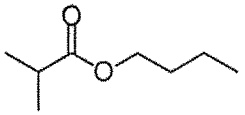
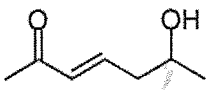
Chem 342-Jasperse Test 2 Version 1 Name:

NMR, IR

1. Predict the ^{1}H NMR spectrum. Include the approximate chemical shifts (1's, 2's, etc.), the integration, and the splitting (can use "s" for singlet; "d" for doublet; "t" for triplet' "q" for quartet; and "m" for multiplet, anything more complex than a quartet). Note: for signals that are symmetry equivalent, do not list them twice.

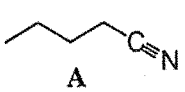


2. Predict the ^{13}C NMR spectrum. Include the approximate chemical shifts (220-160, 160-100, 100-50, or 50-0) and the splitting if a couple carbon was taken (q, t, d, s).

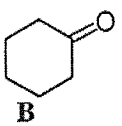


3. Match the following structures with the listed feature IR signals:

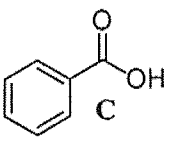
1) 3300-3200 2) 3300-2500, 1680 3) 2200 4) 1720



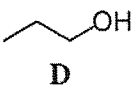
A



B



C



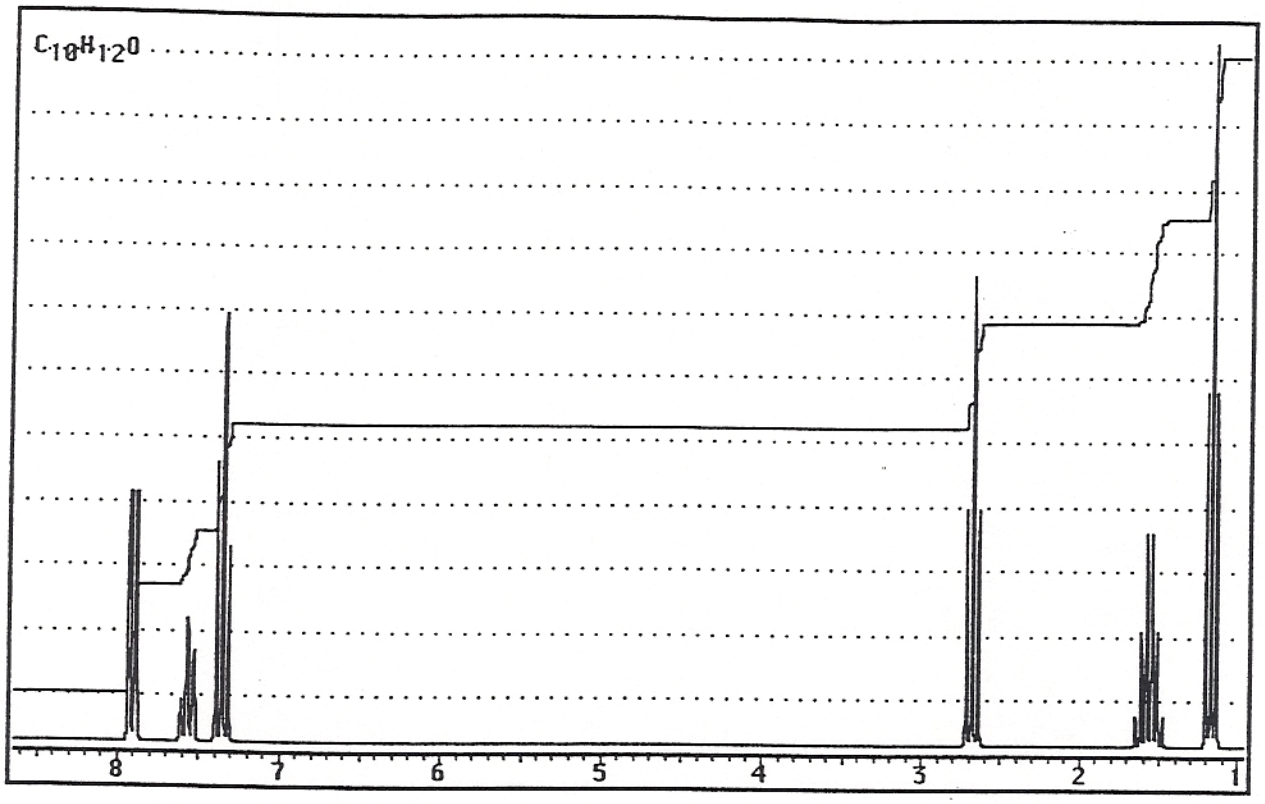
D

Solve the structures for the following. If you get a structure perfect, you will get full credit. If you do not get a structure perfect, you may still get some partial credit. Thus, it is in your interest to show some of your work, make a structure guess, or tell me what you do know for sure.

4. $C_{10}H_{12}O$

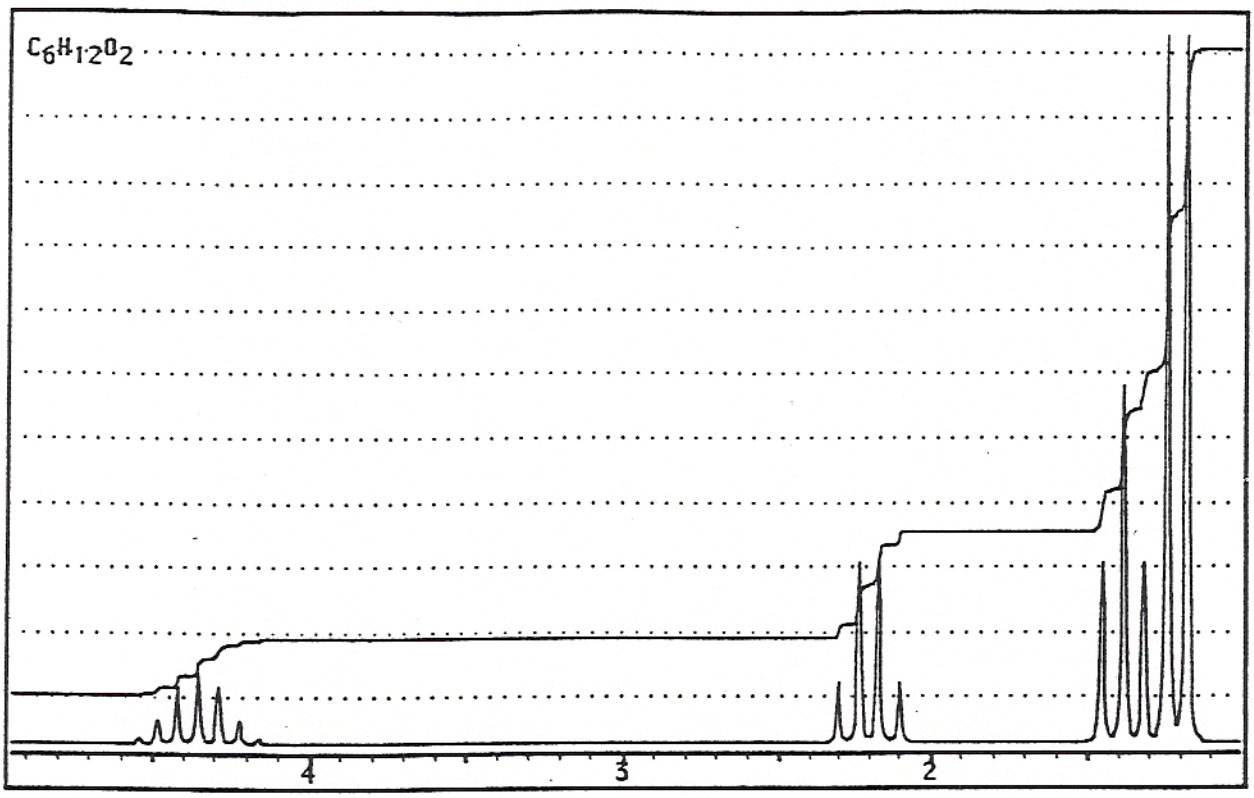
IR: 1670

^{13}C NMR: 210 (s, short), 150 (s, short), 130 (d, tall) 124 (d, tall), 120 (d), 33 (t), 26 (t), 20 (q)



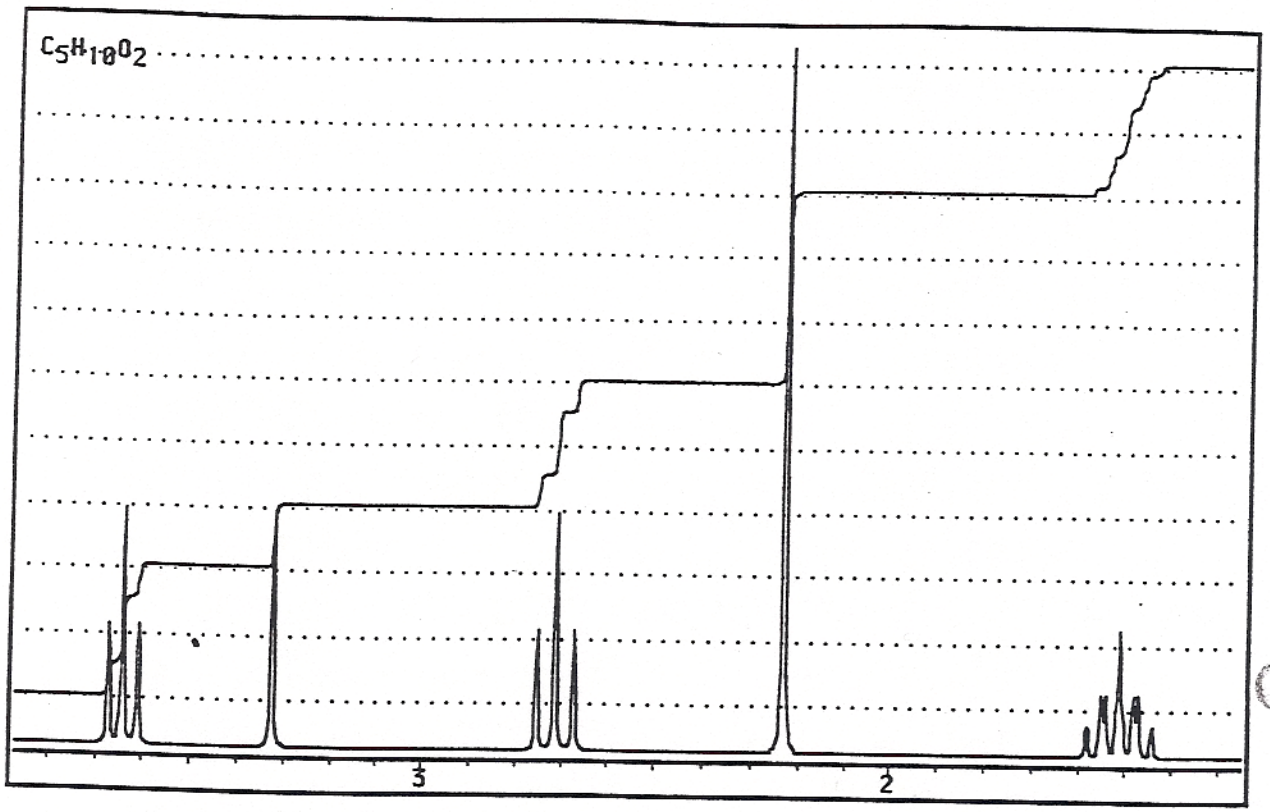
5. $C_6H_{12}O_2$

IR: 1750
^{13}C NMR: 180 (s, short), 70 (d), 36 (t), 30 (q), 20 (q, extra tall)



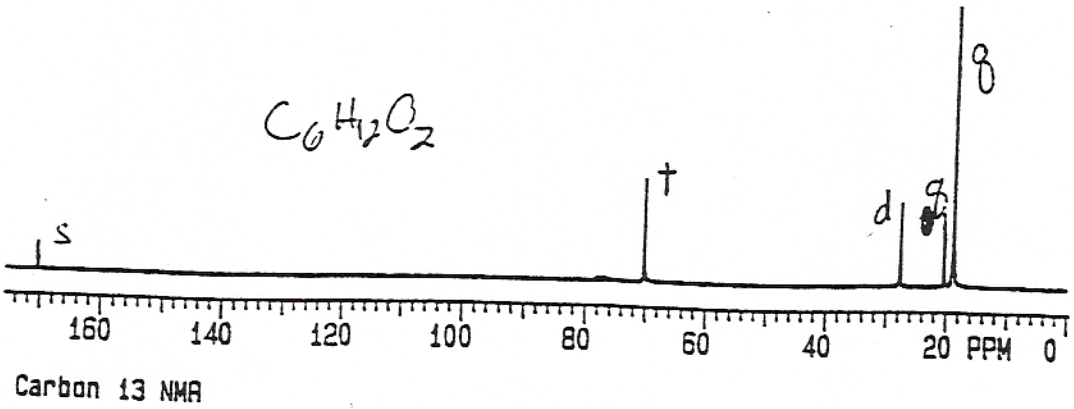
6. $C_5H_{10}O_2$

IR: 3300-3200, 1710
^{13}C NMR: 210 (s), 65 (t), 38 (t), 35 (t), 28 (q)



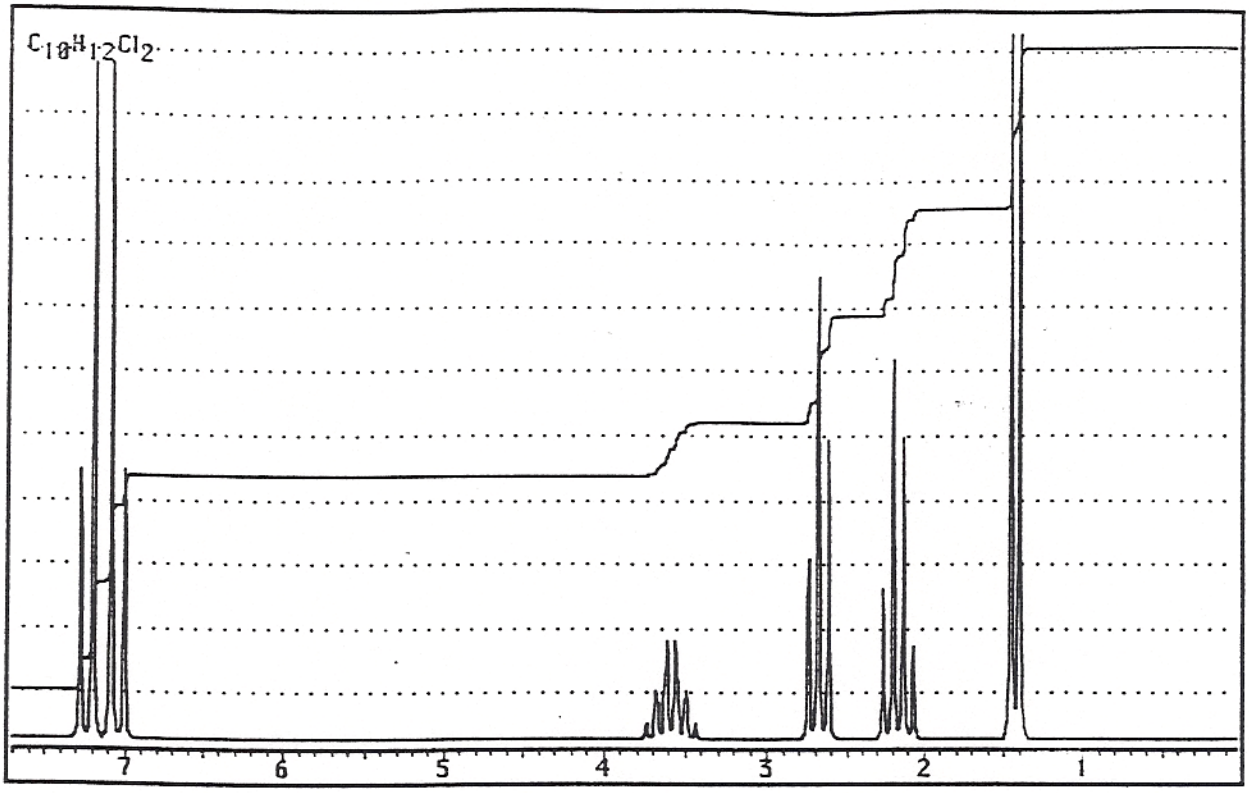
7. $C_6H_{12}O_2$ IR: 1745

(Note: There are two plausible solutions to this problem.)



Carbon 13 NMR

8. $C_{10}H_{12}Cl_2$ ^{13}C NMR 150 (s), 144 (s), 133 (d), 126 (d), 58 (d), 37 (t), 32 (t), 22 (q)



9. $C_6H_{14}O$

IR 3300-3200
^{13}C NMR 78 (d), 40 (d), 36 (t), 25 (q), 20 (q, extra tall)

6H, d, 1.0
3H, t, 1.2
2H, pentet, 1.4
1H, octet, 1.8
1H, broad s, 3.0
1H, q, 3.8

(2 acceptable answers)

10. $C_7H_{14}O_3$ IR: 3300-3200, 1745
^{13}C NMR 180 (s), 75 (d), 65 (t), 38 (t), 30 (t), 25 (q), 20 (q)