

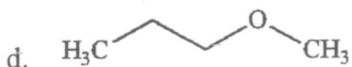
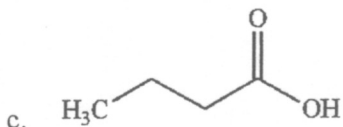
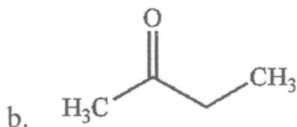
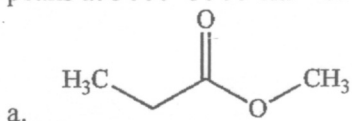
Name: _____

CHM 228 Exam 1b Summer 2018

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- D 1. The amount of energy in infrared light corresponds to:
- the amount of energy needed to promote one electron from a bonding to an antibonding molecular orbital
 - the amount of energy needed to fragment a molecule
 - the amount of energy needed to strip a molecule of one electron to generate a cation radical
 - the amount of energy needed to increase certain molecular motions, such as bond vibrations, in organic molecules
- A 2. Which of the following compounds gives an infrared spectrum with a peak at $\sim 1750\text{ cm}^{-1}$, but no significant peaks at $3000\text{--}3500\text{ cm}^{-1}$ or $1050\text{--}1250\text{ cm}^{-1}$?



Problem

3100 2200
↙ ↘

3. Cyclohexene and hex-2-yne both have the molecular formula, C_6H_{10} .

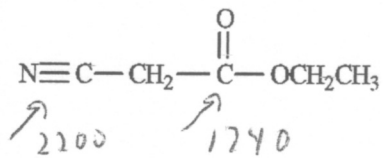
a) How would you use infrared spectroscopy to distinguish between the two compounds?

b) How could the mass spectrum be used to distinguish between the two compounds?

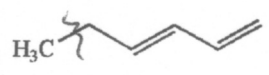
HEX-2-YNE

GIVES $CH_3C\equiv CCH_2+$
 $C_4H_7 = 55$
ALLYLIC

4. At what approximate positions might the compound below show IR absorptions?

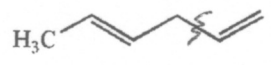


5. Which type of spectroscopy (IR or MS) will best distinguish between the pair of compounds below? Give a brief reason.



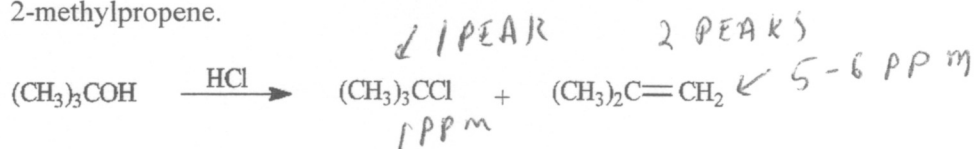
ALLYLIC
FRAGMENT
 $C_5H_7 = 67$

vs.



ALLYLIC
FRAGMENT
 $C_4H_7 = 55$

6. Treatment of *tert*-butyl alcohol with hydrogen chloride yields a mixture of *tert*-butyl chloride and 2-methylpropene.

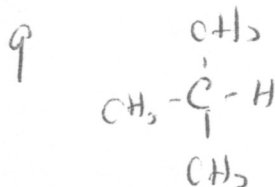


- a) After chromatographic separation, how would you use ^1H NMR to help you decide which was which?

b)

Short Answer

7. What is the maximum number of nearest neighbors the a hydrogen atom in an organic compound can have? Draw a structure of a compound that demonstrates this.

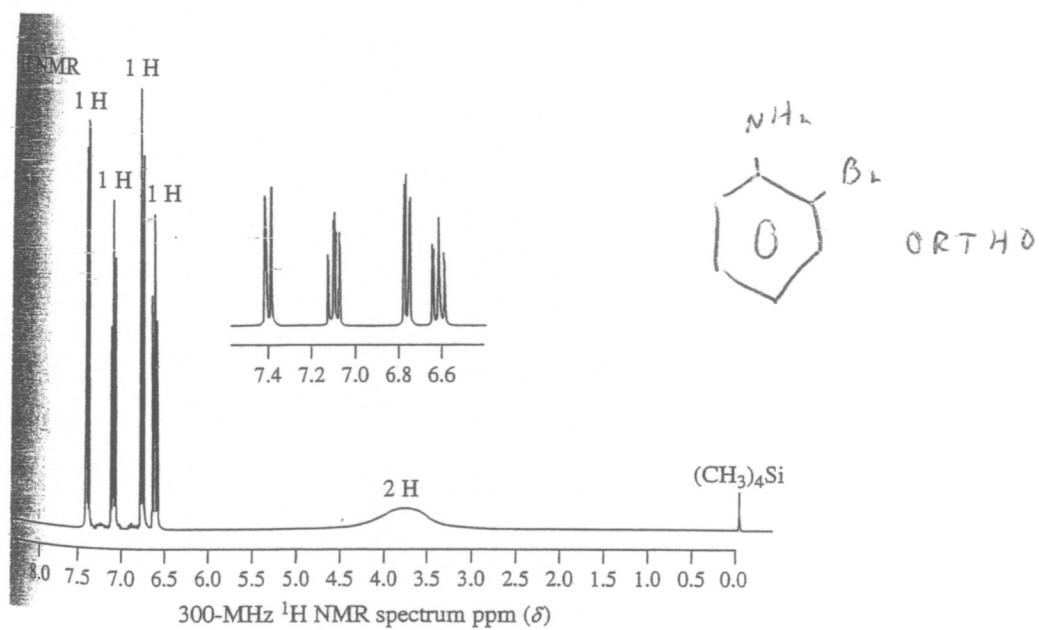


8. Which feature in the ^1H NMR spectrum provides information about the electronic environment of the protons in a compound?

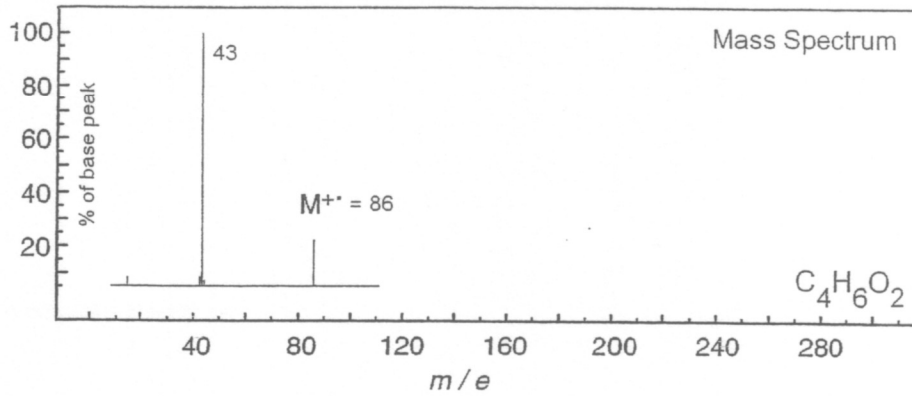
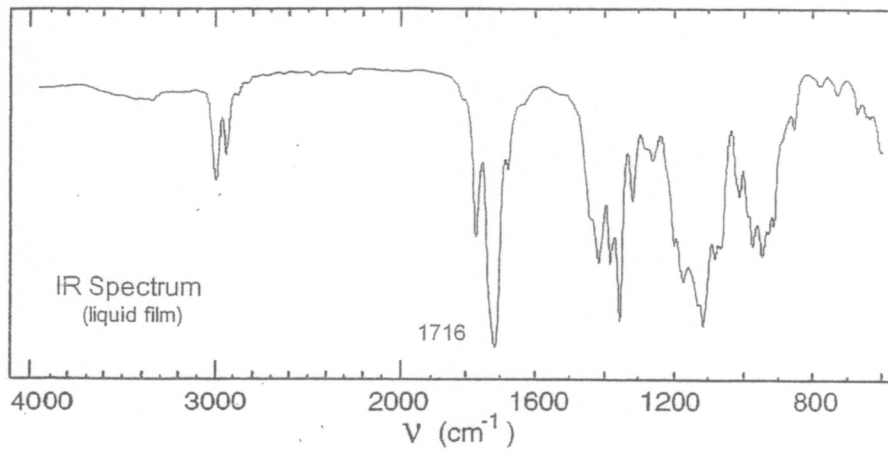
CHEMICAL SHIFT

9. On each of the next three pages, identify the compounds (one on each page)

What is the structure? The formula is C_6H_6NBr .



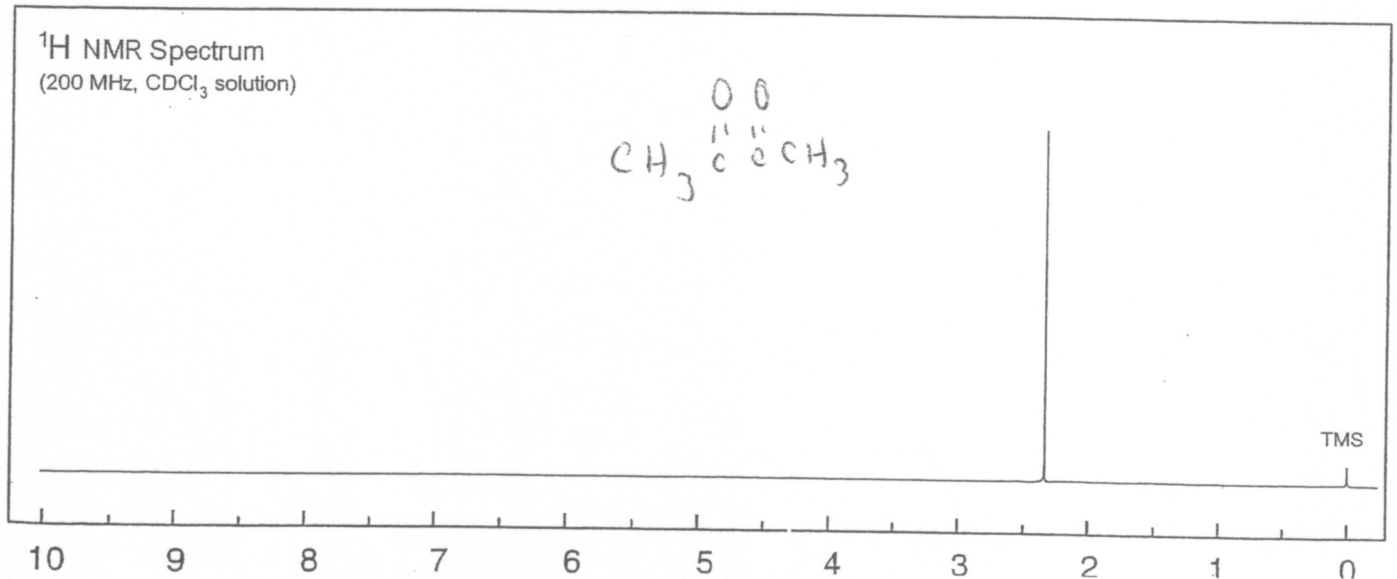
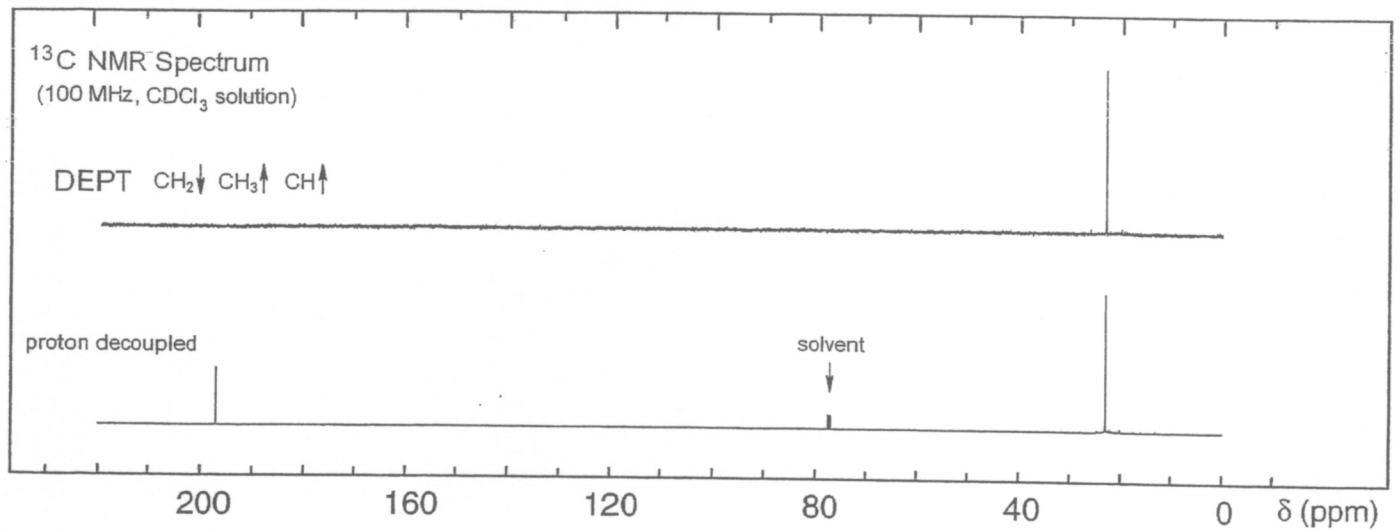
Problem 6



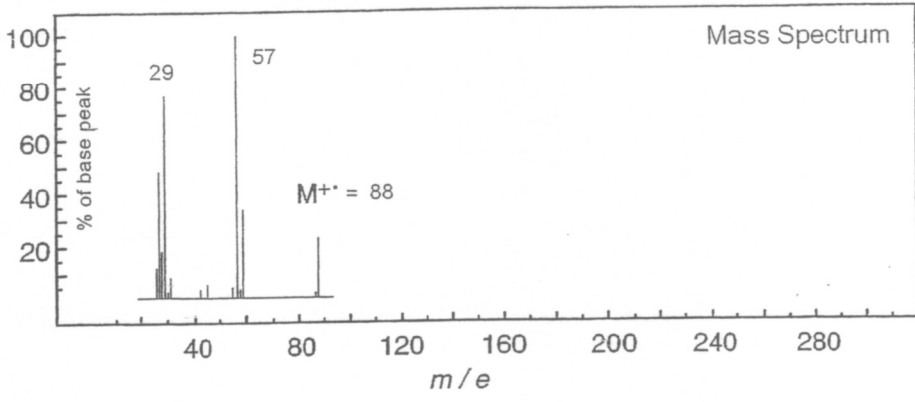
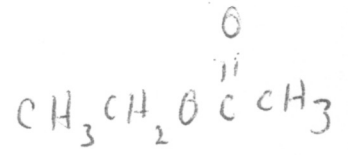
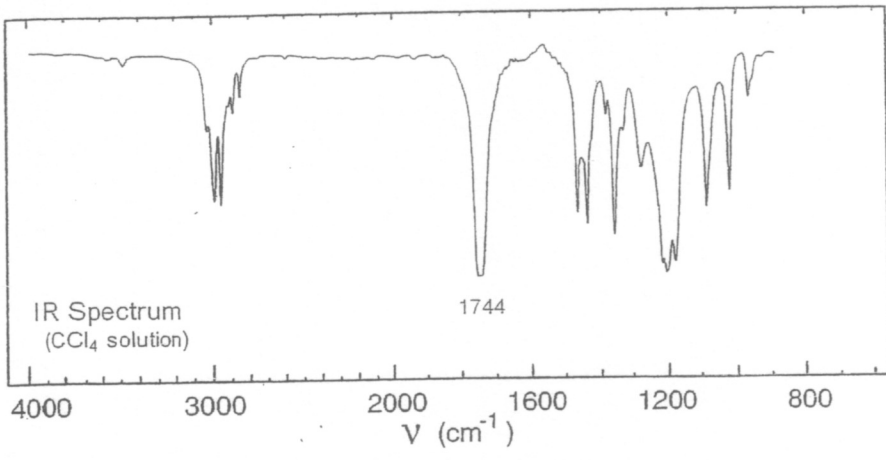
UV Spectrum

$\lambda_{\text{max}} 289 \text{ nm}$ ($\log_{10} \epsilon 1.4$)

solvent : methanol



Problem 4



No significant UV
absorption above 220 nm

