



كلية العلوم

القسم : الكيمياء

السنة : الثالثة

المادة : كيمياء عضوية ٣

المحاضرة : تمارين مطيافية / عملي

{{ مكتبة A to Z }}

مكتبة A to Z : Facebook Group

2026

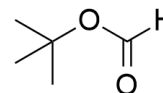
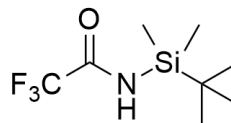
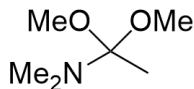
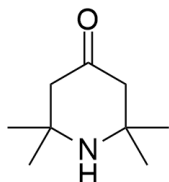
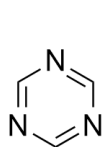
كلية العلوم ، كلية الصيدلة ، الهندسة التقنية

يمكنكم طلب المحاضرات برسالة نصية (SMS) أو عبر (What's app-Telegram) على الرقم 0931497960



Write out the answers on separate sheets of paper.

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



2. Propose a structure that is consistent with each set of data.

- a.  $\text{C}_4\text{H}_{10}\text{O}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 1.28 (9H) |
| singlet | $\delta$ | 1.35 (1H) |

- b.  $\text{C}_7\text{H}_{15}\text{Cl}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 1.10 (9H) |
| singlet | $\delta$ | 1.60 (6H) |

- c.  $\text{C}_2\text{H}_4\text{Br}_2$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| doublet | $\delta$ | 2.50 (3H) |
| quartet | $\delta$ | 5.90 (1H) |

- d.  $\text{C}_4\text{H}_8\text{Cl}_2$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| doublet | $\delta$ | 1.60 (3H) |
| quartet | $\delta$ | 2.15 (2H) |
| triplet | $\delta$ | 3.72 (2H) |
| sextet  | $\delta$ | 4.27 (1H) |

- e.  $\text{C}_5\text{H}_8\text{Br}_4$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 3.60 (8H) |
|---------|----------|-----------|

- f.  $\text{C}_4\text{H}_9\text{Br}$

$^1\text{H}$  NMR spectrum

|           |          |           |
|-----------|----------|-----------|
| doublet   | $\delta$ | 1.10 (6H) |
| multiplet | $\delta$ | 1.90 (1H) |
| doublet   | $\delta$ | 3.40 (2H) |

g.  $\text{C}_5\text{H}_{11}\text{Br}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 1.10 (9H) |
| singlet | $\delta$ | 3.20 (2H) |

h.  $\text{C}_7\text{H}_{14}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 1.10 (9H) |
| singlet | $\delta$ | 1.60 (3H) |
| doublet | $\delta$ | 4.60 (1H) |
| doublet | $\delta$ | 4.80 (1H) |

i.  $\text{C}_4\text{H}_8\text{O}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| triplet | $\delta$ | 1.10 (3H) |
| singlet | $\delta$ | 2.10 (3H) |
| quartet | $\delta$ | 2.40 (2H) |

j.  $\text{C}_7\text{H}_{14}\text{O}$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| triplet | $\delta$ | 0.90 (6H) |
| sextet  | $\delta$ | 1.60 (4H) |
| quartet | $\delta$ | 2.40 (4H) |

k.  $\text{C}_5\text{H}_{10}\text{O}_2$

$^1\text{H}$  NMR spectrum

|           |          |           |
|-----------|----------|-----------|
| triplet   | $\delta$ | 0.94 (3H) |
| multiplet | $\delta$ | 1.39 (2H) |
| multiplet | $\delta$ | 1.62 (2H) |
| triplet   | $\delta$ | 2.35 (2H) |
| singlet   | $\delta$ | 12.0 (1H) |

l.  $\text{C}_6\text{H}_{12}\text{O}_2$

$^1\text{H}$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| singlet | $\delta$ | 1.08 (9H) |
| singlet | $\delta$ | 2.23 (2H) |
| singlet | $\delta$ | 12.1 (1H) |

m.  $C_5H_8O_4$

$^1H$  NMR spectrum

|           |          |            |
|-----------|----------|------------|
| triplet   | $\delta$ | 0.93 (3H)  |
| multiplet | $\delta$ | 1.80 (2H)  |
| triplet   | $\delta$ | 3.10 (1H)  |
| singlet   | $\delta$ | 12.70 (2H) |

n.  $C_6H_{12}O_2$

$^1H$  NMR spectrum

|           |          |           |
|-----------|----------|-----------|
| doublet   | $\delta$ | 1.18 (6H) |
| triplet   | $\delta$ | 1.26 (3H) |
| multiplet | $\delta$ | 2.51 (1H) |
| quartet   | $\delta$ | 4.13 (2H) |

o.  $C_7H_{12}O_4$

$^1H$  NMR spectrum

|         |          |           |
|---------|----------|-----------|
| triplet | $\delta$ | 1.28 (6H) |
| singlet | $\delta$ | 3.36 (2H) |
| quartet | $\delta$ | 4.21 (4H) |

p.  $C_7H_{14}O_2$

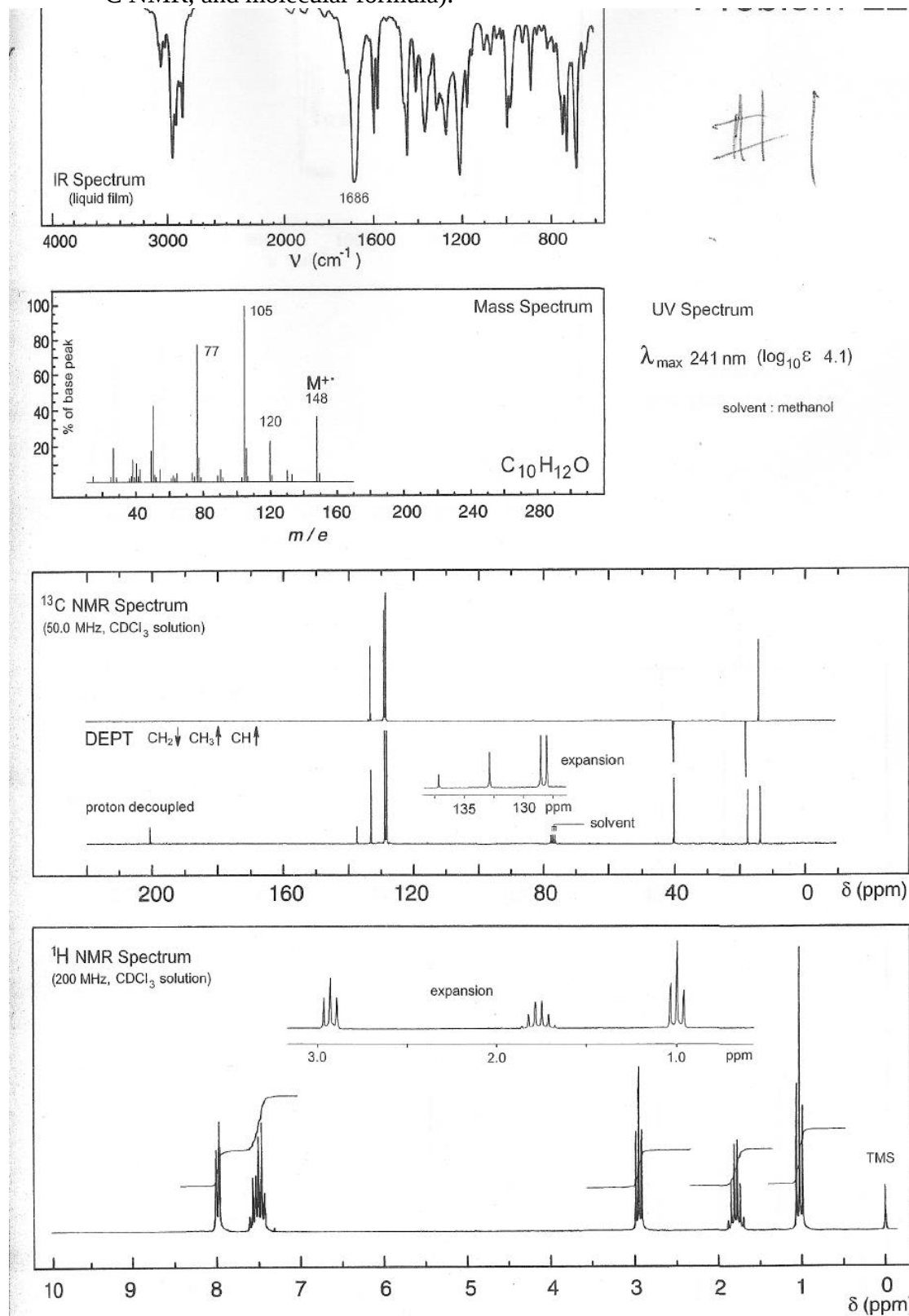
$^1H$  NMR spectrum

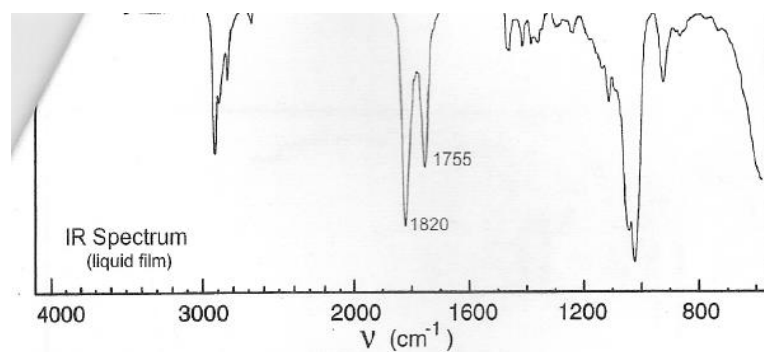
|           |          |           |
|-----------|----------|-----------|
| doublet   | $\delta$ | 0.92 (6H) |
| multiplet | $\delta$ | 1.52 (2H) |
| multiplet | $\delta$ | 1.70 (1H) |
| singlet   | $\delta$ | 2.09 (3H) |
| triplet   | $\delta$ | 4.10 (2H) |

3. Each compound gives only one signal in its  $^1H$  NMR spectrum. Propose a structure for each.

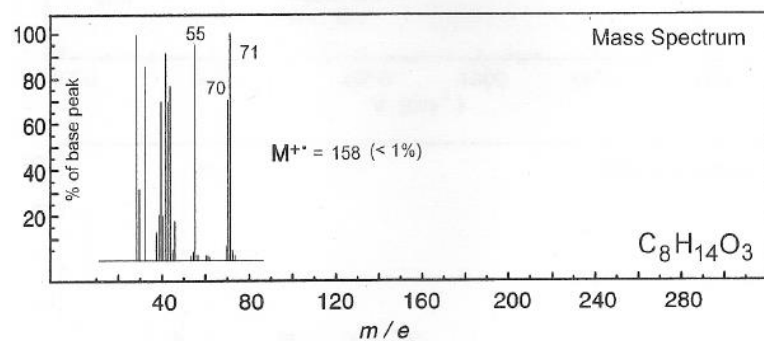
- $C_3H_6O$
- $C_5H_{10}$
- $C_5H_{12}$
- $C_4H_6Cl_4$

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

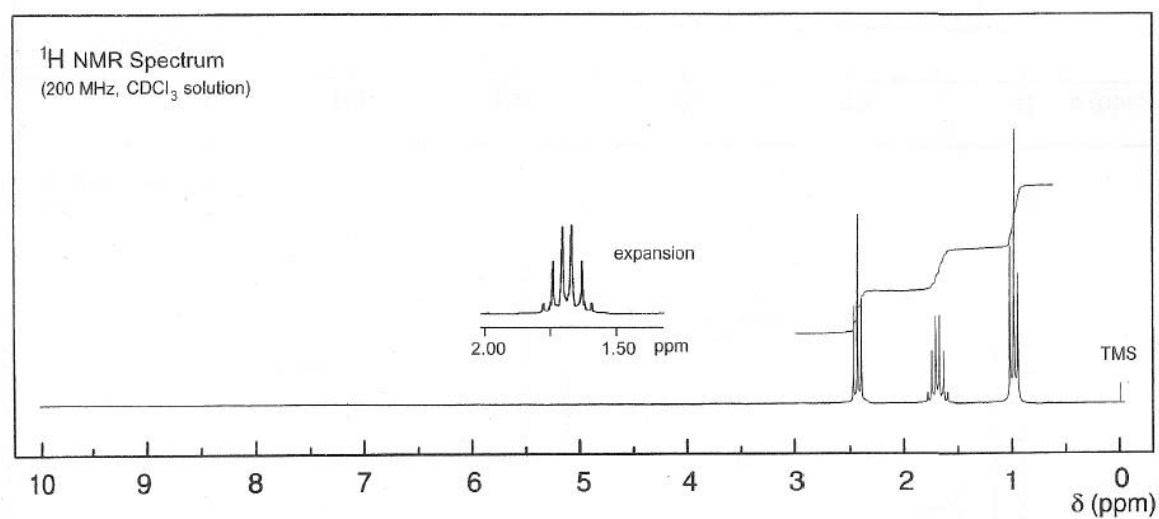
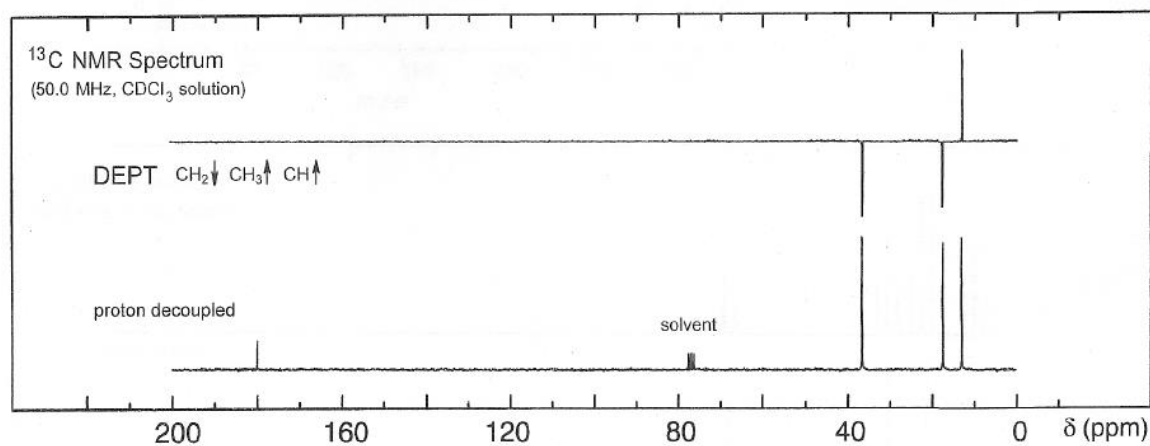


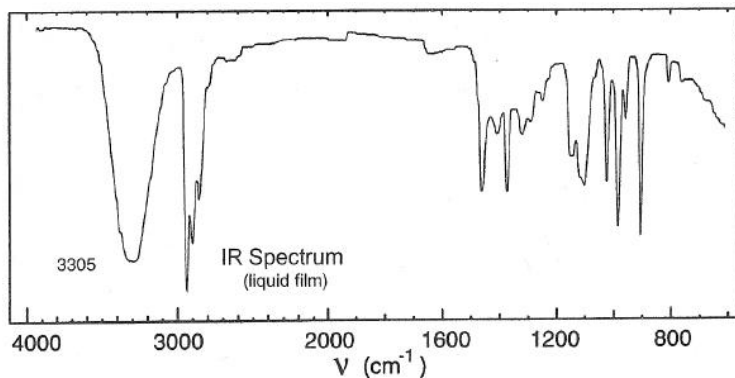


#2

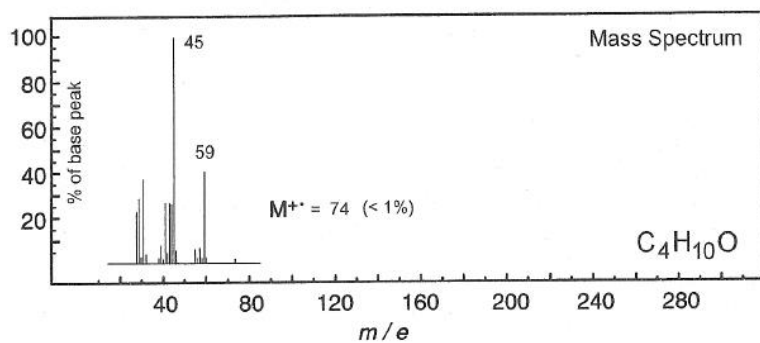


No significant UV  
absorption above 220 nm

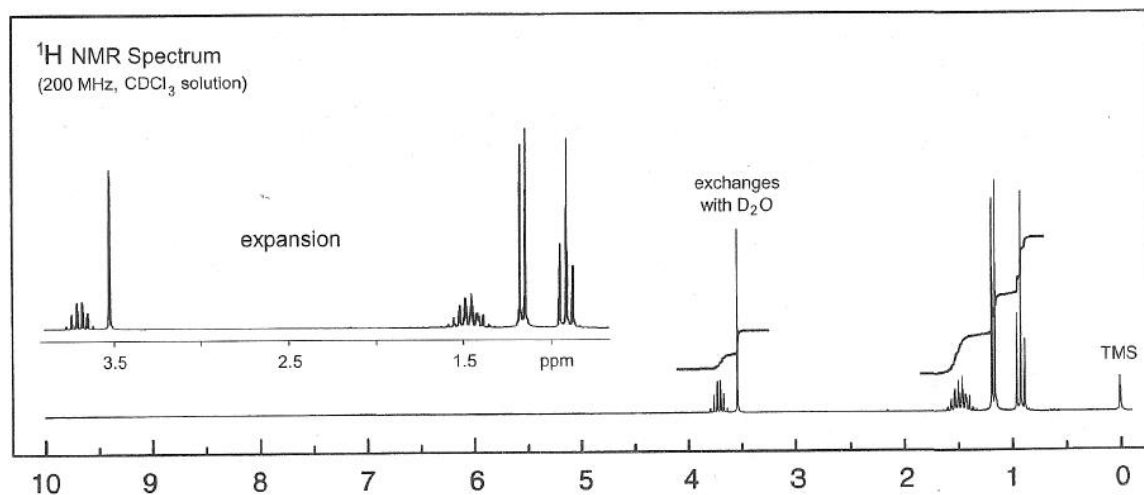
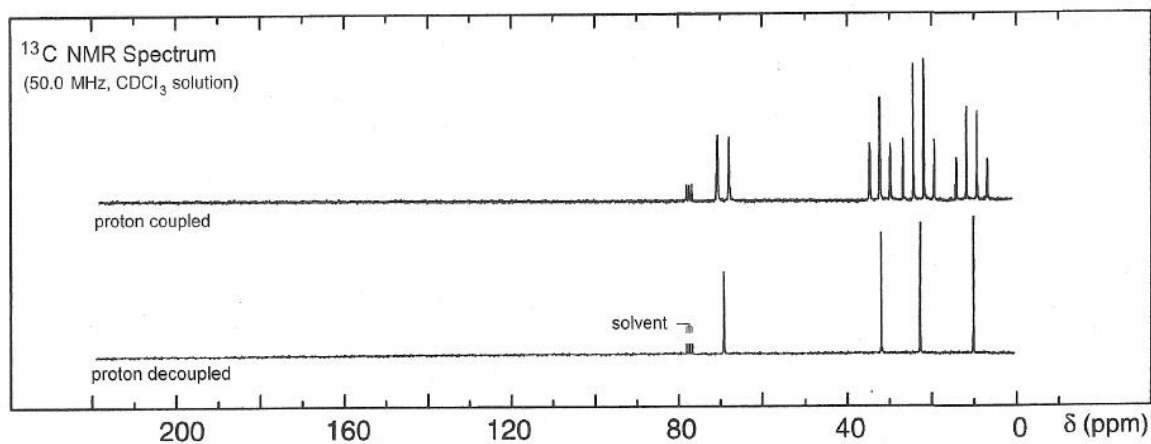


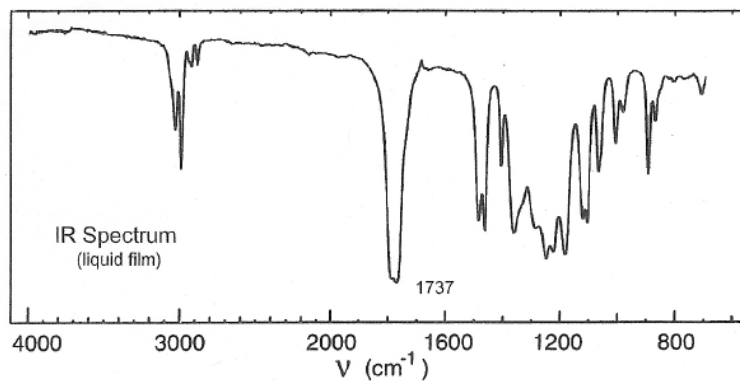


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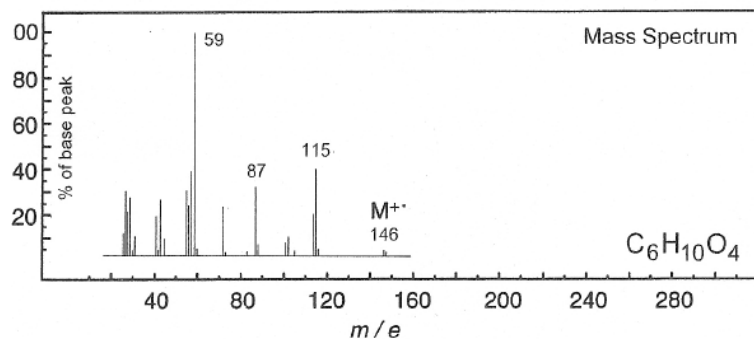


No significant UV  
absorption above 220 nm

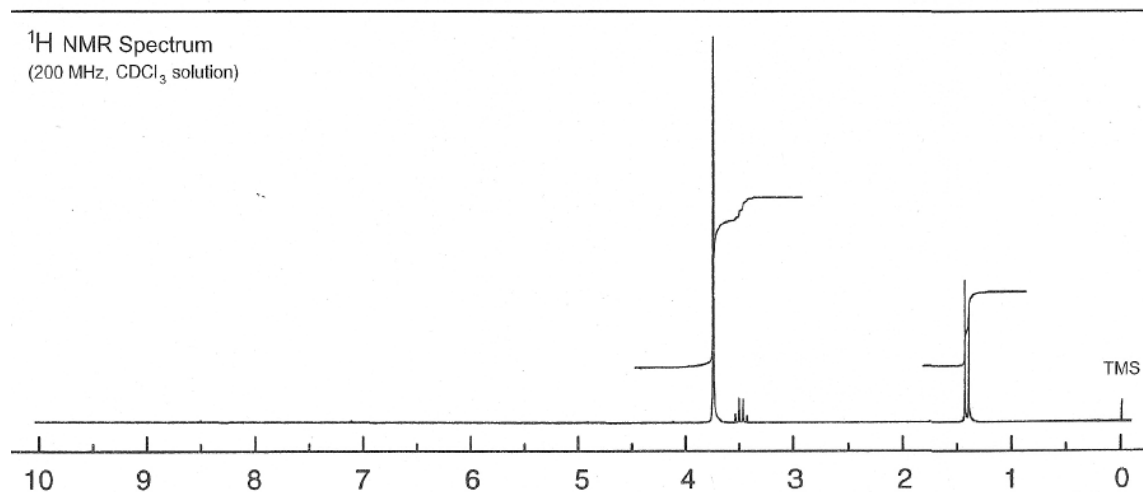
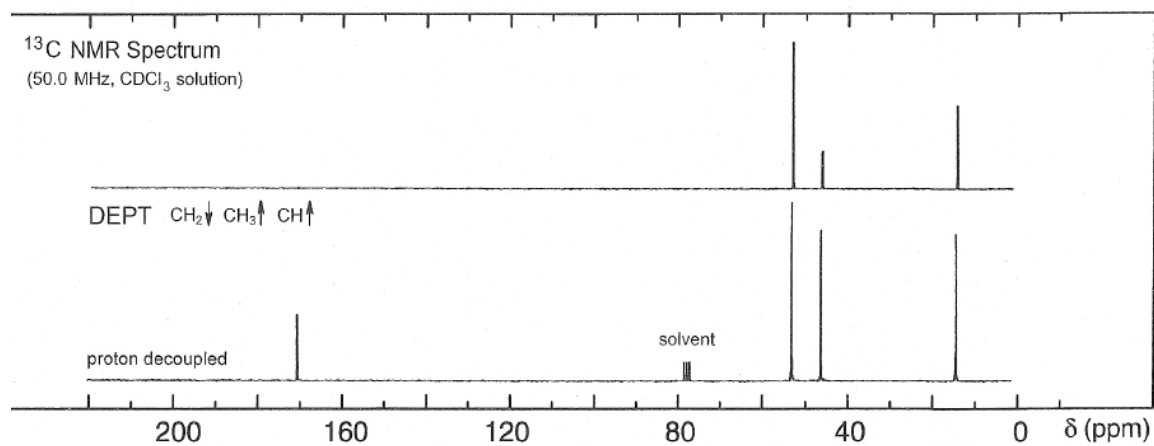


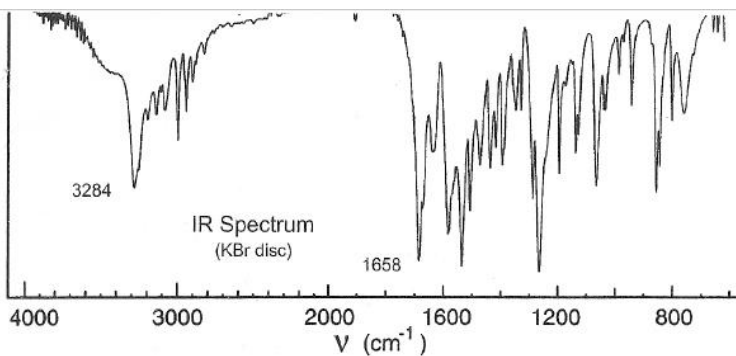


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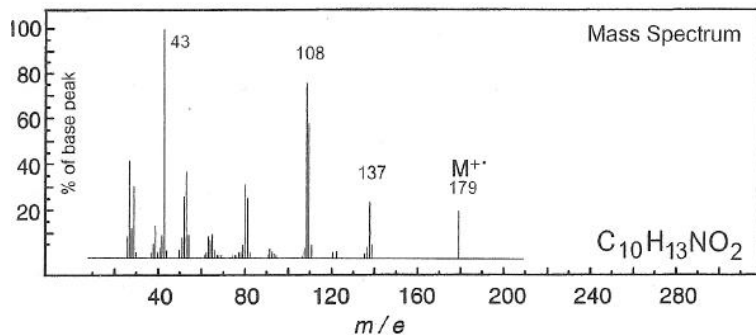


No significant UV  
absorption above 220 nm





#5

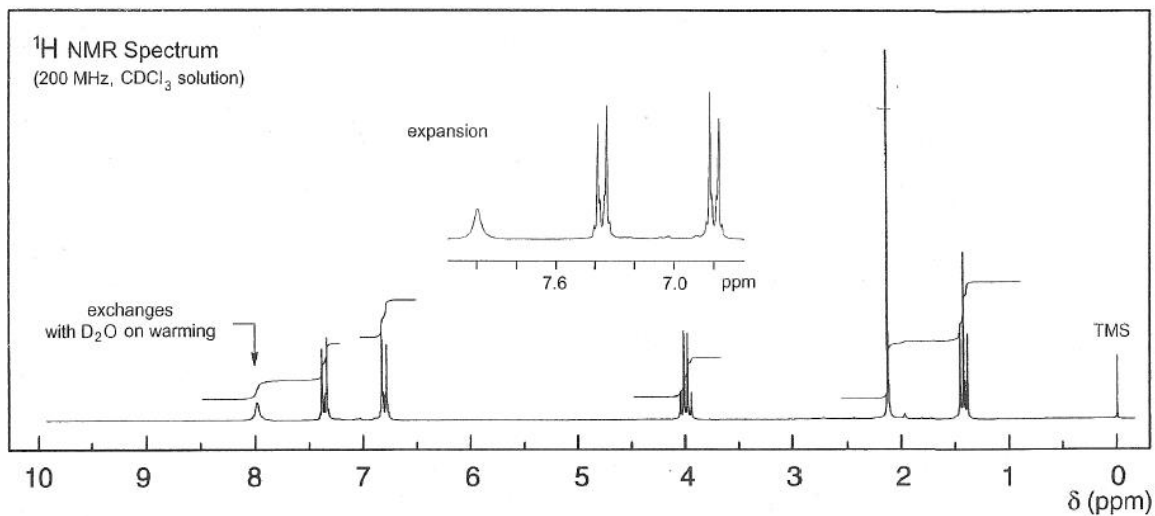
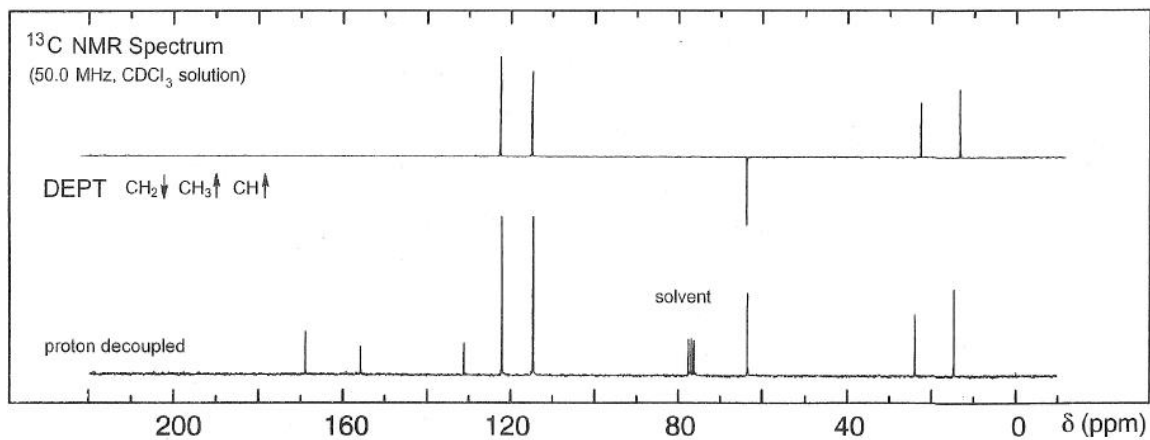


UV Spectrum

$\lambda_{\text{max}}$  250 nm ( $\log_{10} \epsilon$  3.1)

$\lambda_{\text{max}}$  287 nm ( $\log_{10} \epsilon$  2.2)

solvent: chloroform





مكتبة  
A to Z