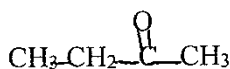


Name Key Print Name BA = bad attempt
 Please show work on all questions for partial credit even on questions which do not specify. (25 total pts)

1. Given the following molecule draw the expected NMR spectrum by completing the following information. You must show all work for full credit. (# peaks in coupling pattern = $2nI + 1$ where $I = \frac{1}{2}$ for proton NMR). (15 pts)



- 1) Show approximate relative chemical shift (note: my letters do not necessarily mean that the peaks show up separately, it may or may not) (3 pts)

$BA = -1\frac{1}{2}$

b + c are same distance from π bond but b has CH_3 so more deshielded

2) Explain integration peak area for the whole molecule (3 pts)

1 pt each

b \rightarrow 2H a \rightarrow 3H
 c \rightarrow 3H $BA = -1\frac{1}{2}$

- 3) Explain coupling for whole molecule (6 pts)

b $\rightarrow n = 3 \rightarrow 2(3)\frac{1}{2} + 1 = 4$

a $\rightarrow n = 2$

$BA = 3$

c $\rightarrow n = 0 \rightarrow$ singlet

$2(2)\frac{1}{2} + 1 = 3$

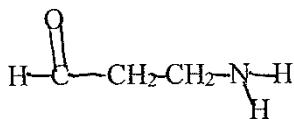
- 4) Show the completed final NMR spectrum (3 pts)

1 pt each

NW = -1 each

Integrate -1
 Coupling -1

2. For the following molecule, using the provided IR chart (10 pts, 5 pts each)



NSE = not specific enough

alkane
 C-H

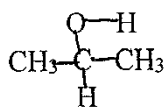
2850 - 2960 cm^{-1} -2 1/2

Give one IR peak from the IR chart specifying what structure gives that peak and the peak wavenumbers.

Functional group part is C=O aldehyde giving IR peak at 1730 cm^{-1}

C-N amine 1030-1230 N-H amine 3300-3500 cm^{-1}

Extra Credit: For the molecule given, show your calculation of the molecular ion peak (2 pts)



$C_3H_8O \rightarrow 3(12) + 8(1) + 16 = 60$

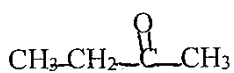
1/2 pt 1/2 pt

atomic mass
not atomic #

Name Key Print Name _____

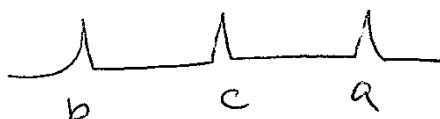
Please show work on all questions for partial credit even on questions which do not specify. (25 total pts)

1. Given the following molecule draw the expected NMR spectrum by completing the following information. You must show all work for full credit. (# peaks in coupling pattern = $2nI + 1$ where $I = \frac{1}{2}$ for proton NMR). (15 pts)



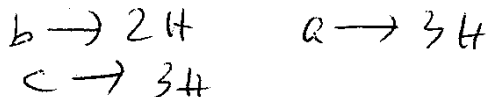
a b c

- 1) Show approximate relative chemical shift (note: my letters do not necessarily mean that the peaks show up separately, it may or may not)(3 pts)

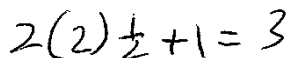
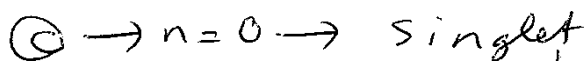
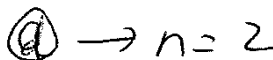
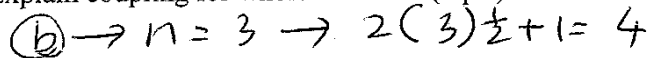


b + c are same distance from pi bond but b has CH₃ so more deshielded

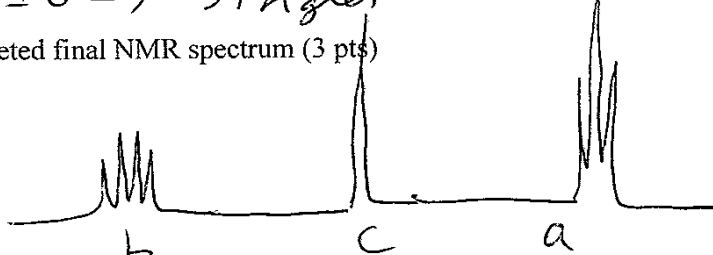
- 2) Explain integration peak area for the whole molecule (3 pts)



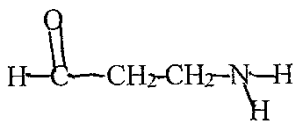
- 3) Explain coupling for whole molecule (6 pts)



- 4) Show the completed final NMR spectrum (3 pts)



2. For the following molecule, using the provided IR chart (10 pts, 5 pts each)



alkane
C-H

2850 - 2960 cm⁻¹

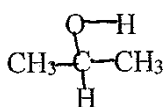
Give one IR peak from the IR chart specifying what structure gives that peak and the peak wavenumbers.

Functional group part is C=O aldehyde giving IR peak at 1730 cm⁻¹

N-H amine

3300 - 3500 cm⁻¹

Extra Credit: For the molecule given, show your calculation of the molecular ion peak (2 pts)

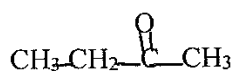


C₃H₈O → 3(12) + 8(1) + 16 = 60

Name _____ Print Name _____

Please show work on all questions for partial credit even on questions which do not specify. (25 total pts)

1. Given the following molecule draw the expected NMR spectrum by completing the following information. You must show all work for full credit. (# peaks in coupling pattern = $2nI + 1$ where $I = \frac{1}{2}$ for proton NMR). *(15 pts)* (15 pts)



a b c

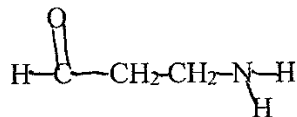
- 1) Show approximate relative chemical shift (note: my letters do not necessarily mean that the peaks show up separately, it may or may not)(3 pts)

- 2) Explain integration peak area for the whole molecule (3 pts)

- 3) Explain coupling for whole molecule (6 pts)

- 4) Show the completed final NMR spectrum (3 pts)

2. For the following molecule, using the provided IR chart (10 pts, 5 pts each)



Give one IR peak from the IR chart specifying what structure gives that peak and the peak wavenumbers.

Functional group part is _____ giving IR peak at _____ cm^{-1}

Extra Credit: For the molecule given, show your calculation of the molecular ion peak (2 pts)

