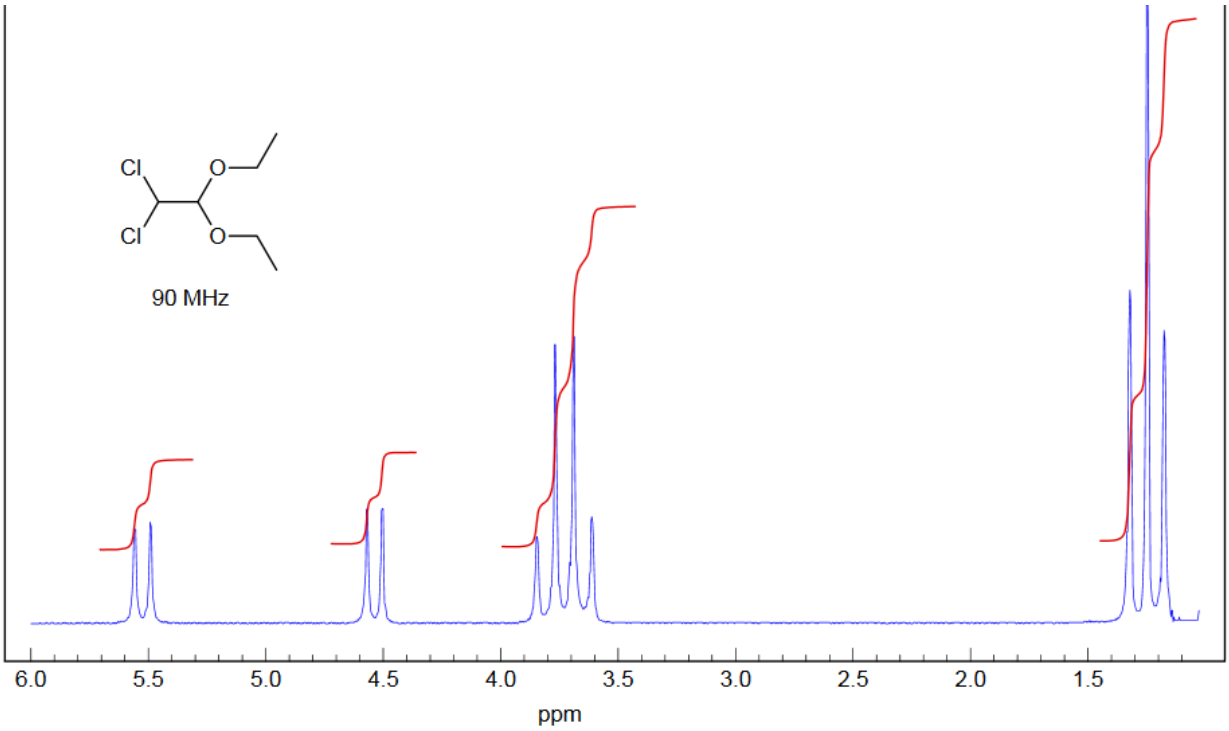
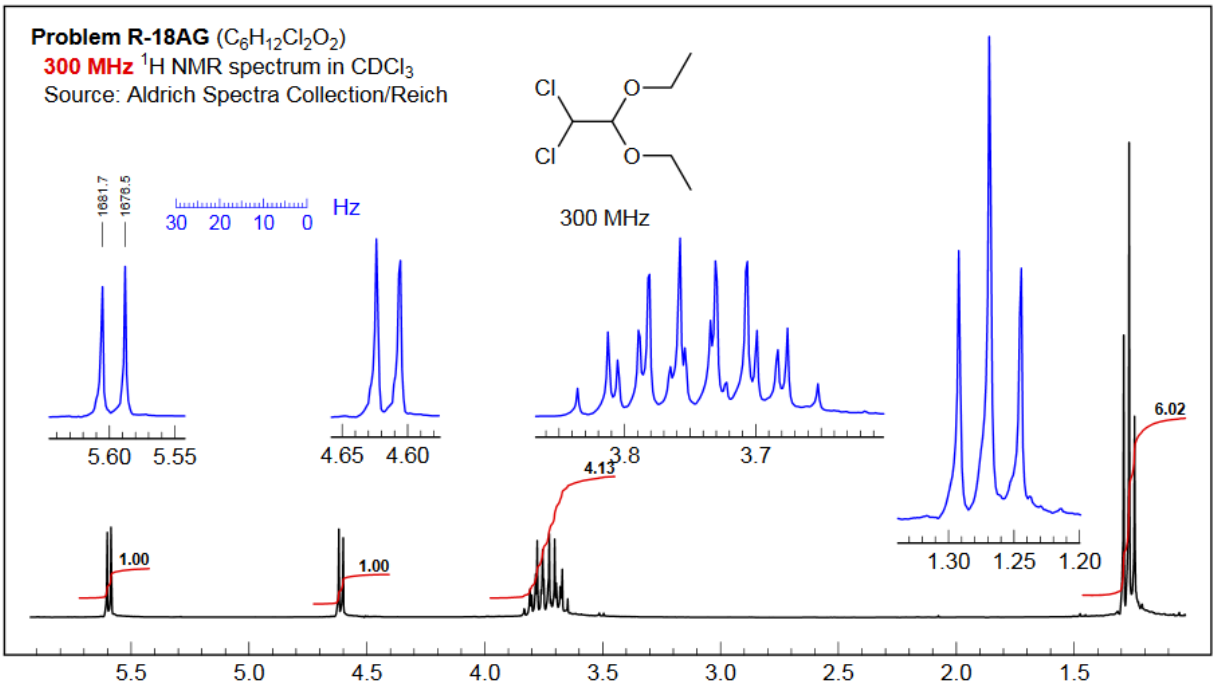
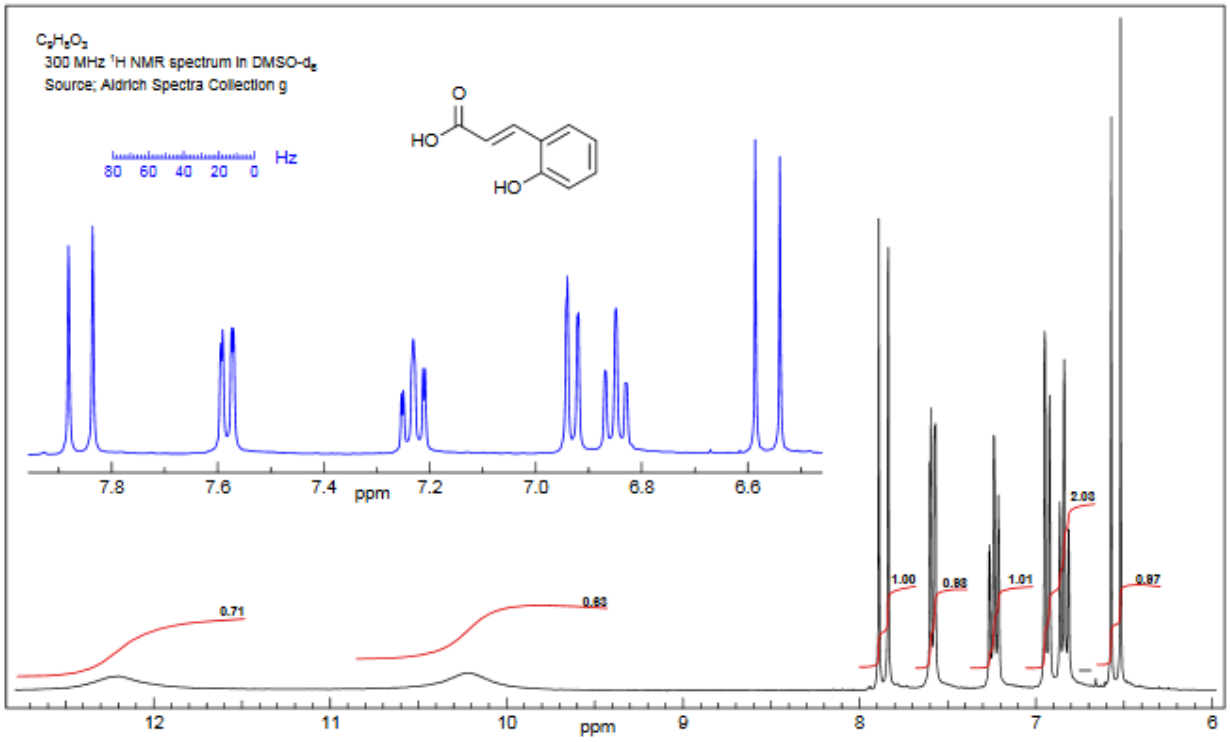
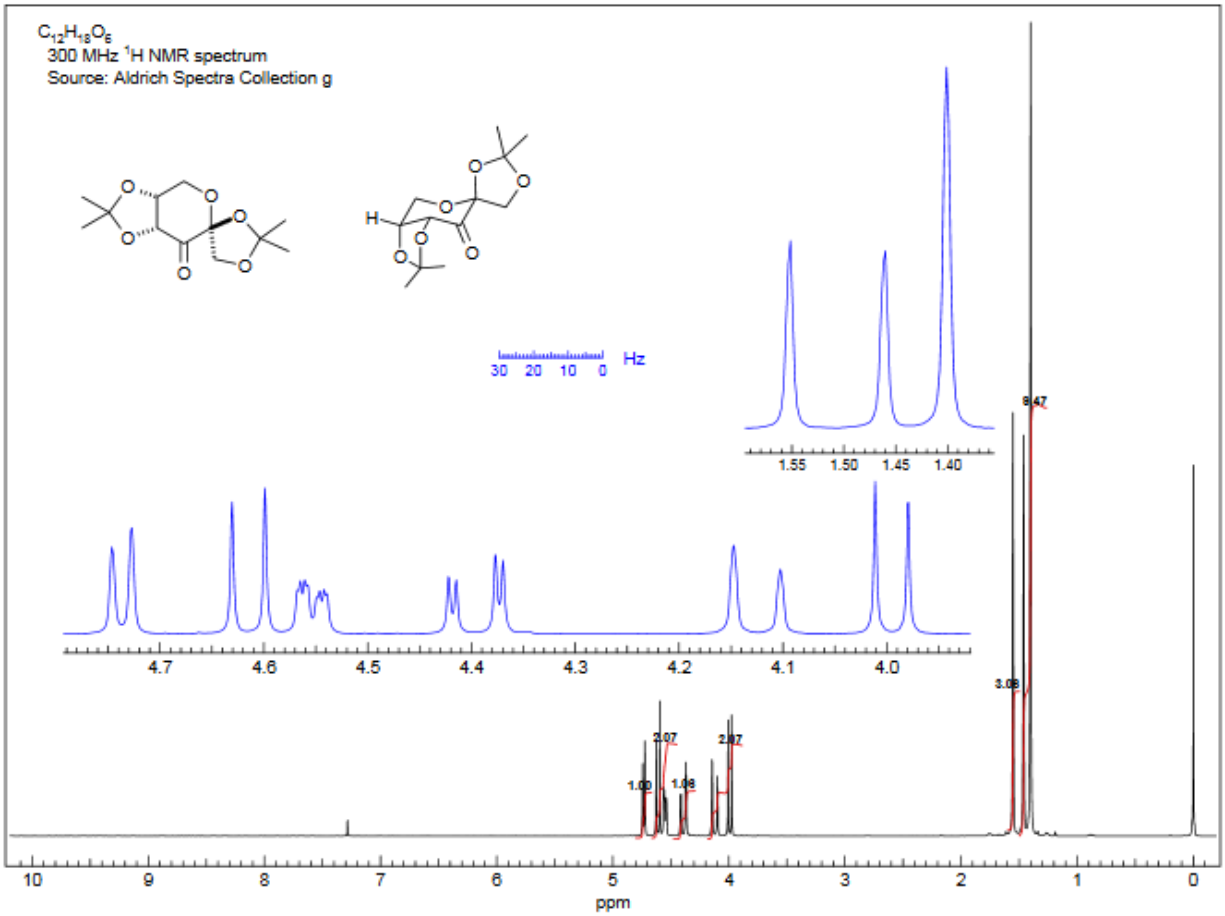
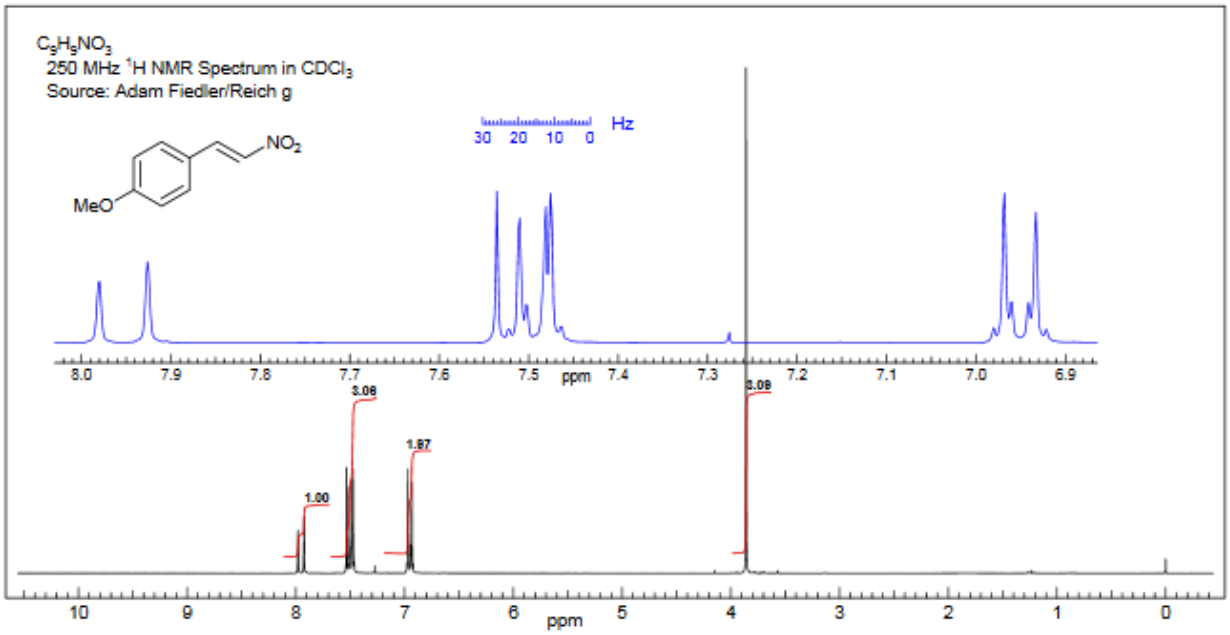
Problem # 21

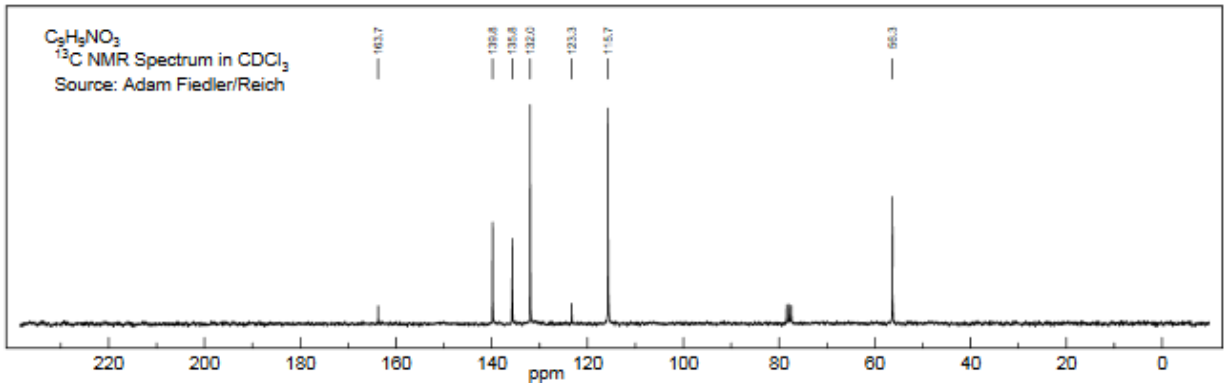

Cl
O
Cl
O
90 MHz
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
ppm

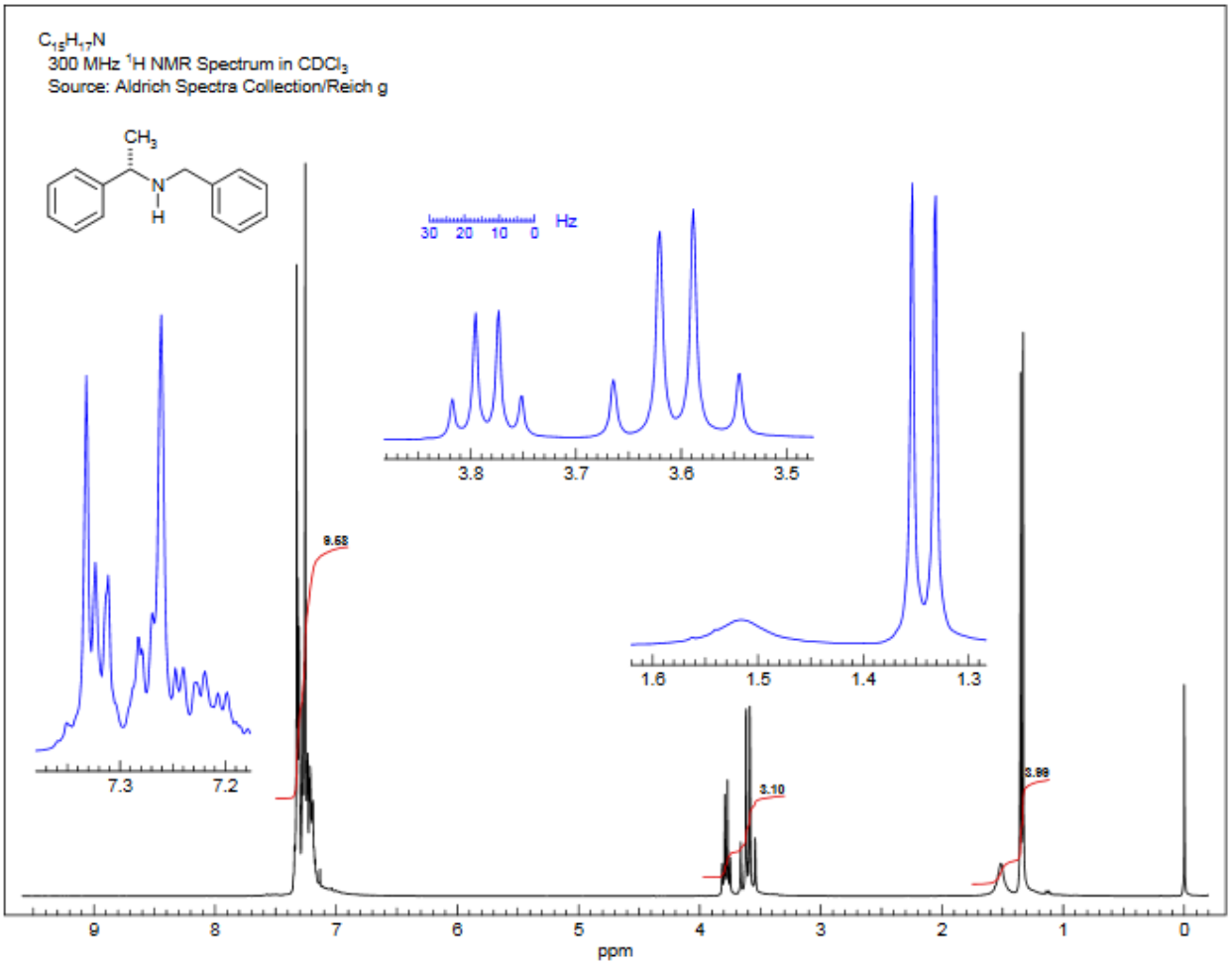

Problem R-18AG (C6H12Cl2O2)
300 MHz 1H NMR spectrum in CDCl3
Source: Aldrich Spectra Collection/Reich
Cl
O
Cl
O
300 MHz
1681.7
1678.5
30 20 10 0 Hz
5.60 5.55
4.65 4.60
3.8 3.7
1.30 1.25 1.20
1.00
1.00
4.13
6.02
5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5

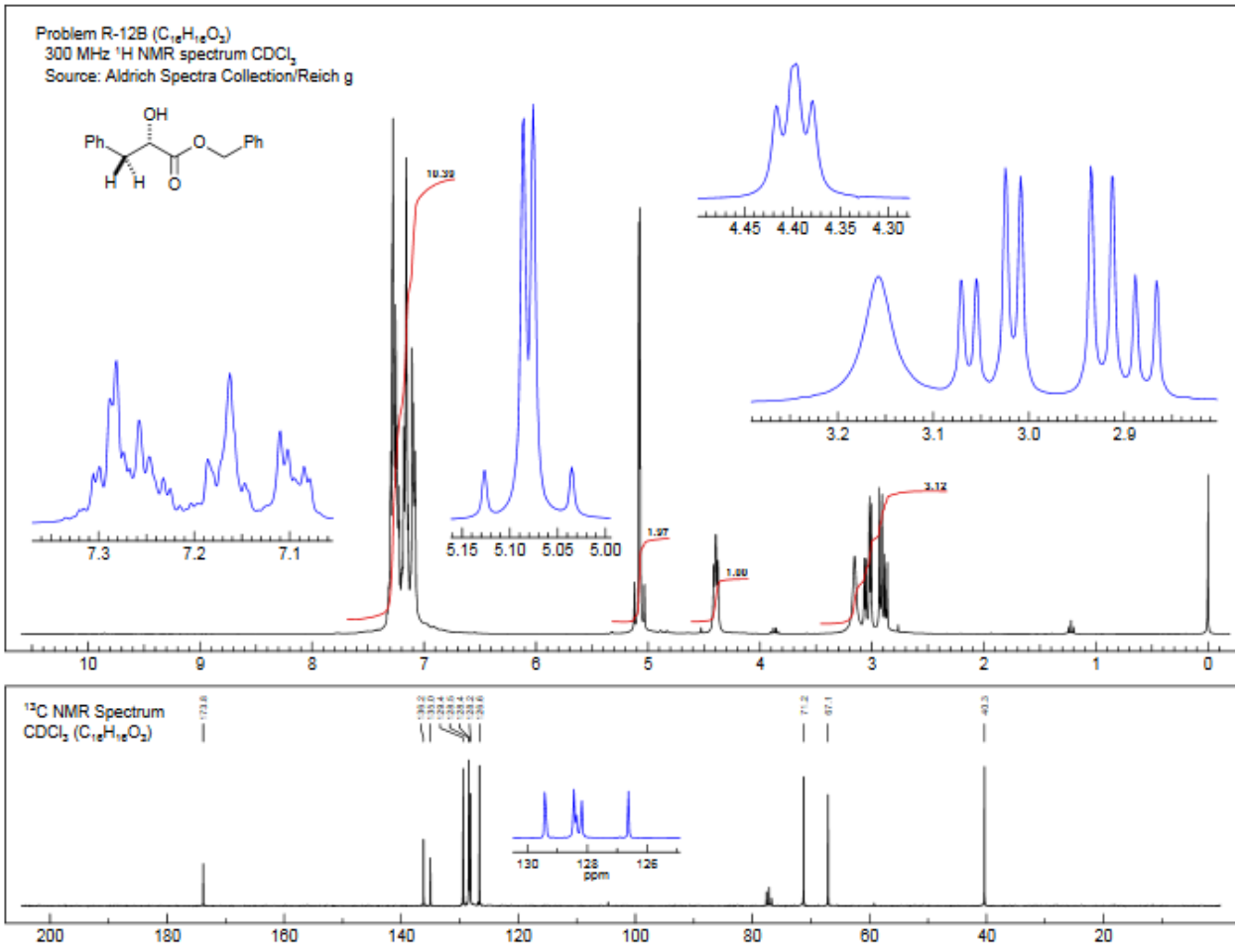

C9H8O3
300 MHz 1H NMR spectrum in DMSO-d6
Source; Aldrich Spectra Collection g
Hz
80 60 40 20 0
HO
O
HO
7.8 7.6 7.4 ppm 7.2 7.0 6.8 6.6
0.71
0.83
1.00
0.88
1.01
2.03
0.87
12 11 10 ppm 9 8 7 6

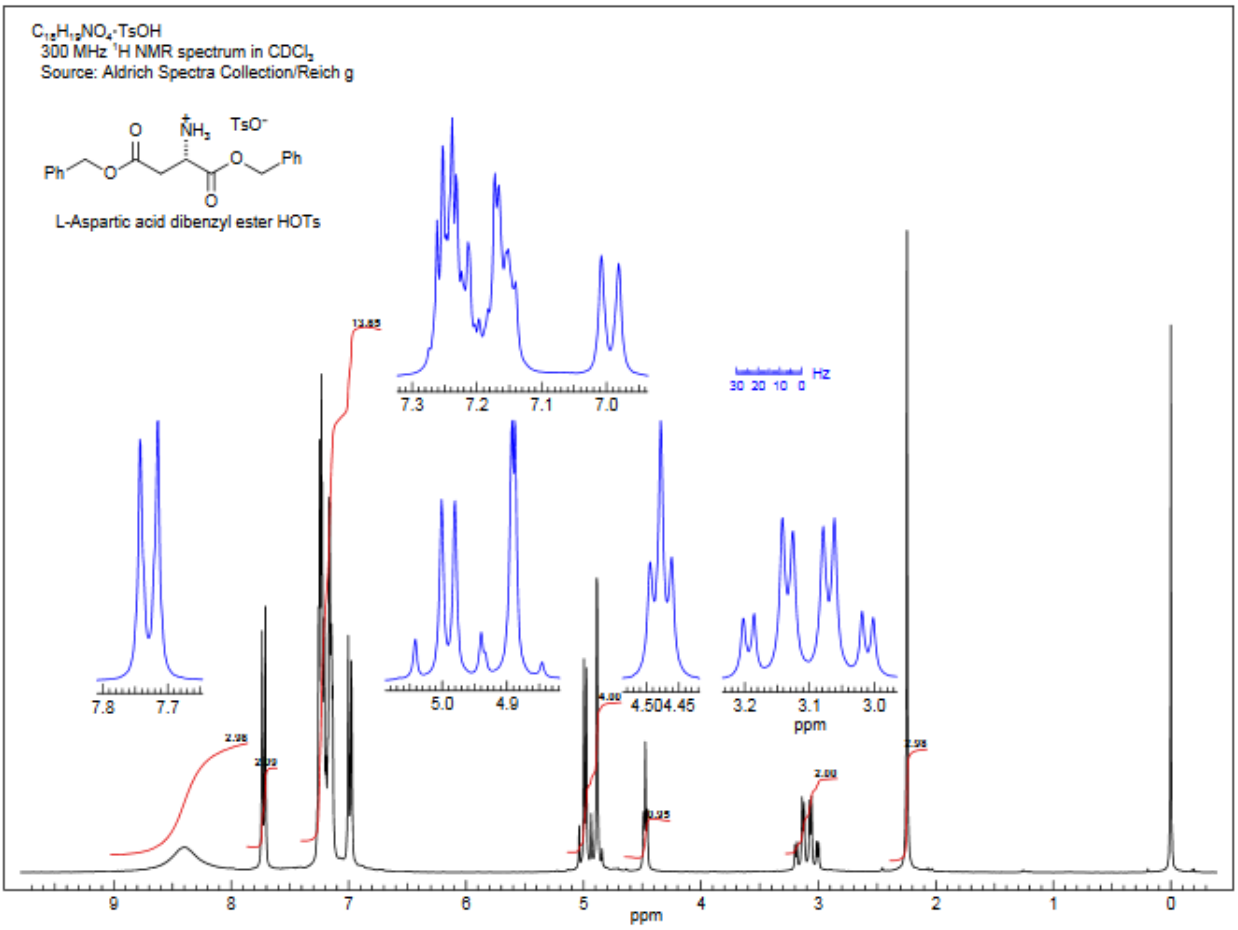

C12H18O6
300 MHz 1H NMR spectrum
Source: Aldrich Spectra Collection g
Hz
30 20 10 0
1.55 1.50 1.45 1.40
4.7 4.6 4.5 4.4 4.3 4.2 4.1 4.0
6.47
3.08
2.07
2.07
1.00
1.08
10 9 8 7 6 5 4 3 2 1 0 ppm

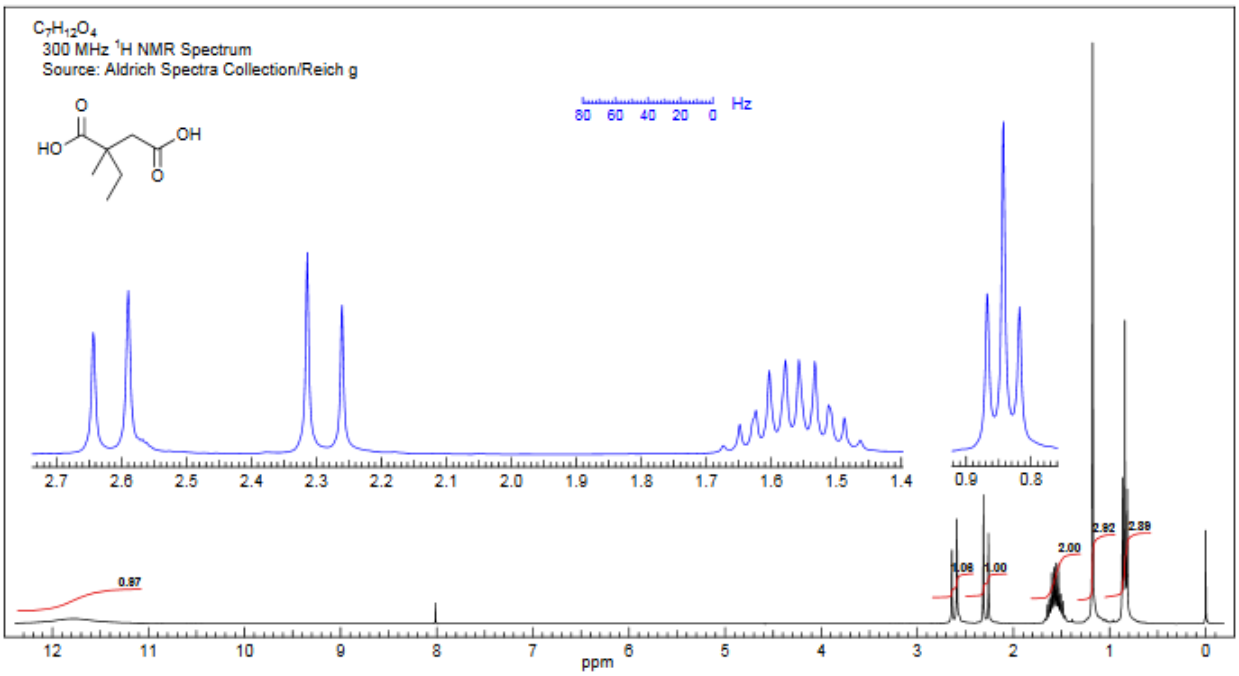

C9H9NO3
250 MHz 1H NMR Spectrum in CDCl3
Source: Adam Fiedler/Reich g
NO2
MeO
Hz
30 20 10 0
8.0 7.9 7.8 7.7 7.6 7.5 ppm 7.4 7.3 7.2 7.1 7.0 6.9
3.08
1.97
1.00
3.08
10 9 8 7 6 ppm 5 4 3 2 1 0

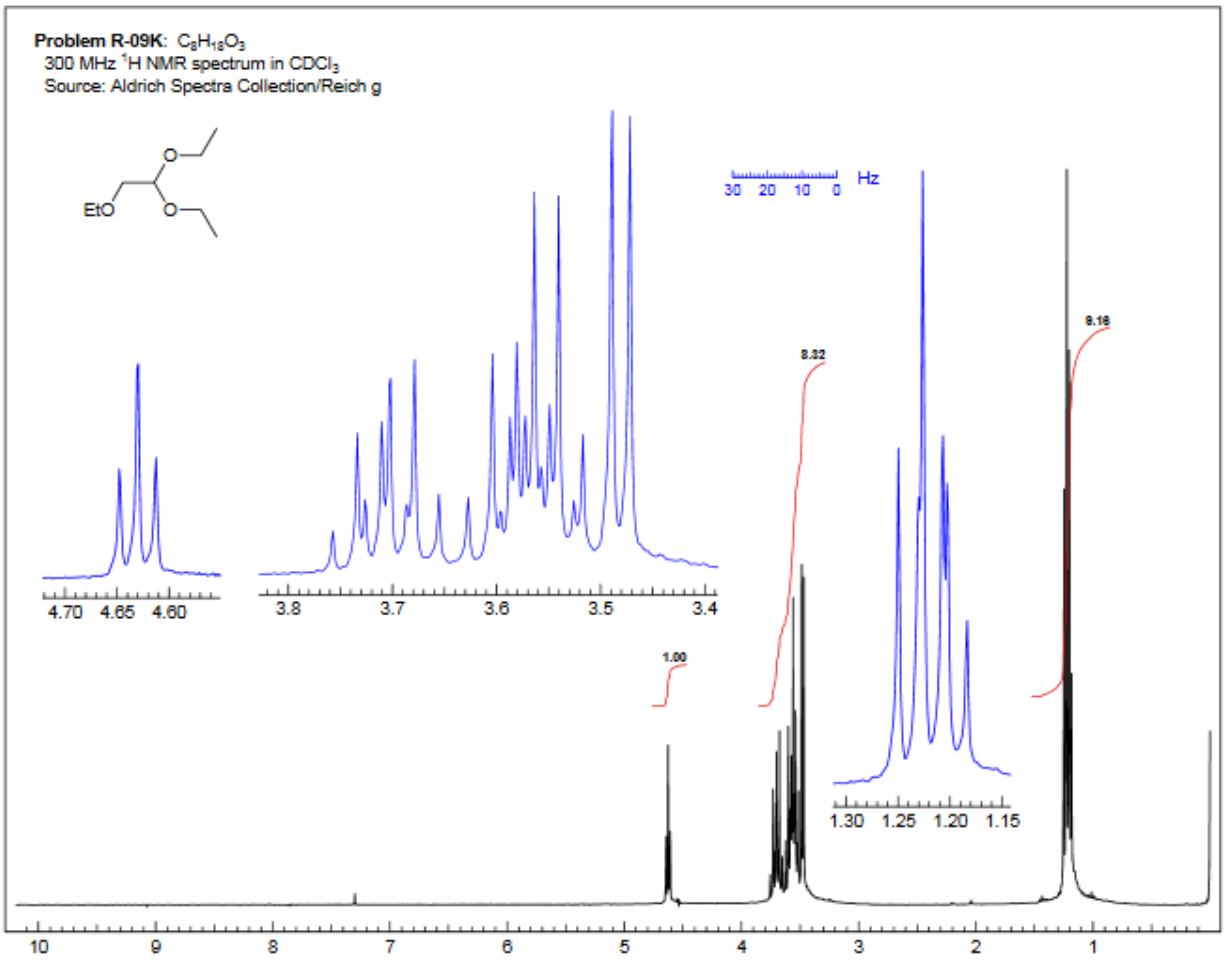

C9H9NO3
13C NMR Spectrum in CDCl3
Source: Adam Fiedler/Reich
163.7
139.8
135.8
132.0
123.3
115.7
55.3
220 200 180 160 140 ppm 120 100 80 60 40 20 0

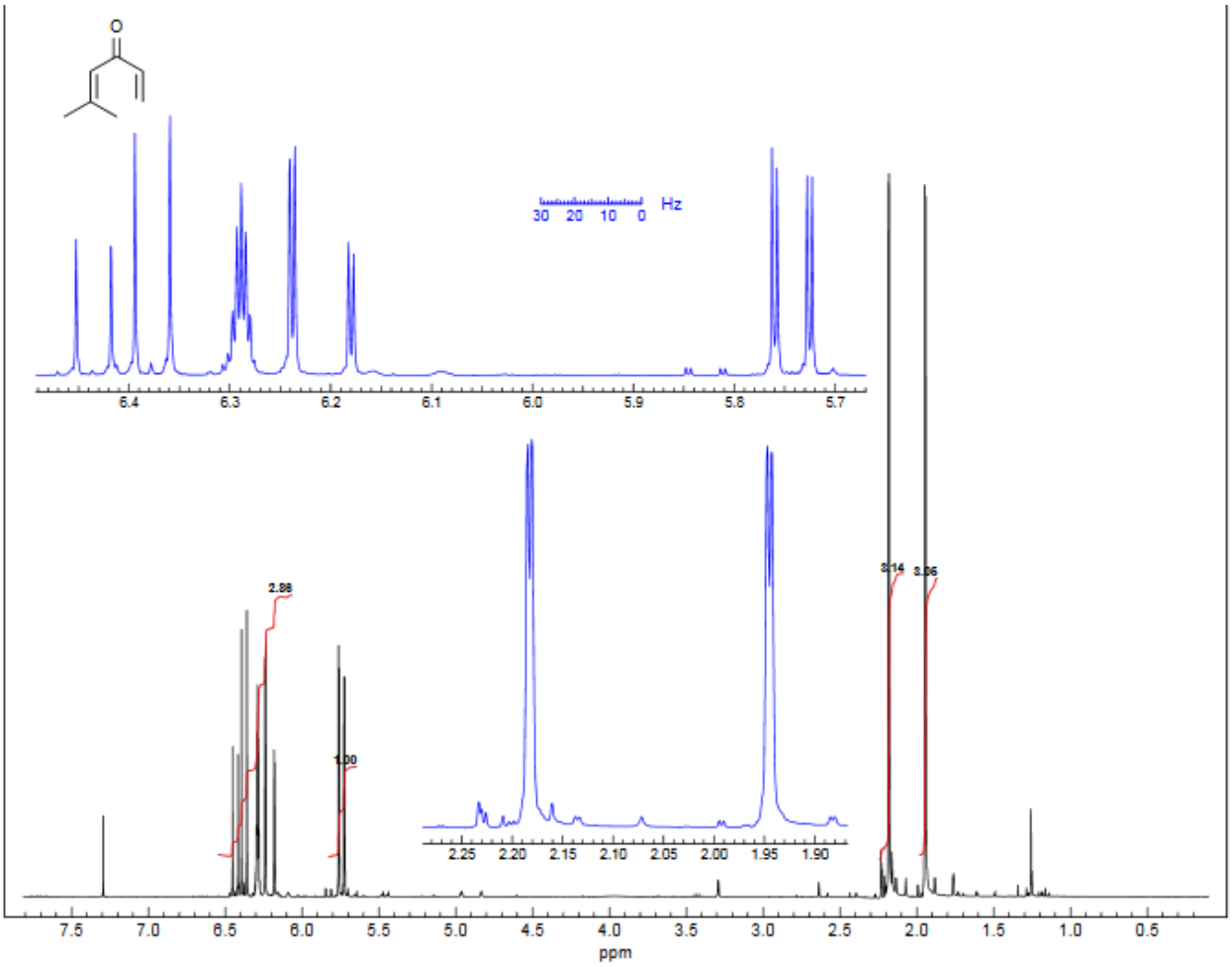

C15H17N
300 MHz 1H NMR Spectrum in CDCl3
Source: Aldrich Spectra Collection/Reich g
CH3
N
H
30 20 10 0 Hz
3.8 3.7 3.6 3.5
1.6 1.5 1.4 1.3
7.3 7.2
8.68
3.10
3.89
9 8 7 6 5 4 3 2 1 0
ppm

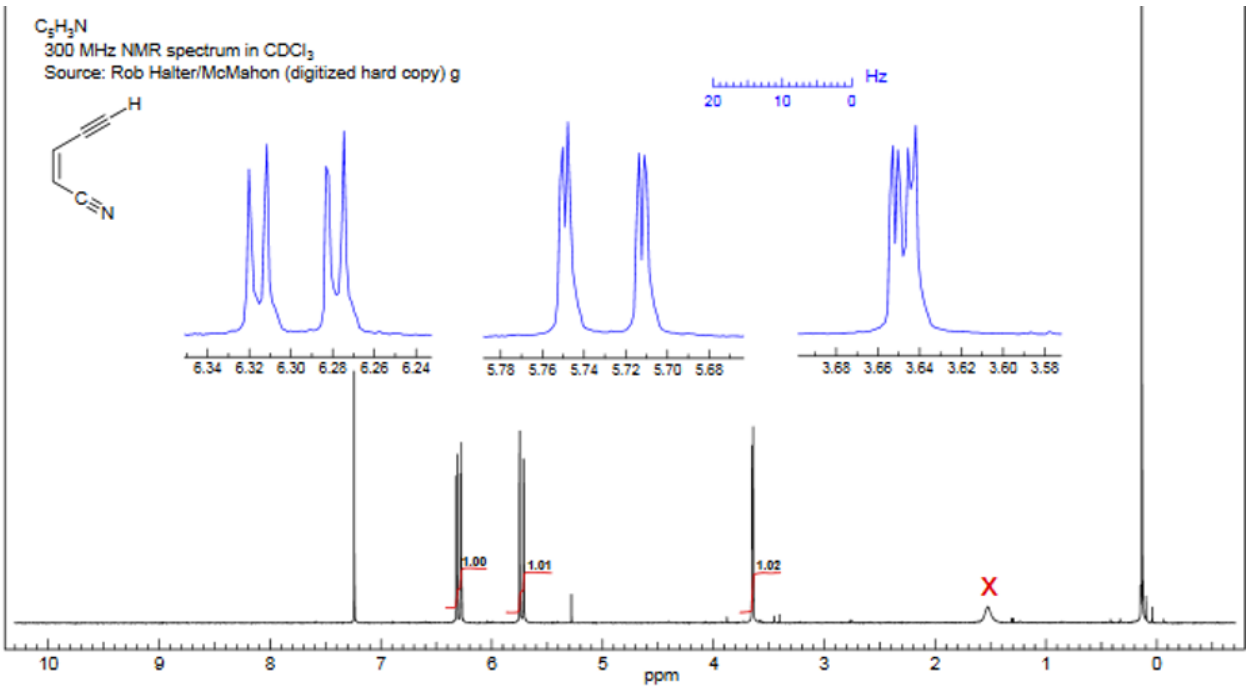

Problem R-12B ($C_{16}H_{16}O_3$)
300 MHz ^{1}H NMR spectrum $CDCl_3$
Source: Aldrich Spectra Collection/Reich g
OH
Ph
O
Ph
H
H
O
10.39
1.97
1.00
3.12
7.3
7.2
7.1
5.15
5.10
5.05
5.00
4.45
4.40
4.35
4.30
3.2
3.1
3.0
2.9
10
9
8
7
6
5
4
3
2
1
0
^{13}C NMR Spectrum
$CDCl_3$ ($C_{16}H_{16}O_3$)
130
128
126
ppm
200
180
160
140
120
100
80
60
40
20


C18H19NO4·TsOH
300 MHz 1H NMR spectrum in CDCl3
Source: Aldrich Spectra Collection/Reich g
L-Aspartic acid dibenzyl ester HOTs
ppm


C7H12O4
300 MHz 1H NMR Spectrum
Source: Aldrich Spectra Collection/Reich g
ppm


Problem R-09K: $C_8H_{18}O_3$
300 MHz ^{1}H NMR spectrum in $CDCl_3$
Source: Aldrich Spectra Collection/Reich g
EtO
O
O
Hz
30 20 10 0
8.32
9.18
1.00
4.70 4.65 4.60
3.8 3.7 3.6 3.5 3.4
1.30 1.25 1.20 1.15
10 9 8 7 6 5 4 3 2 1


O
Hz
30 20 10 0
6.4 6.3 6.2 6.1 6.0 5.9 5.8 5.7
2.25 2.20 2.15 2.10 2.05 2.00 1.95 1.90
2.88
1.00
3.14
3.06
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 1.0 0.5
ppm


C5H3N
300 MHz NMR spectrum in CDCl3
Source: Rob Halter/McMahon (digitized hard copy) g
H
C≡N
Hz
20 10 0
6.34 6.32 6.30 6.28 6.26 6.24
5.78 5.76 5.74 5.72 5.70 5.68
3.68 3.66 3.64 3.62 3.60 3.58
1.00
1.01
1.02
X
10 9 8 7 6 5 4 3 2 1 0
ppm