Chem 342-Jasperse Test 2 Version 4 Name:

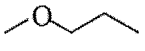
NMR, IR

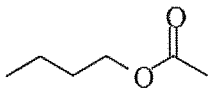
NOTE: This Version is Longer than the Real Test Will Be

1. Predict the ^{1}H NMR spectra for the following molecules. Include predicted:
   - chemical shifts
   - integration
   - splitting pattern (singlet, doublet, triplet, quartet, etc., multiplet)

Example

3's, 2H, t
1's (or 2's), 2H, pentet (or multiplet)
3's, 2H, t

a. 

b. 

2. Assign the dimethylbenzene isomer for which the ^{13}C NMR spectrum has:

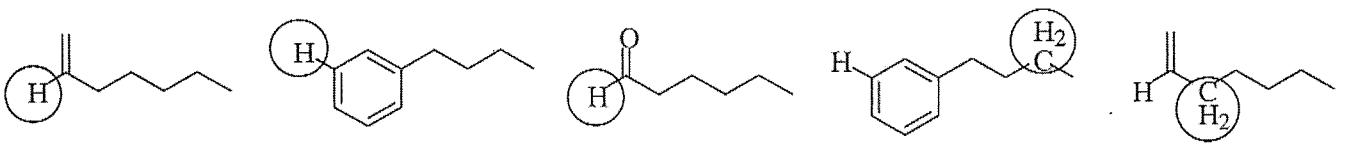
   a. 3 signals (q, s, d)

   b. 4 signals (q, s, d, d)

   c. 5 signals (q, s, d, d, d)

3. Match the circled proton or protons in the following compounds with the correct chemical shift.

1.20 2.05 5.70 7.17 9.55

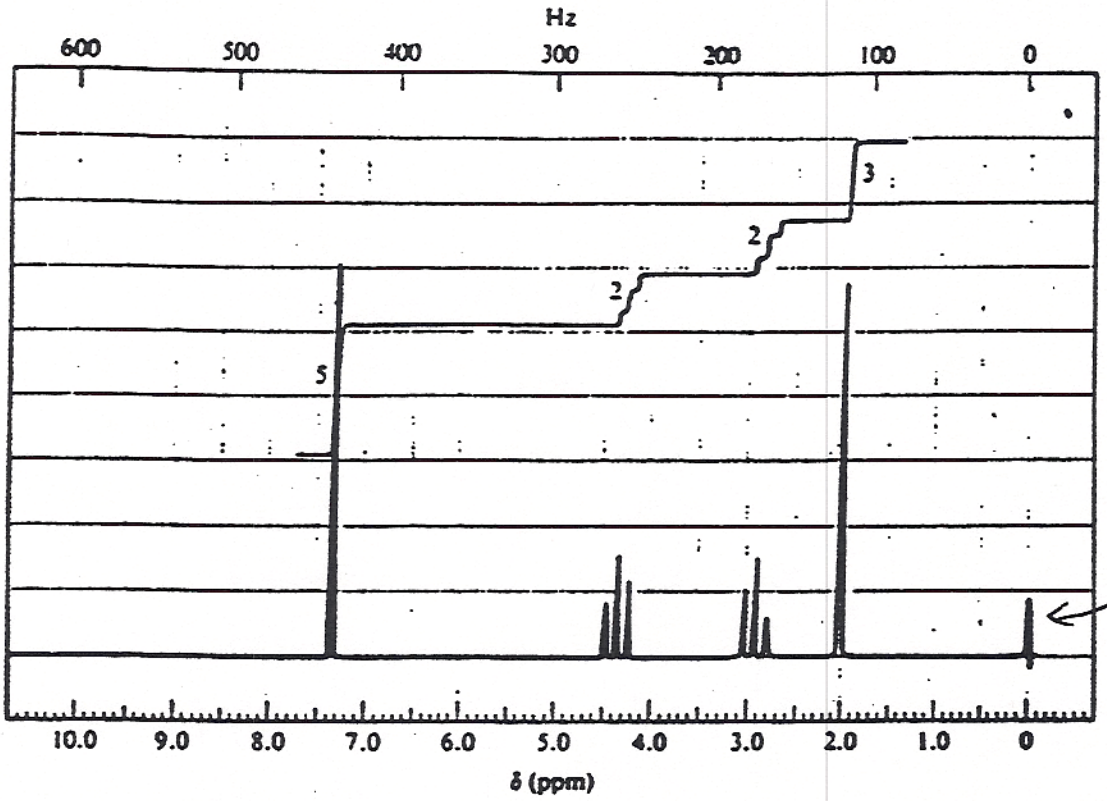


DRAW STRUCTURES FOR THE MOLECULES IN PROBLEMS 3–9

3. $C_{10}H_{12}O_2$

IR: 1740 (strong), 750 (strong), 700 (strong)

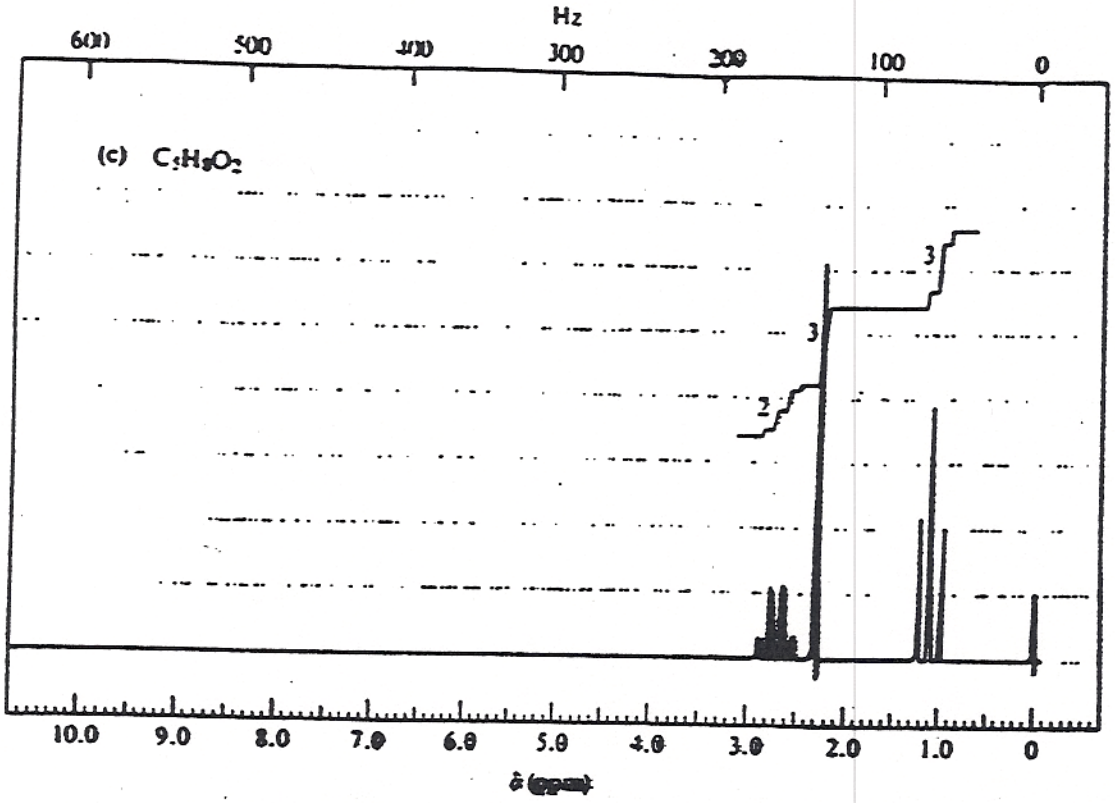
^{13}C NMR: 185 (s), 155 (s), 135 (d), 130 (d), 128 (d), ~~35~~ 65 (t), 28 (t), 20 (q)



Note: Signal at zero is reference signal, nothing in actual molecule.

4. $C_5H_8O_2$

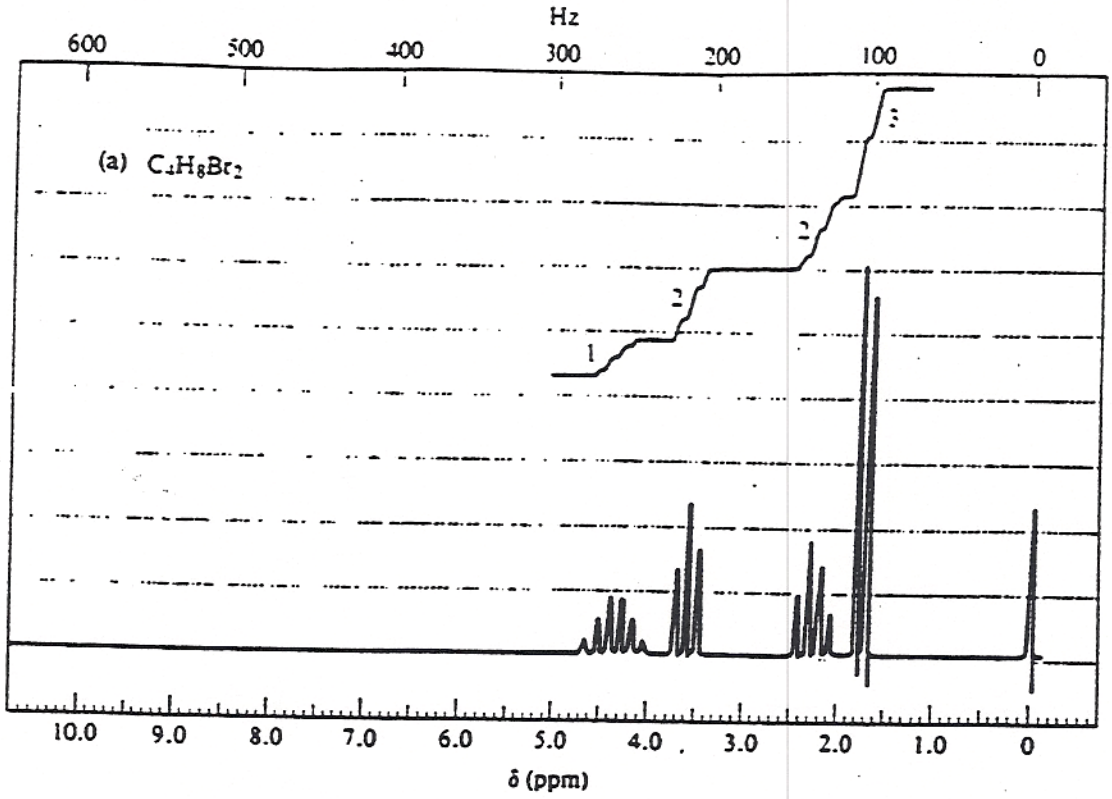
IR: 1720 (s), 1725 (s)



5. $C_4H_8Br_2$

IR: nothing interesting

^{13}C NMR: 45 (d), 37 (t), 24 (t), 18 (q)



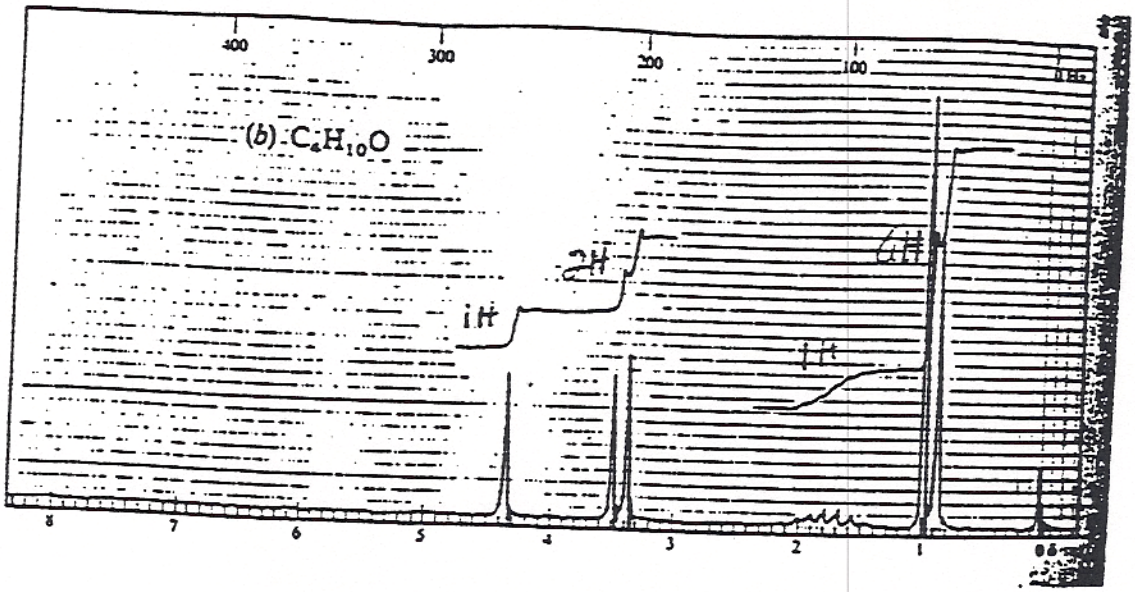
(6.) $C_{11}H_{16}O$

IR: 820 (strong)

^{13}C: 145 (s), 132 (s), 128 (d), 120 (d), 75 (t), 35 (d), 20 (q), 18 (q)

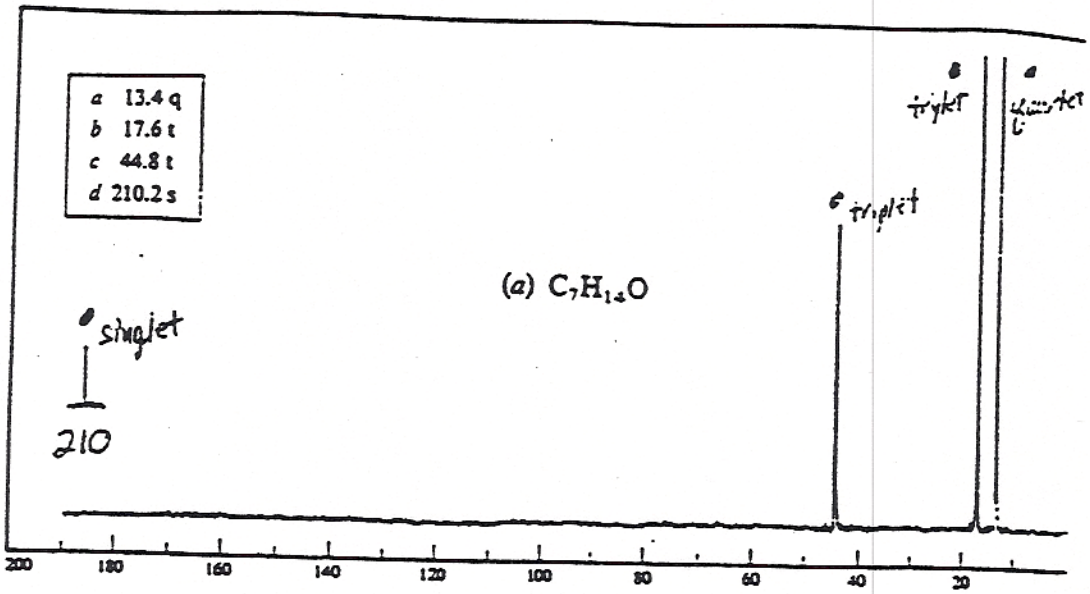
^{1}H NMR: 1.25 (6H, d), 1.30 (3H, t), 2.90 (m, 1H), 4.15 (2H, q), 6.66 (2H, d), 6.97 (2H, d)

7. $C_4H_{10}O$



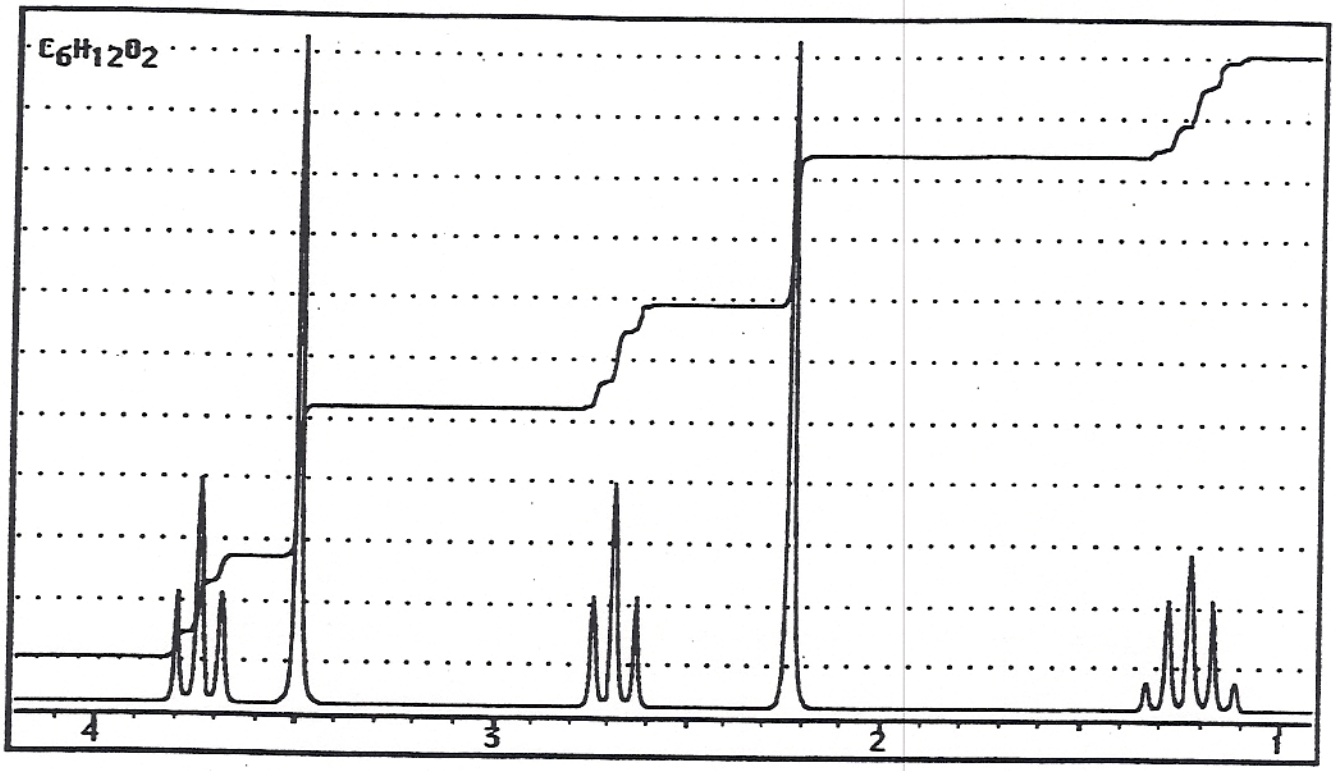
(8c) $C_7H_{14}O$

IR: 1710 (strong)



9. Show the structures for the following molecule, based on the spectroscopic information provided. (10 points)

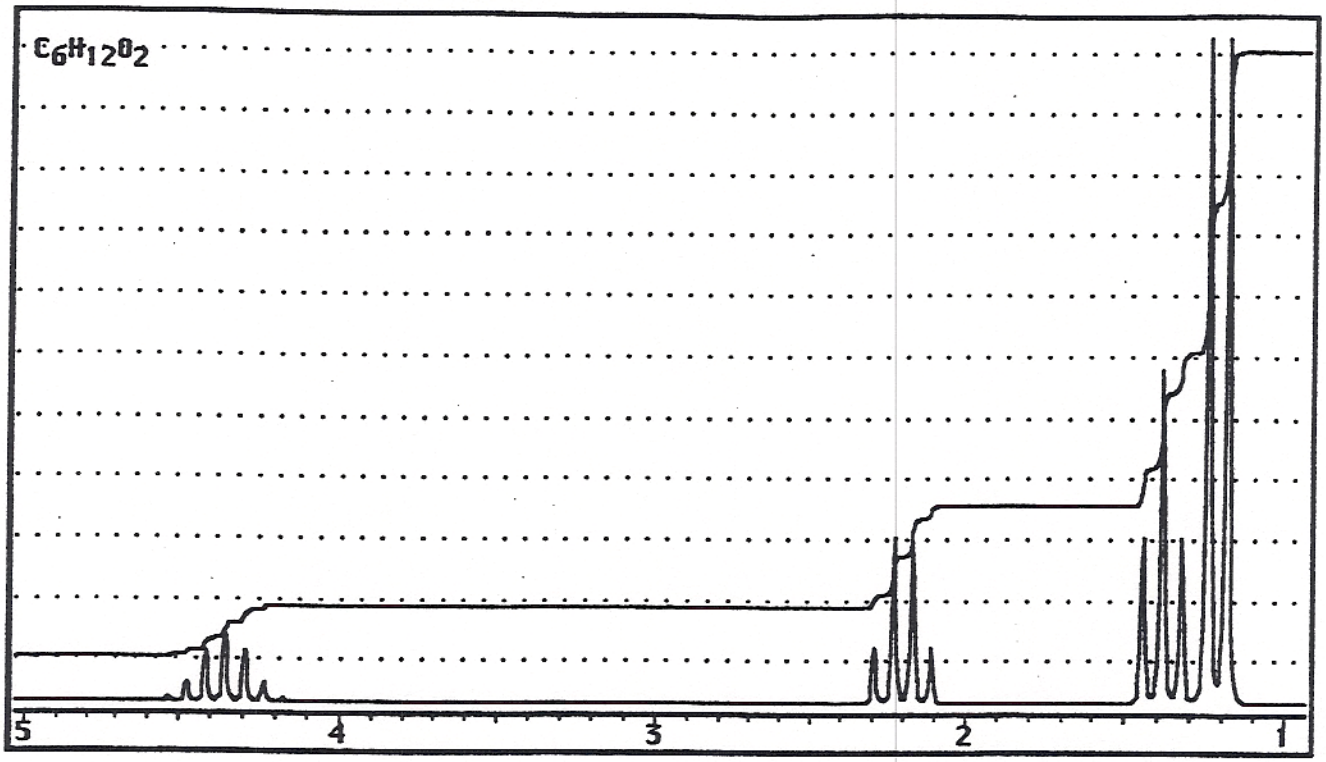
$C_6H_{12}O_2$ IR: 1710, strong ^{13}C NMR: 200 (s), 75 (t), 65 (q), 40 (t), 30 (t), 20 (q)



(10)

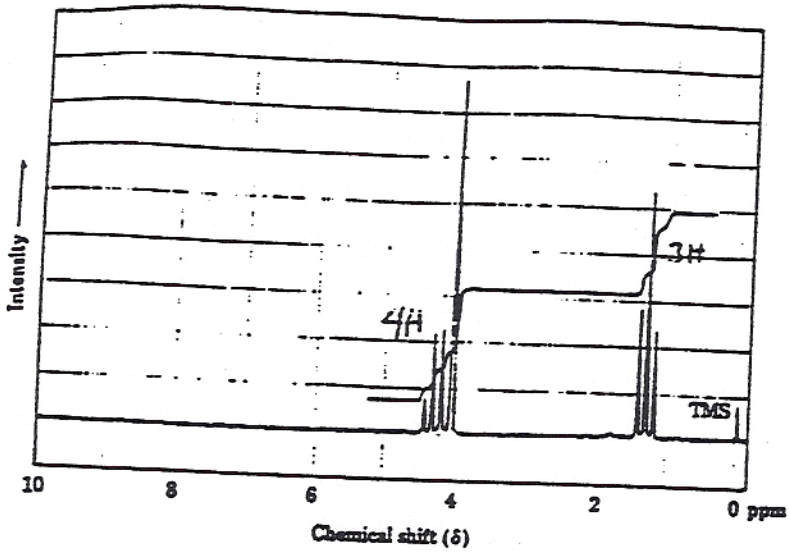
18. Show the structures for the following molecule, based on the spectroscopic information provided. (10 points)

$C_6H_{12}O_2$ IR: 1745, strong ^{13}C NMR: 20 (q), 30 (q), 48 (t), 78 (d), 185 (s)



$C_4H_7O_2Cl$

IR: 1740



11