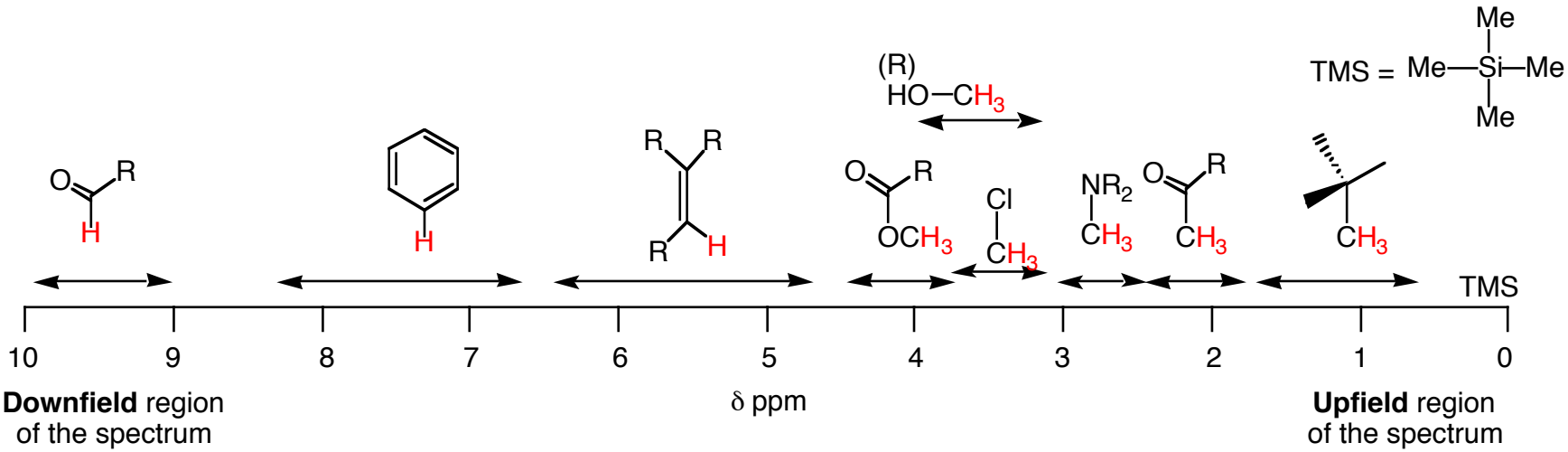
^{1}H NMR

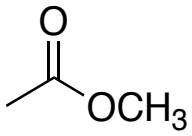
- NMR spectra show applied field strength increasing from left to right
- Left part is **downfield** is **upfield**
- Nuclei that absorb on upfield side are strongly shielded.
- Chart calibrated versus a reference point, set as 0, tetramethylsilane [TMS]

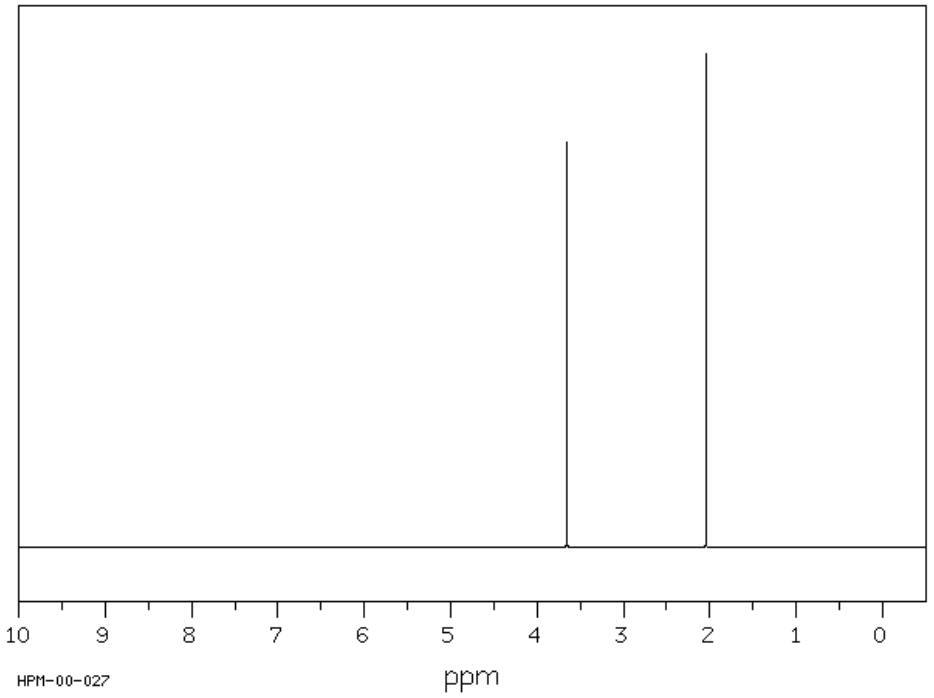



TMS = Me—Si—Me
Me
Me
Me
(R)
HO—CH3
TMS
10
9
8
7
6
5
4
3
2
1
0
δ ppm
Downfield region of the spectrum
Upfield region of the spectrum

^{1}H NMR

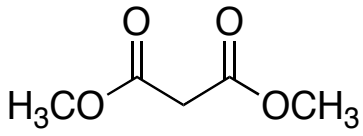
Methyl acetate

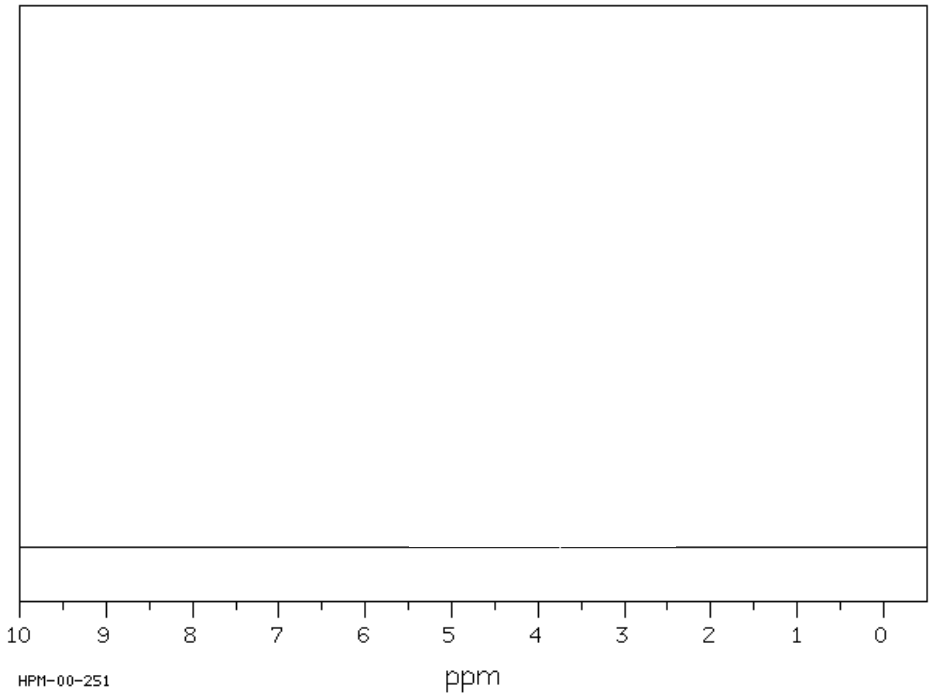


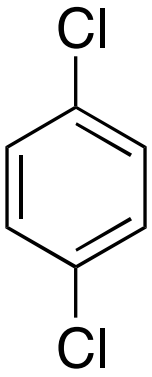


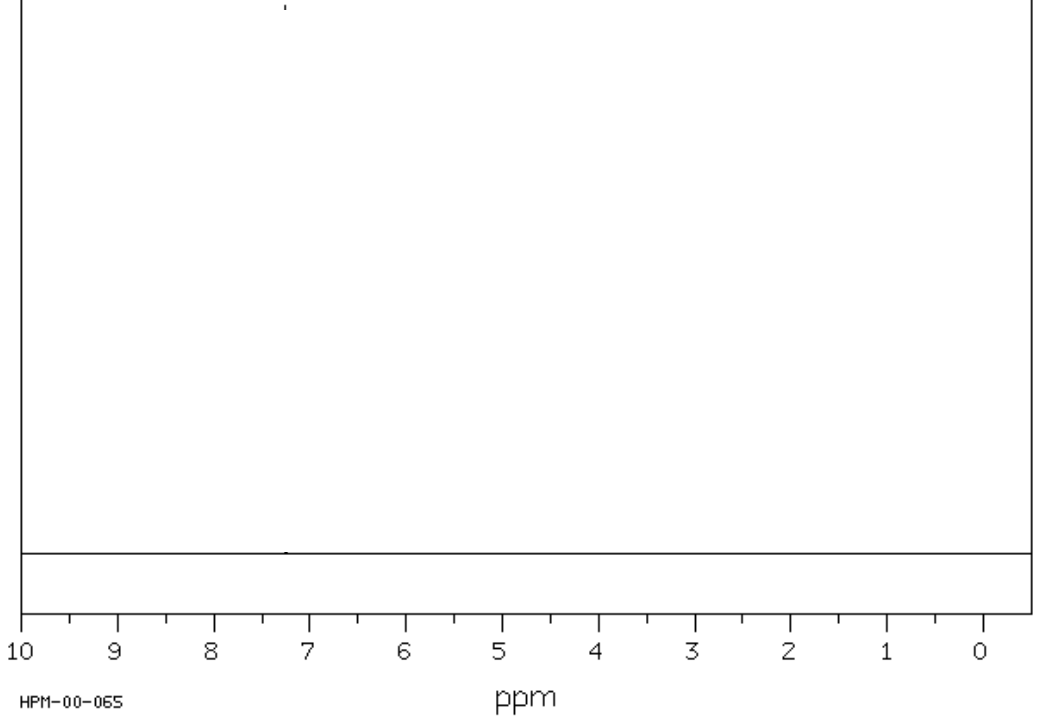
^{1}H NMR

Dimethyl Malonate



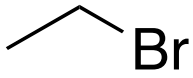


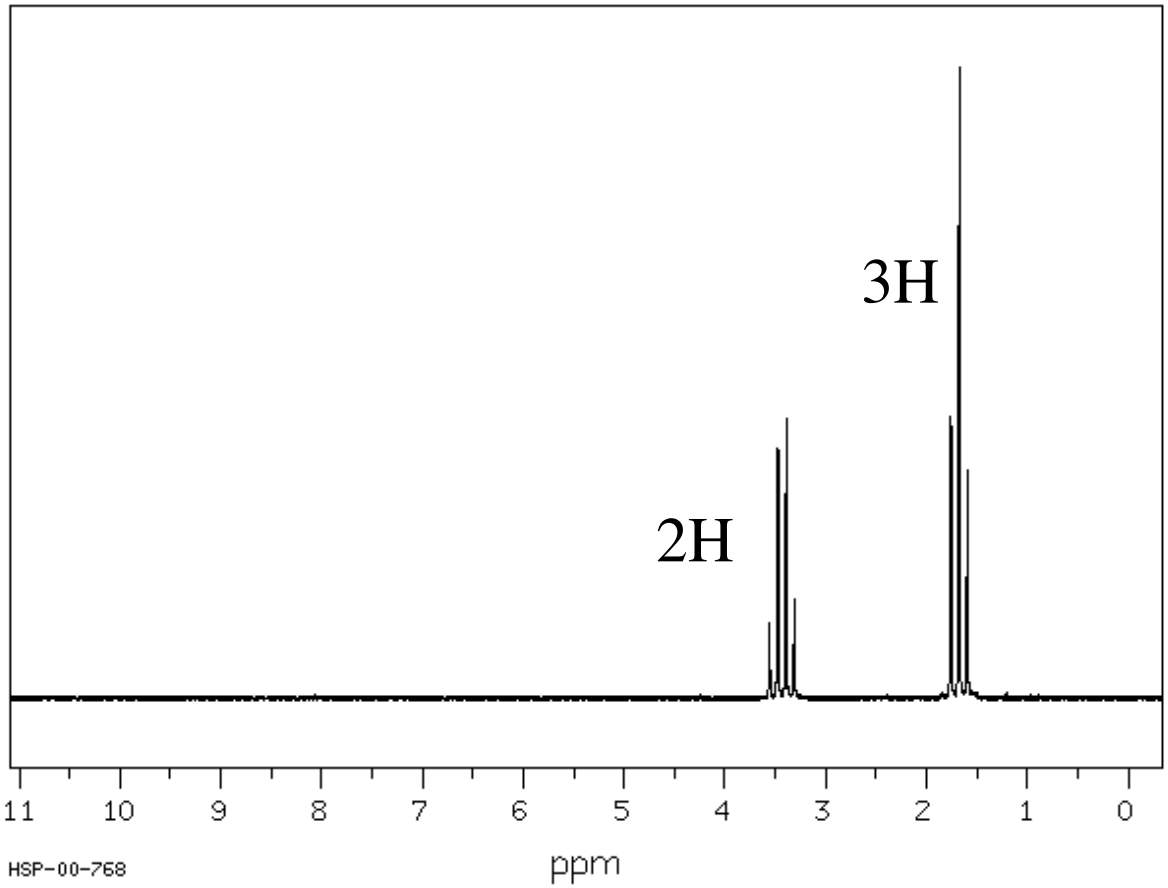

Cl
Cl


10
9
8
7
6
5
4
3
2
1
0
HPM-00-065
ppm

^{1}H NMR

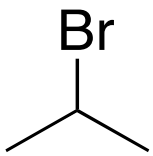
Ethyl bromide

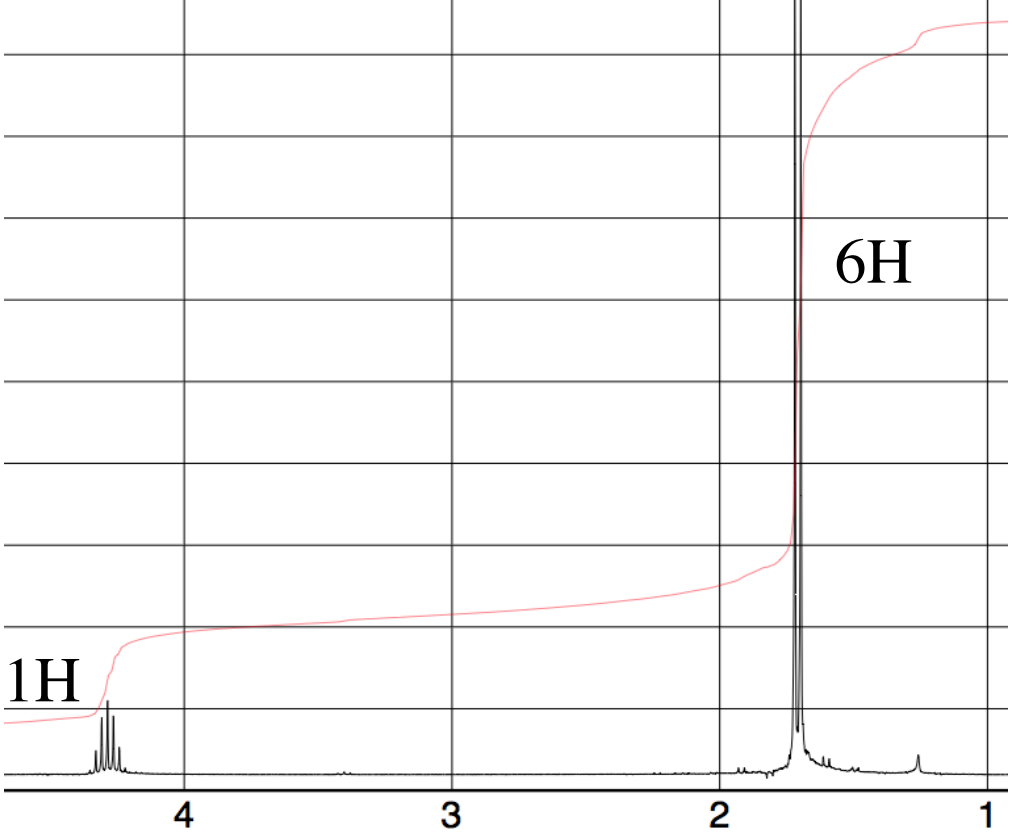




^{1}H NMR

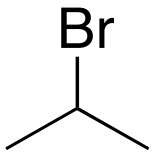
2-bromopropane

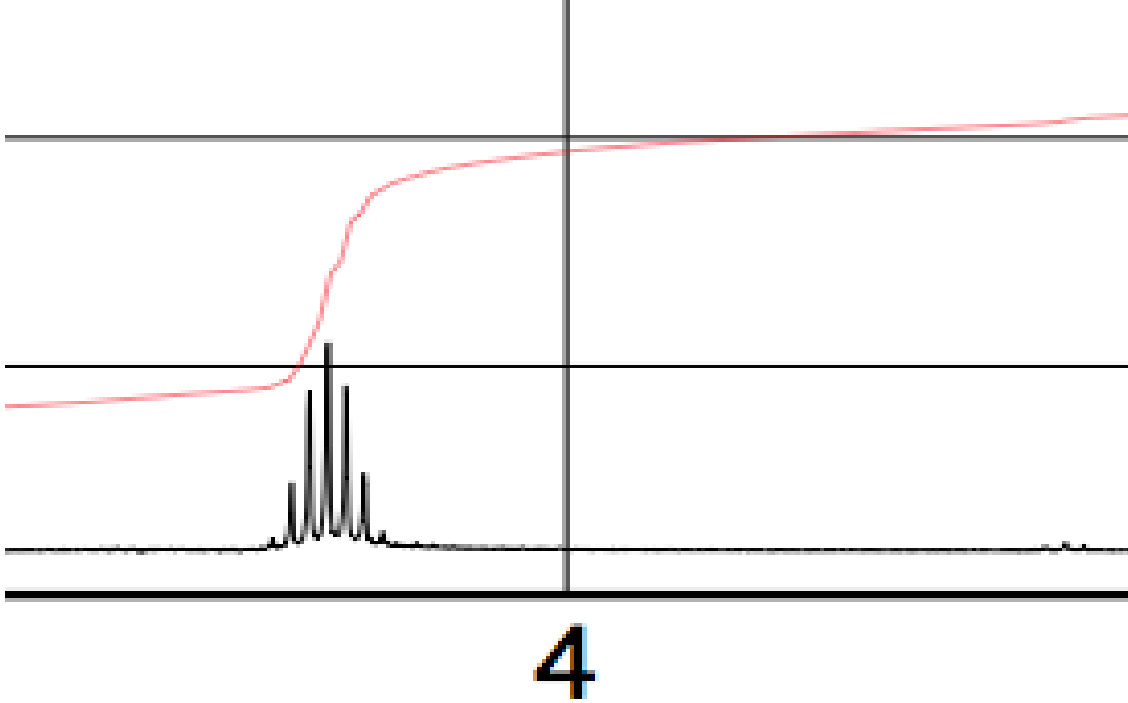


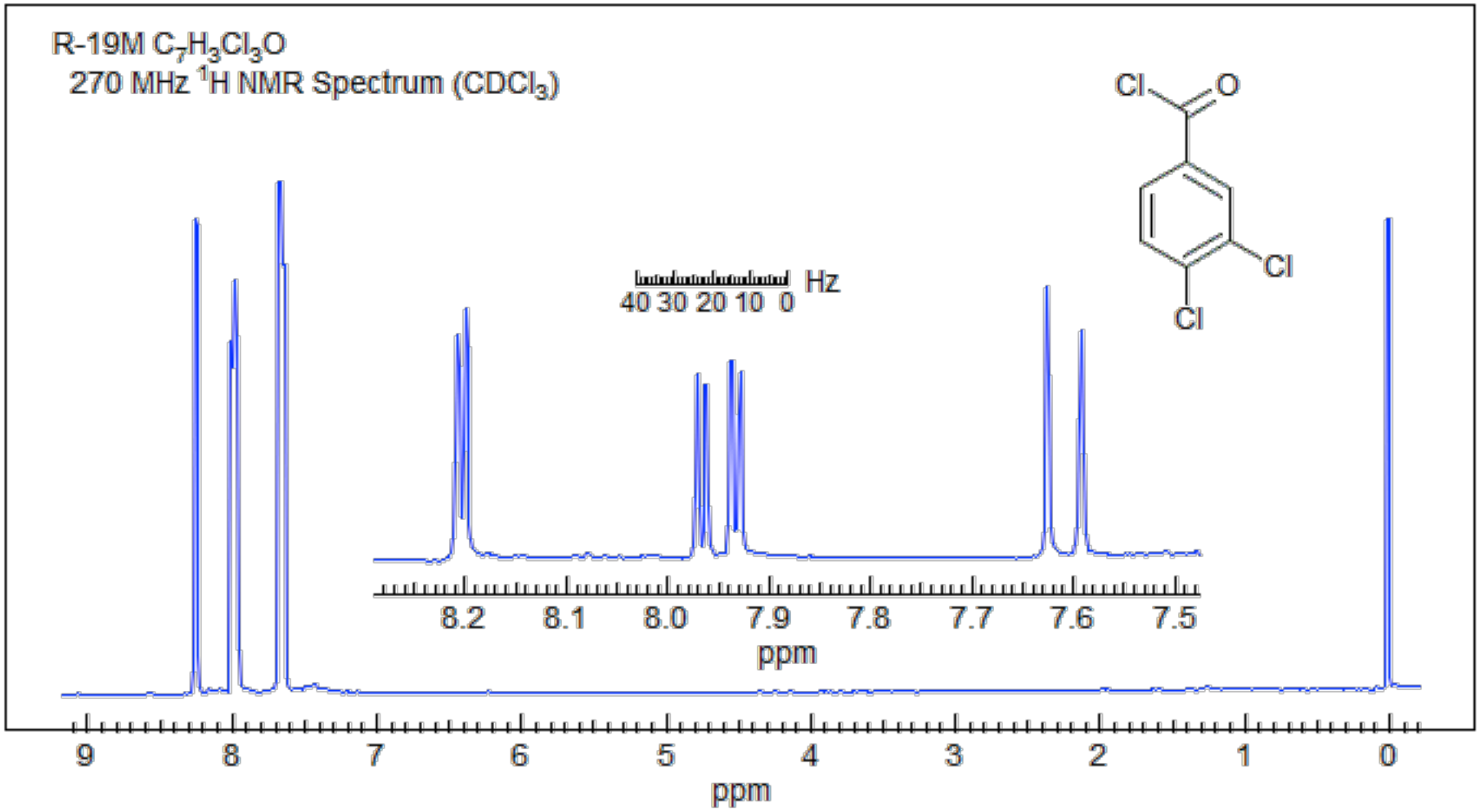


^{1}H NMR

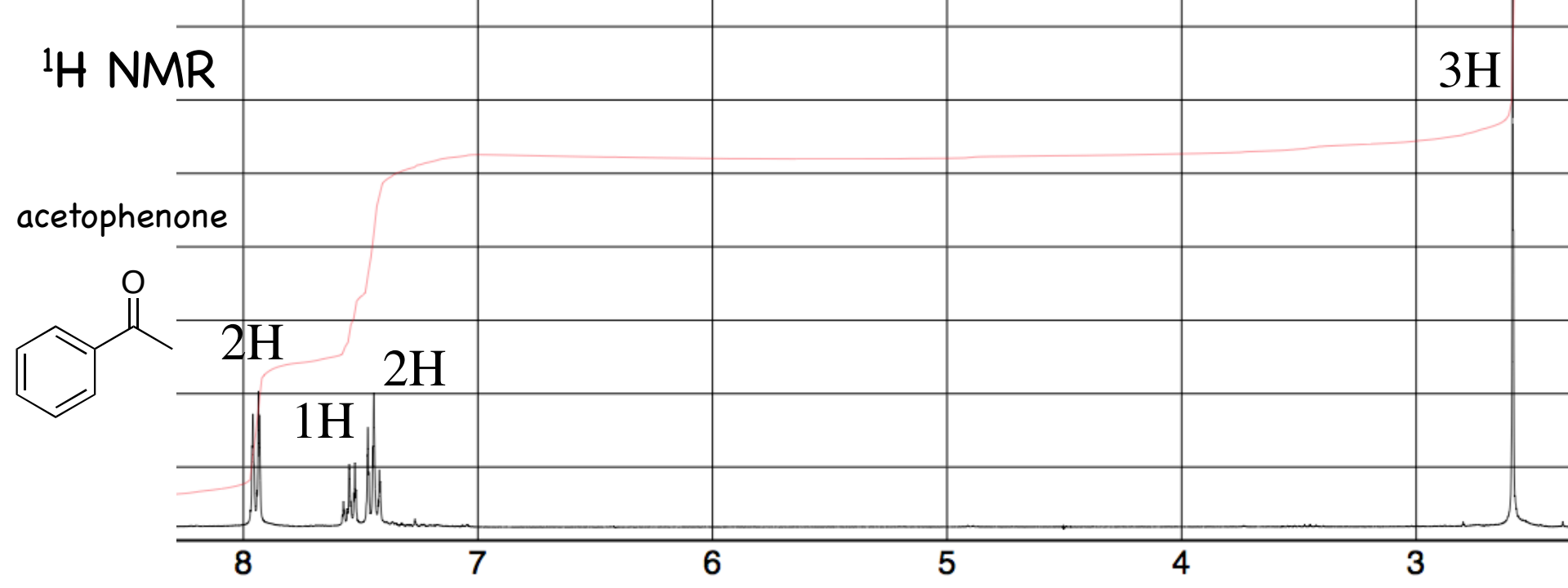
2-bromopropane





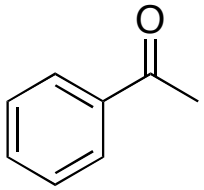

R-19M $C_7H_3Cl_3O$
270 MHz ^1H NMR Spectrum ($CDCl_3$)
Cl
O
Cl
Cl
Hz
40 30 20 10 0
8.2 8.1 8.0 7.9 7.8 7.7 7.6 7.5
ppm
9 8 7 6 5 4 3 2 1 0
ppm

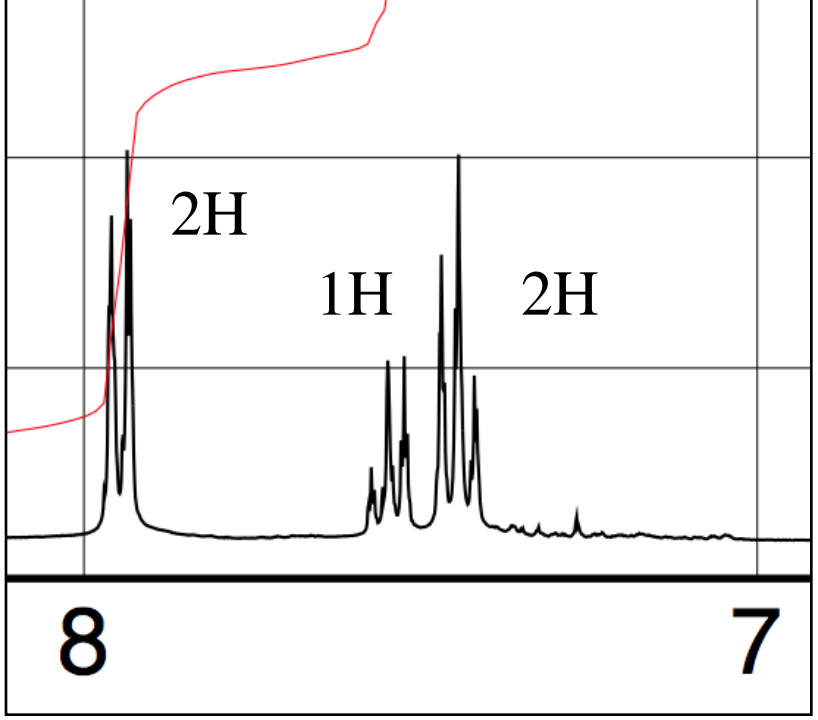
^{1}H NMR



^{1}H NMR

acetophenone

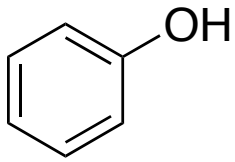


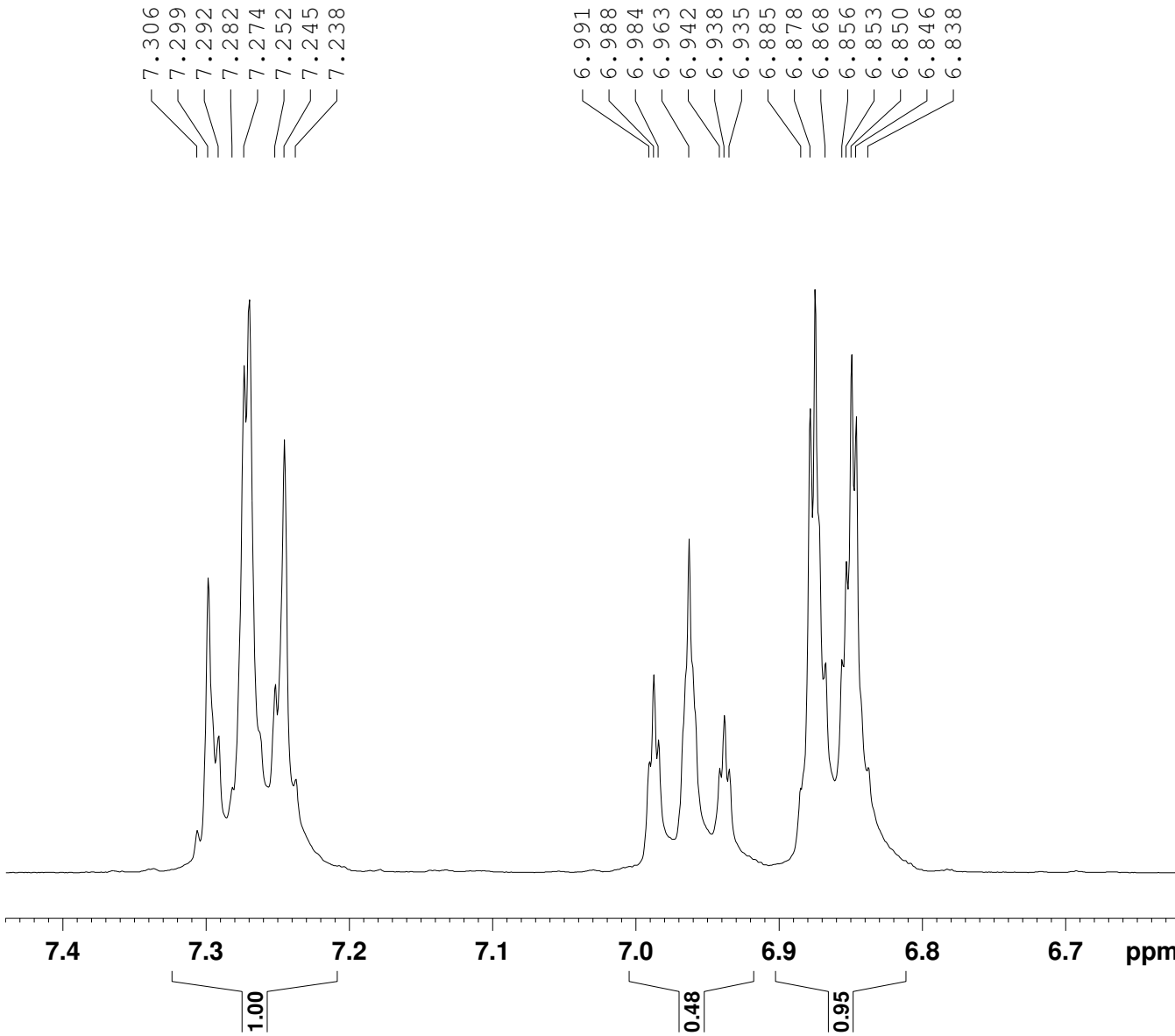


- - ➔ 3H singlet @ 2.5 δ

^{1}H NMR

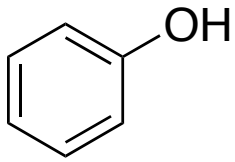
phenol

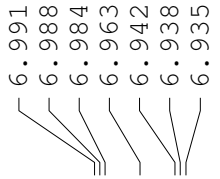


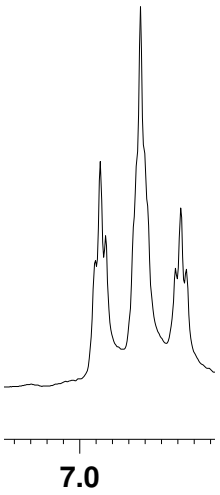


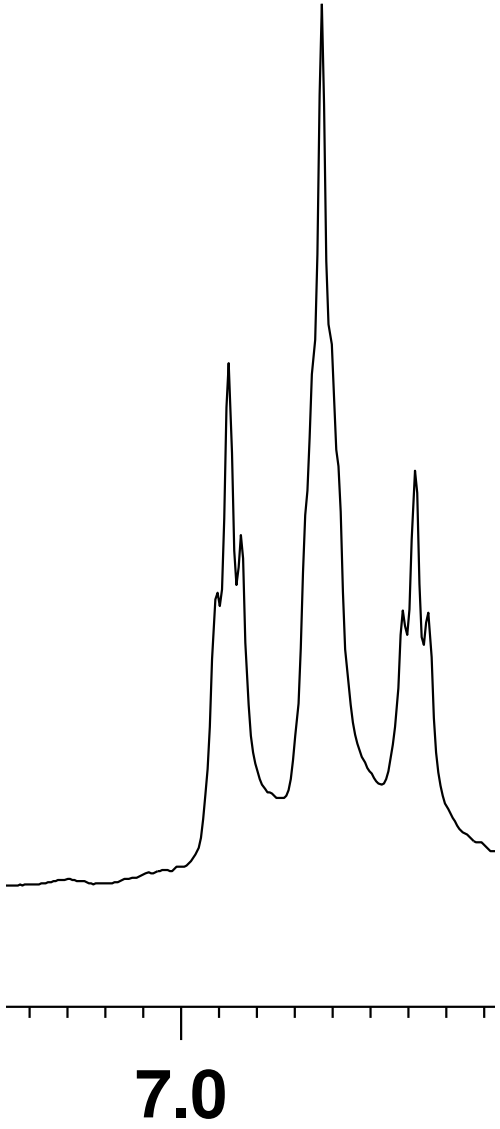
^{1}H NMR

phenol



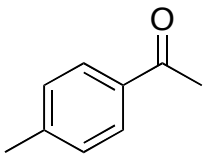


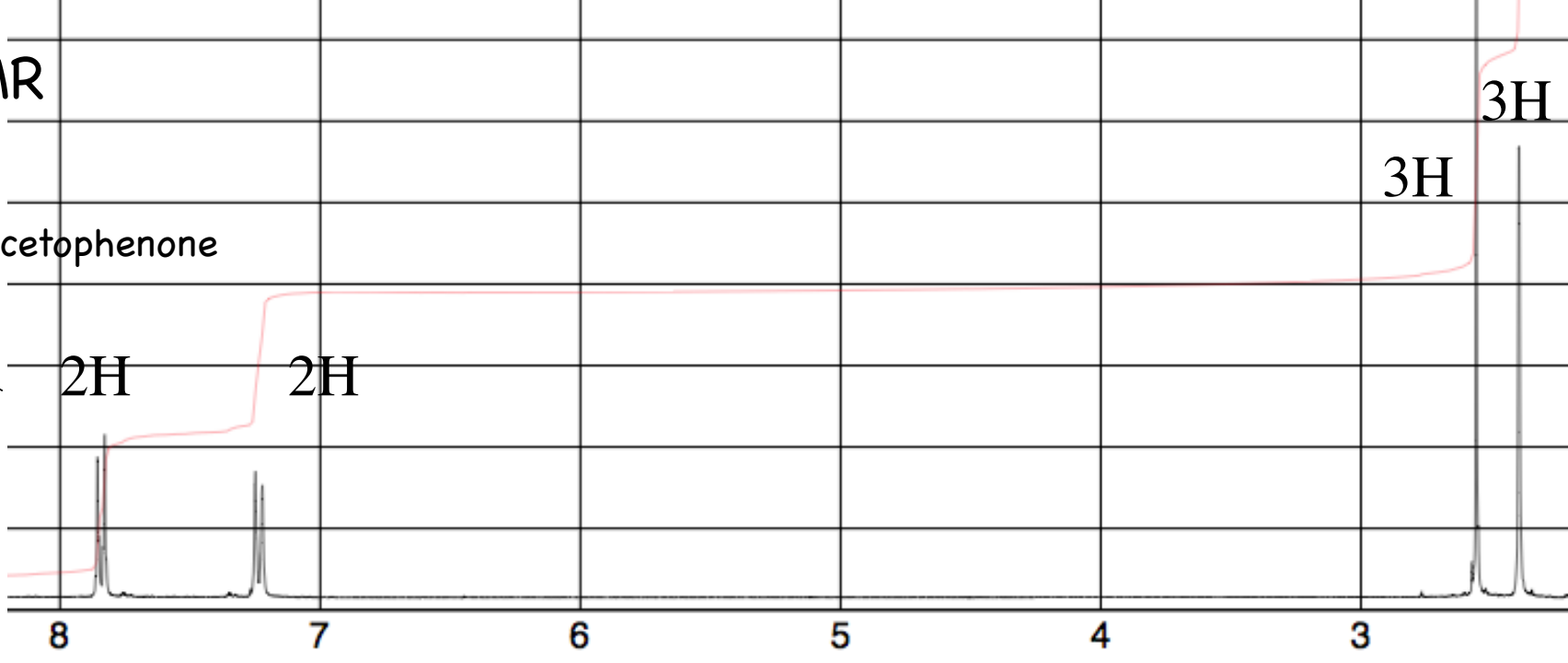




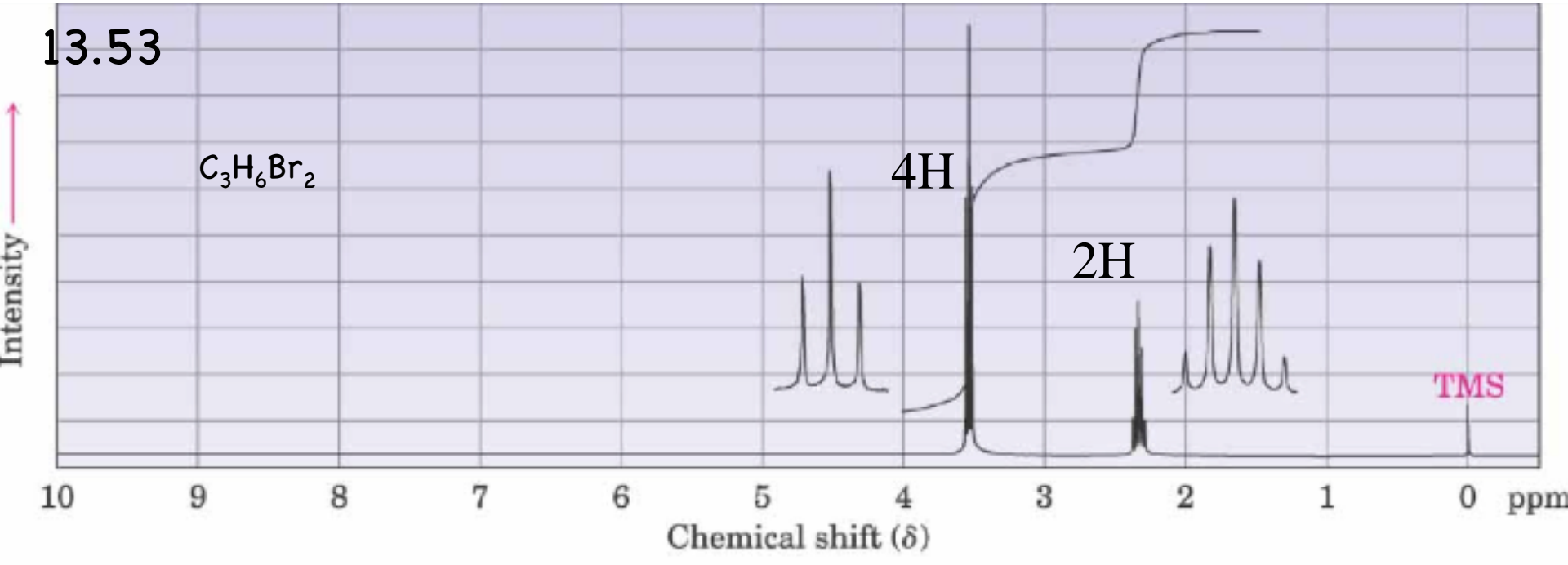
^{1}H NMR

4-methylacetophenone

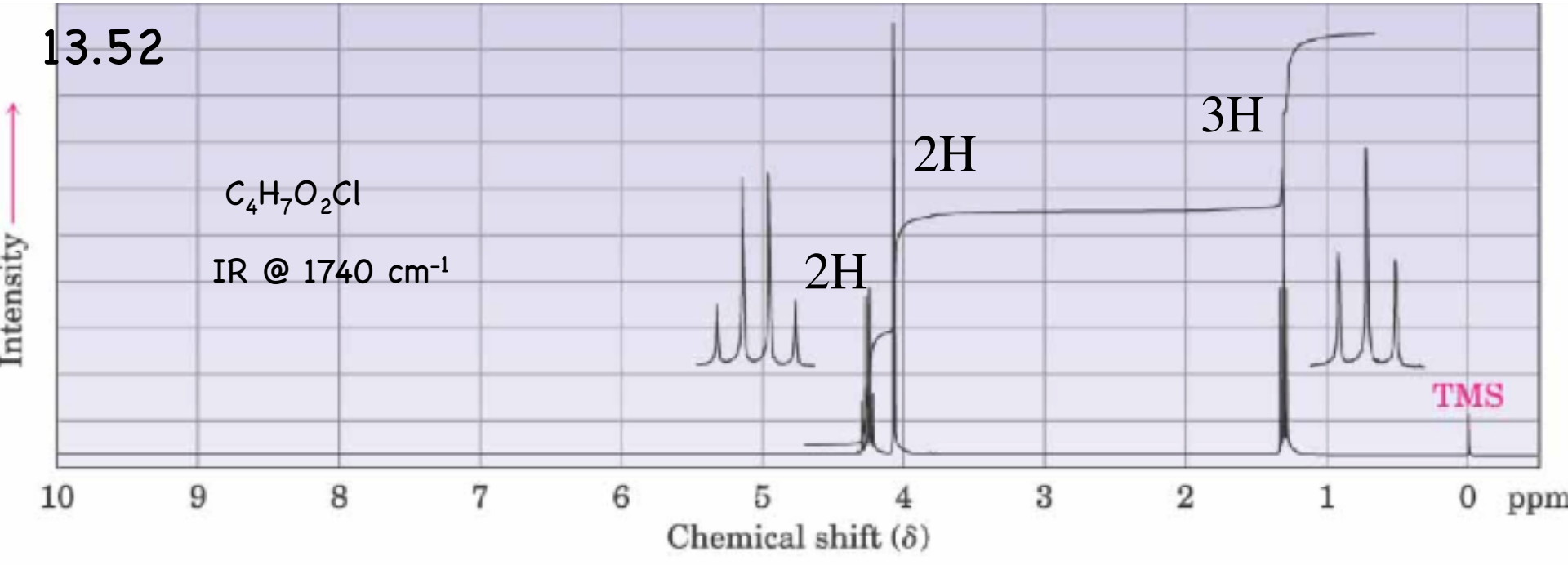


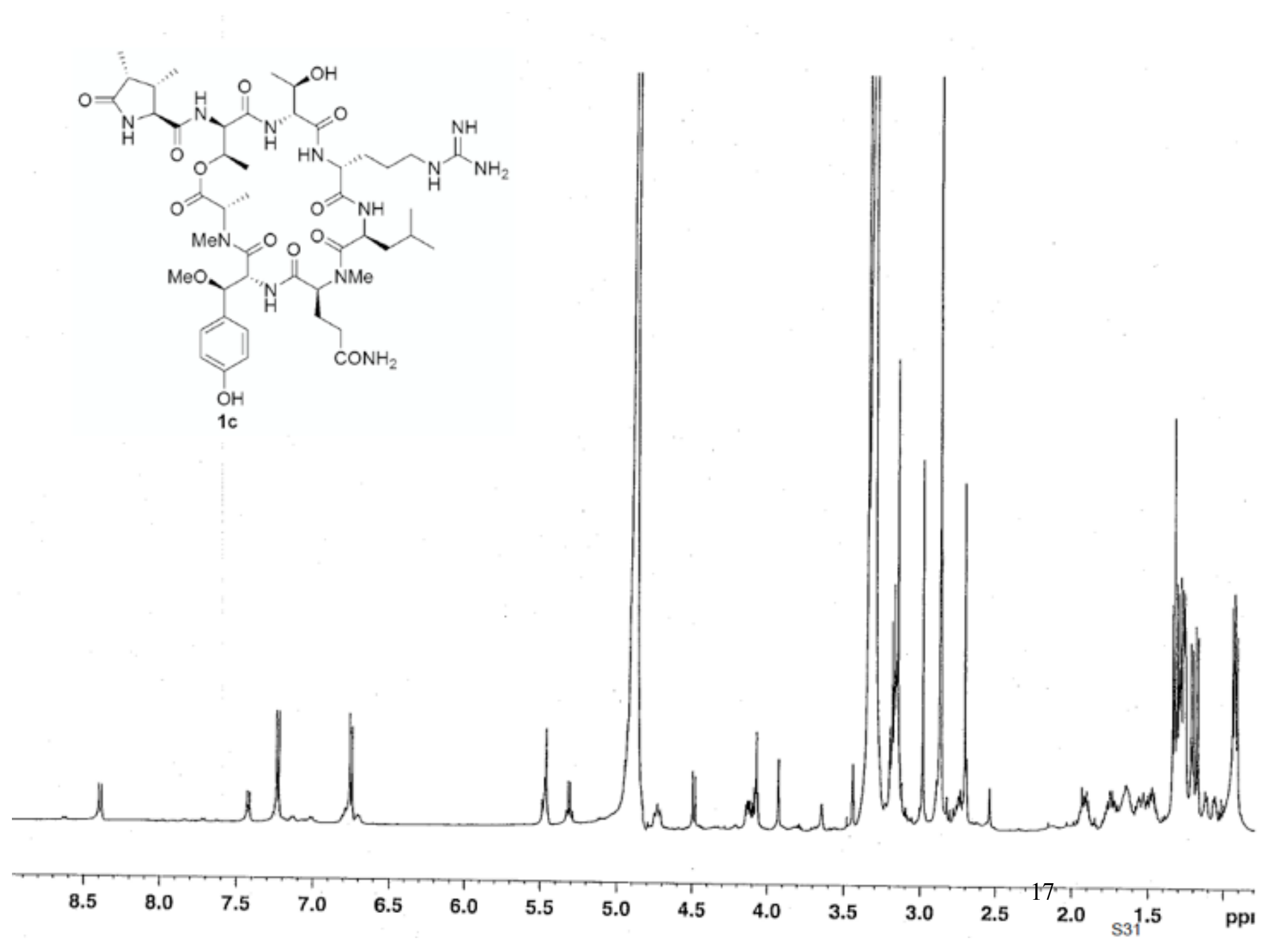


13.53


$C_3H_6Br_2$
4H
2H
TMS
Intensity
10
9
8
7
6
5
4
3
2
1
0
ppm
Chemical shift (δ)

13.52


$C_4H_7O_2Cl$
IR @ 1740 cm^{-1}
2H
2H
3H
TMS
Intensity
10
9
8
7
6
5
4
3
2
1
0
ppm
Chemical shift (δ)


OH
NH
NH2
HN
NH
O
MeN
MeO
NMe
CONH2
OH
1c
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
ppm