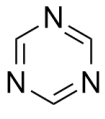
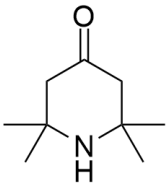
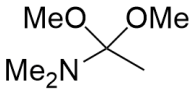
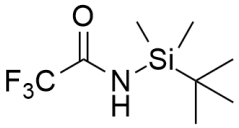
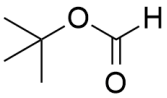
Write out the answers on separate sheets of paper.

1. How many signals will there be in the ^{1}H NMR spectrum of each of these compounds?

2. Propose a structure that is consistent with each set of data.
   a. $C_4H_{10}O$

   ^{1}H NMR spectrum

singlet	δ	1.28 (9H)
singlet	δ	1.35 (1H)

   b. $C_7H_{15}Cl$

   ^{1}H NMR spectrum

singlet	δ	1.10 (9H)
singlet	δ	1.60 (6H)

   c. $C_2H_4Br_2$

   ^{1}H NMR spectrum

doublet	δ	2.50 (3H)
quartet	δ	5.90 (1H)

   d. $C_4H_8Cl_2$

   ^{1}H NMR spectrum

doublet	δ	1.60 (3H)
quartet	δ	2.15 (2H)
triplet	δ	3.72 (2H)
sextet	δ	4.27 (1H)

   e. $C_5H_8Br_4$

   ^{1}H NMR spectrum

singlet	δ	3.60 (8H)

   f. C_4H_9Br

^{1}H NMR spectrum

doublet	δ	1.10 (6H)
multiplet	δ	1.90 (1H)
doublet	δ	3.40 (2H)

g. $C_5H_{11}Br$

^{1}H NMR spectrum

singlet	δ	1.10 (9H)
singlet	δ	3.20 (2H)

h. C_7H_{14}

^{1}H NMR spectrum

singlet	δ	1.10 (9H)
singlet	δ	1.60 (3H)
doublet	δ	4.60 (1H)
doublet	δ	4.80 (1H)

i. C_4H_8O

^{1}H NMR spectrum

triplet	δ	1.10 (3H)
singlet	δ	2.10 (3H)
quartet	δ	2.40 (2H)

j. $C_7H_{14}O$

^{1}H NMR spectrum

triplet	δ	0.90 (6H)
sextet	δ	1.60 (4H)
quartet	δ	2.40 (4H)

k. $C_5H_{10}O_2$

^{1}H NMR spectrum

triplet	δ	0.94 (3H)
multiplet	δ	1.39 (2H)
multiplet	δ	1.62 (2H)
triplet	δ	2.35 (2H)
singlet	δ	12.0 (1H)

l. $C_6H_{12}O_2$

^{1}H NMR spectrum

singlet	δ	1.08 (9H)
singlet	δ	2.23 (2H)
singlet	δ	12.1 (1H)

m. $C_5H_8O_4$

^{1}H NMR spectrum

triplet	δ	0.93 (3H)
multiplet	δ	1.80 (2H)
triplet	δ	3.10 (1H)
singlet	δ	12.70 (2H)

n. $C_6H_{12}O_2$

^{1}H NMR spectrum

doublet	δ	1.18 (6H)
triplet	δ	1.26 (3H)
multiplet	δ	2.51 (1H)
quartet	δ	4.13 (2H)

o. $C_7H_{12}O_4$

^{1}H NMR spectrum

triplet	δ	1.28 (6H)
singlet	δ	3.36 (2H)
quartet	δ	4.21 (4H)

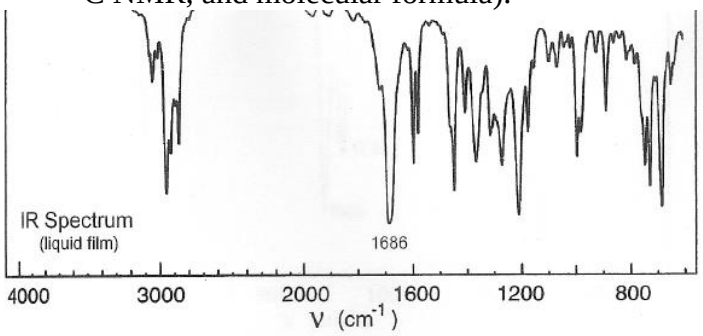
p. $C_7H_{14}O_2$

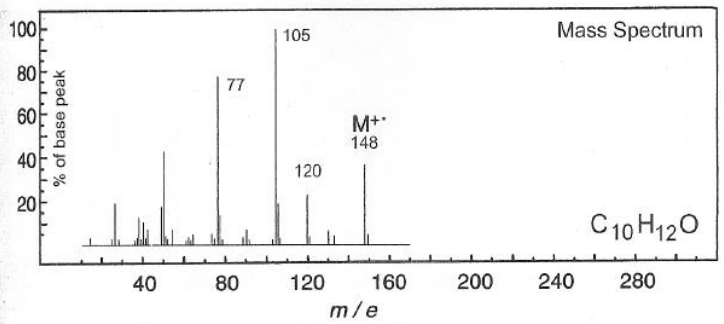
^{1}H NMR spectrum

doublet	δ	0.92 (6H)
multiplet	δ	1.52 (2H)
multiplet	δ	1.70 (1H)
singlet	δ	2.09 (3H)
triplet	δ	4.10 (2H)

3. Each compound gives only one signal in its ^{1}H NMR spectrum. Propose a structure for each.
   a. C_3H_6O
   b. C_5H_{10}
   c. C_5H_{12}
   d. $C_4H_6Cl_4$

4. Propose a structure that is consistent with the data provided (IR, Mass Spec, ^{1}H NMR, ^{13}C NMR, and molecular formula).

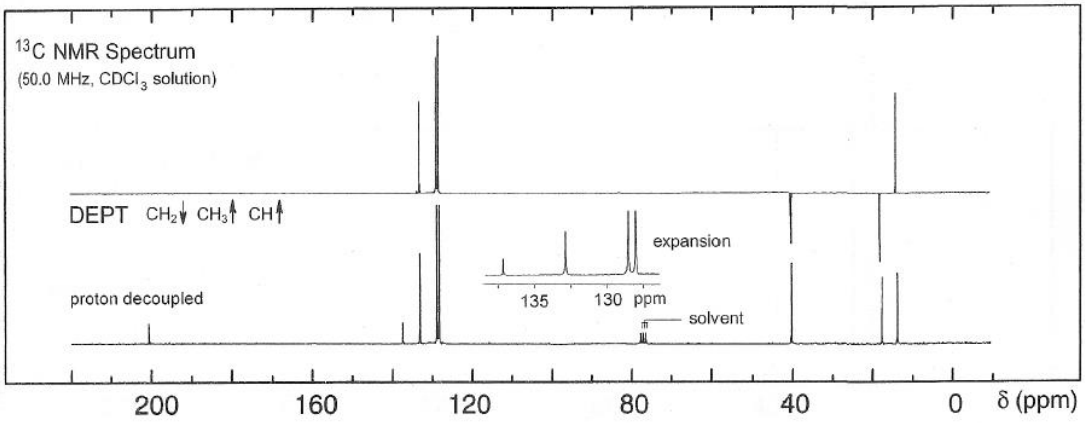


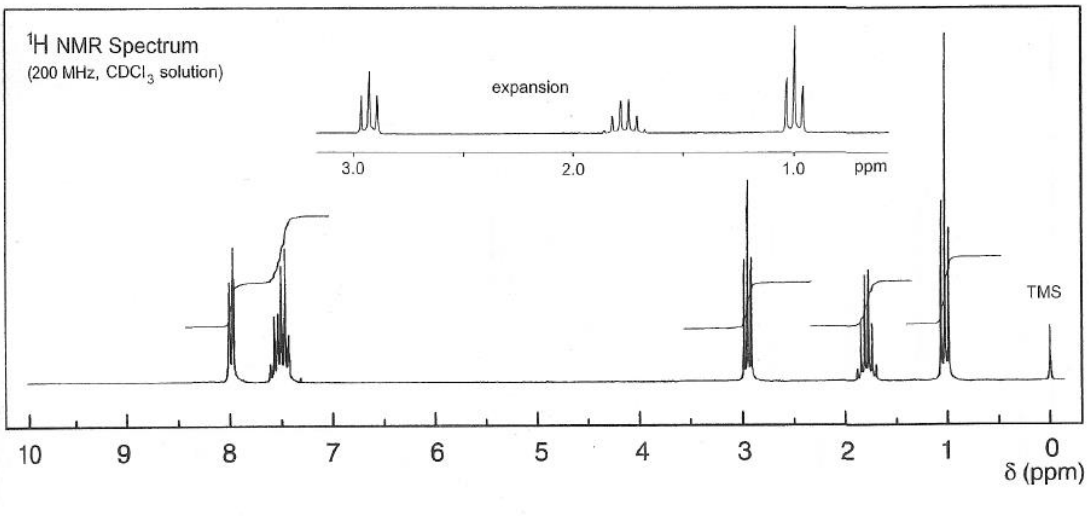


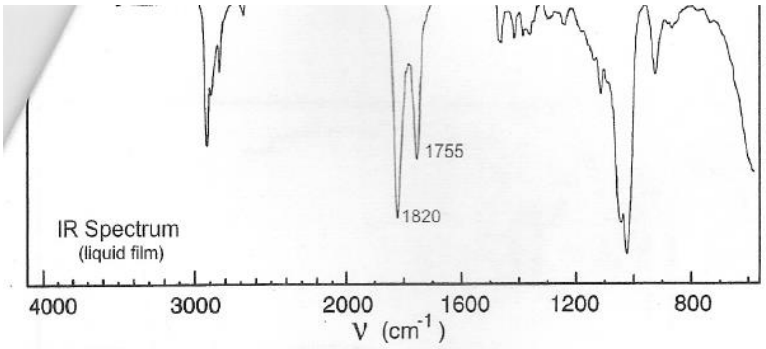
UV Spectrum

λ_{max} 241 nm ($\log_{10}\varepsilon$ 4.1)

solvent : methanol







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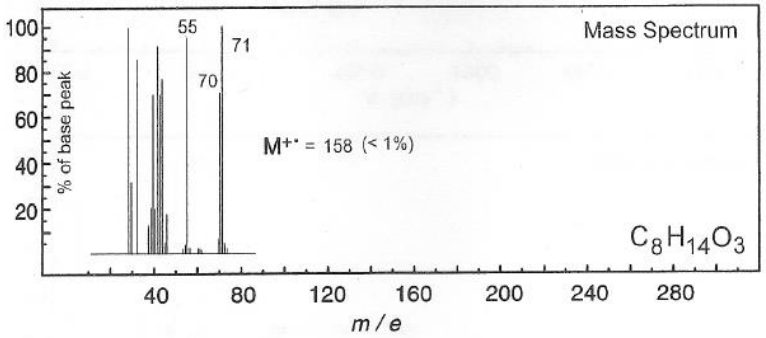
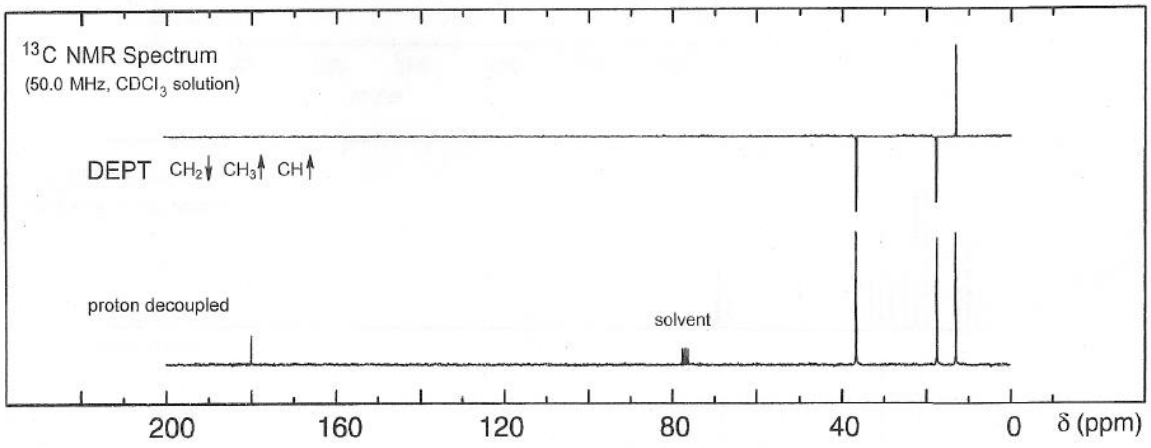
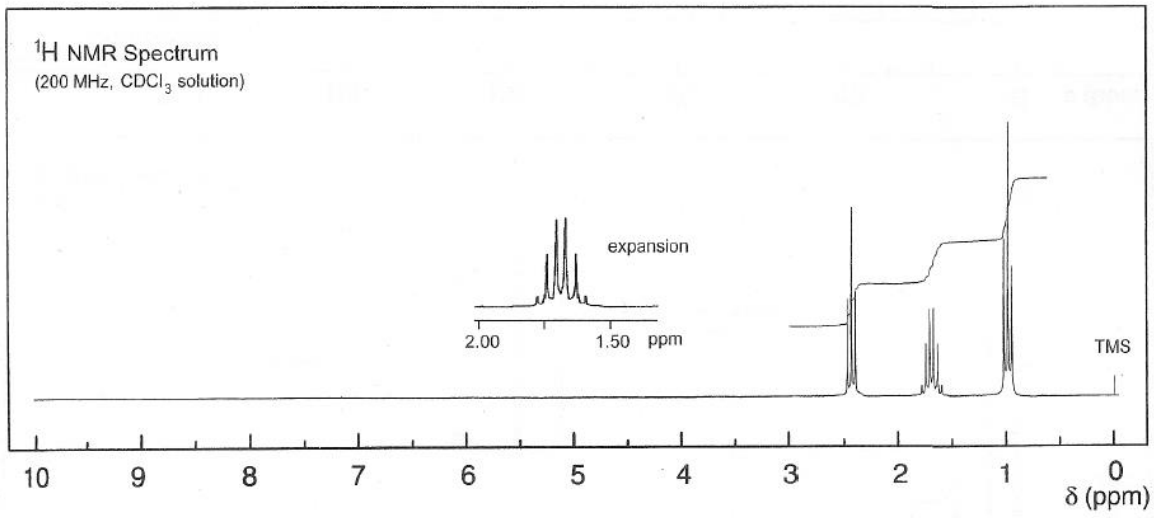
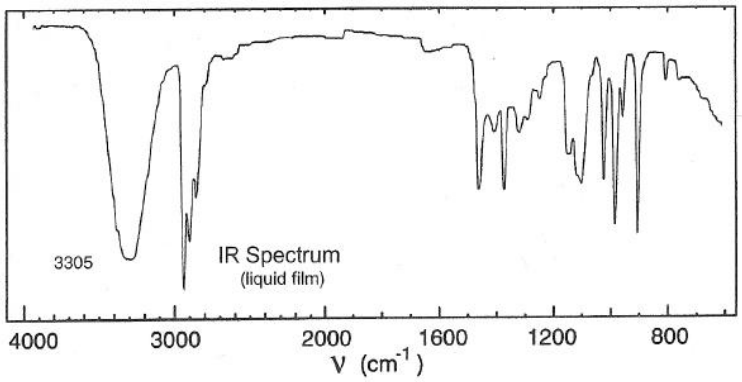


No significant UV absorption above 220 nm







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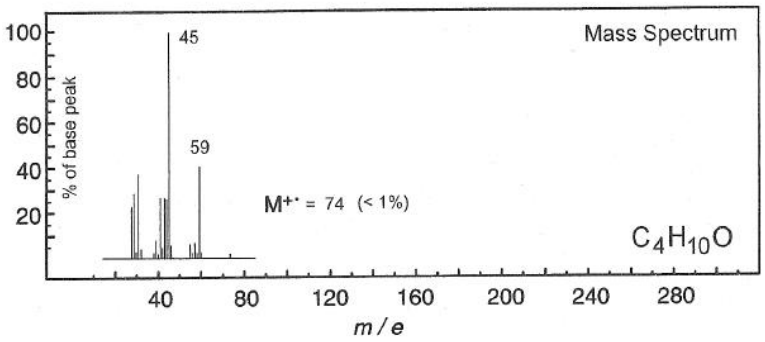
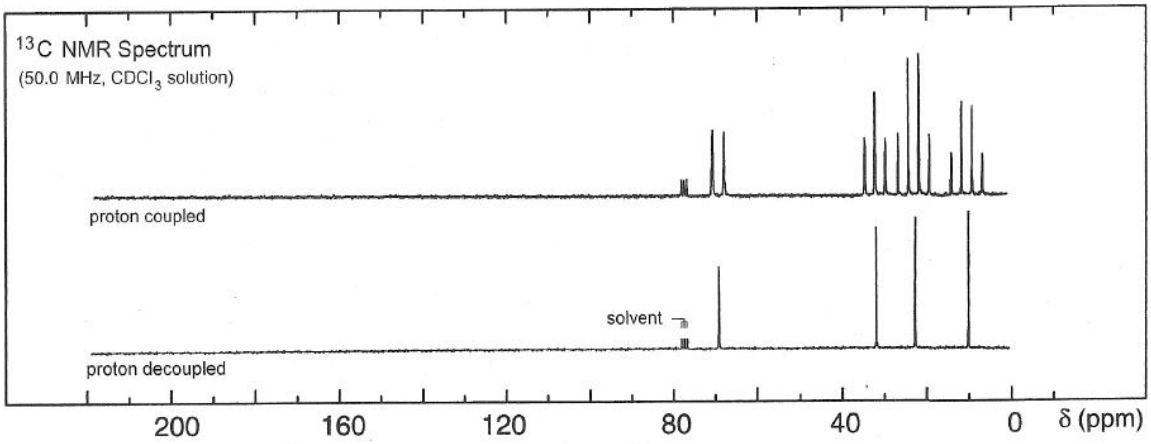
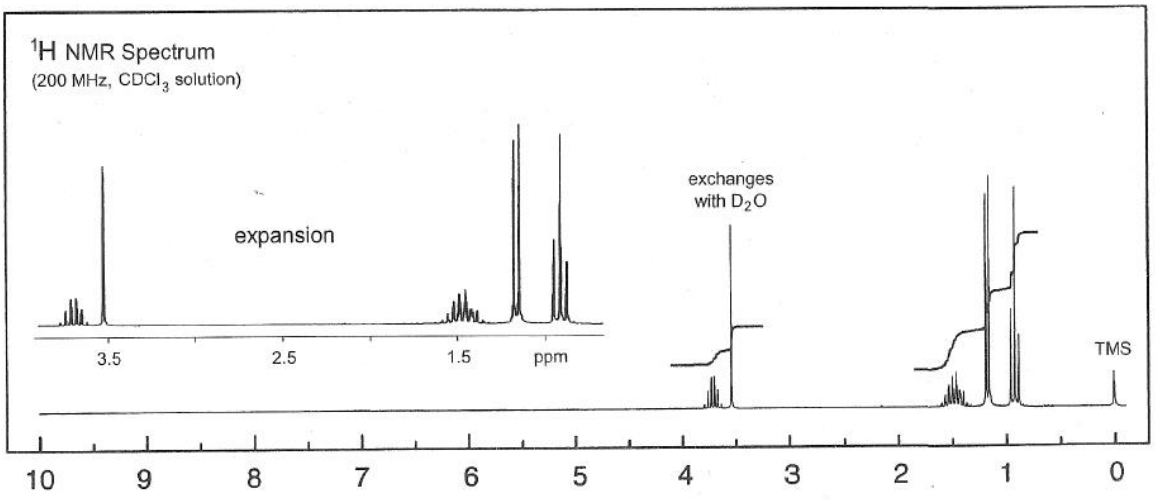
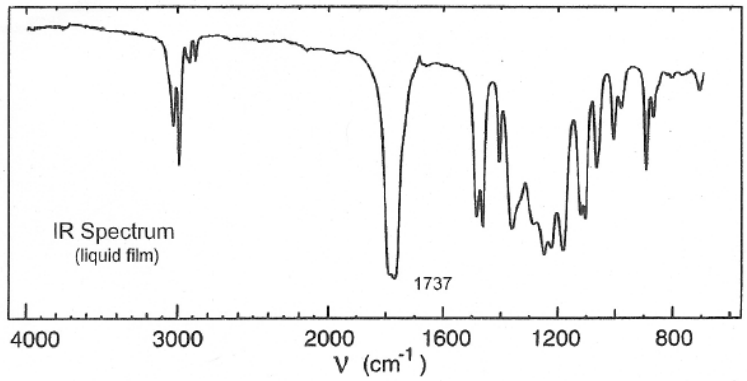


No significant UV absorption above 220 nm







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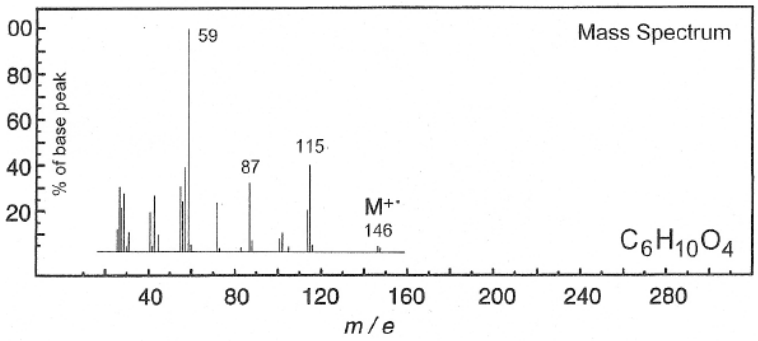
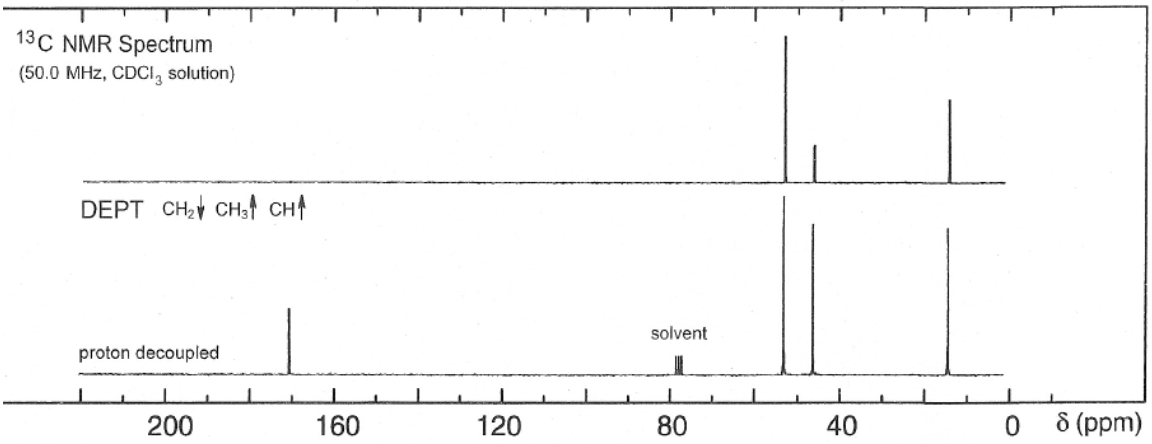
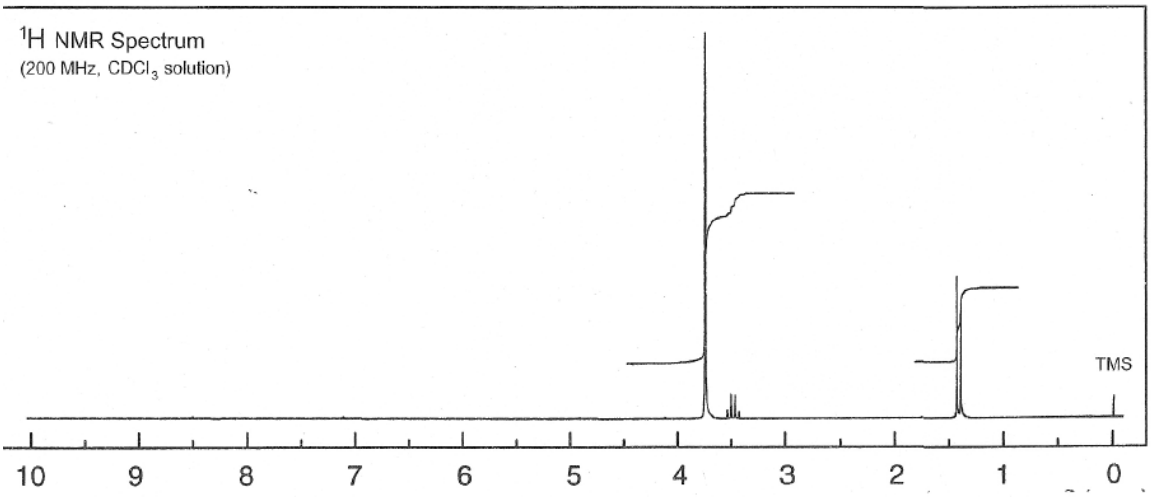
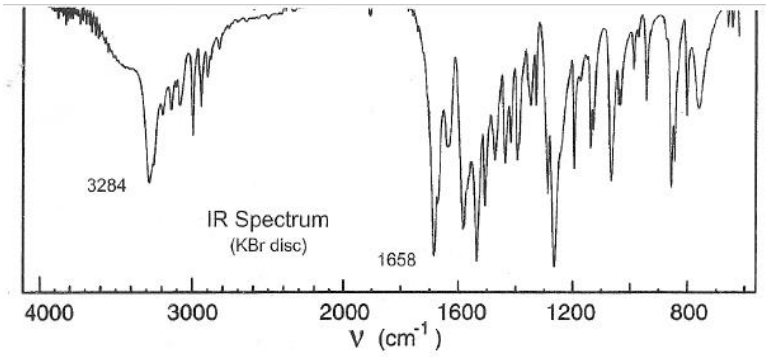


No significant UV absorption above 220 nm







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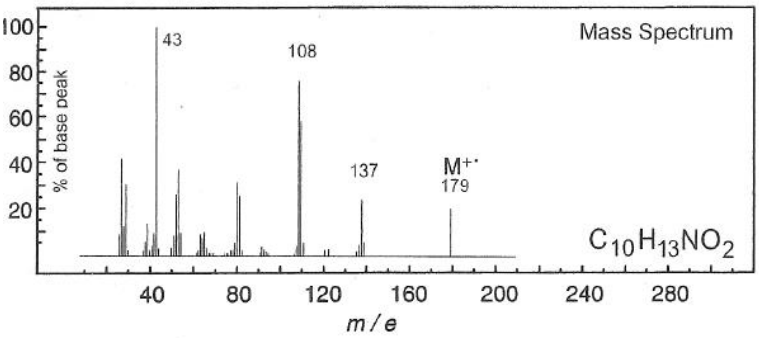

UV Spectrum

λ_{max} 250 nm ($\log_{10}\varepsilon$ 3.1)

λ_{max} 287 nm ($\log_{10}\varepsilon$ 2.2)

solvent : chloroform