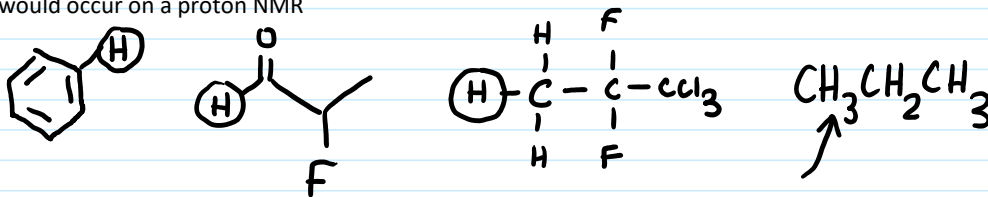


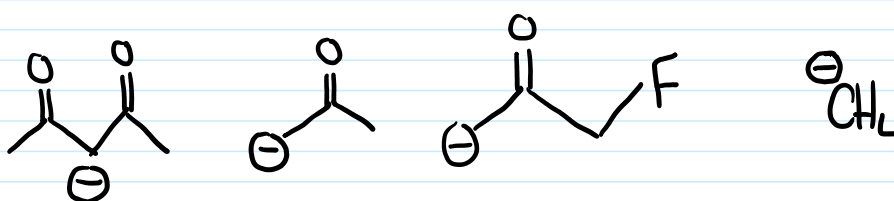
SL midterm review

November 19, 2021 10:36 AM

- 1) Order the following hydrogens in the molecules shown from electron poorest (1) --> electron richest (4) in accordance to where they would occur on a proton NMR



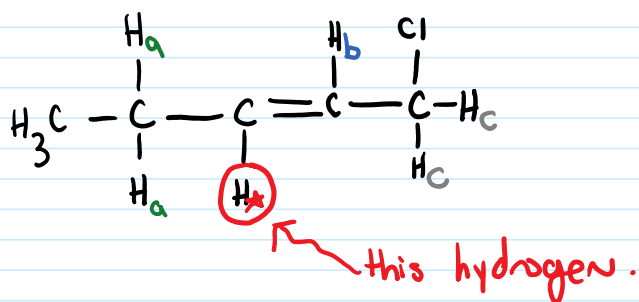
- 2) Label the following molecules from most reactive (least stable) to least reactive (most stable)



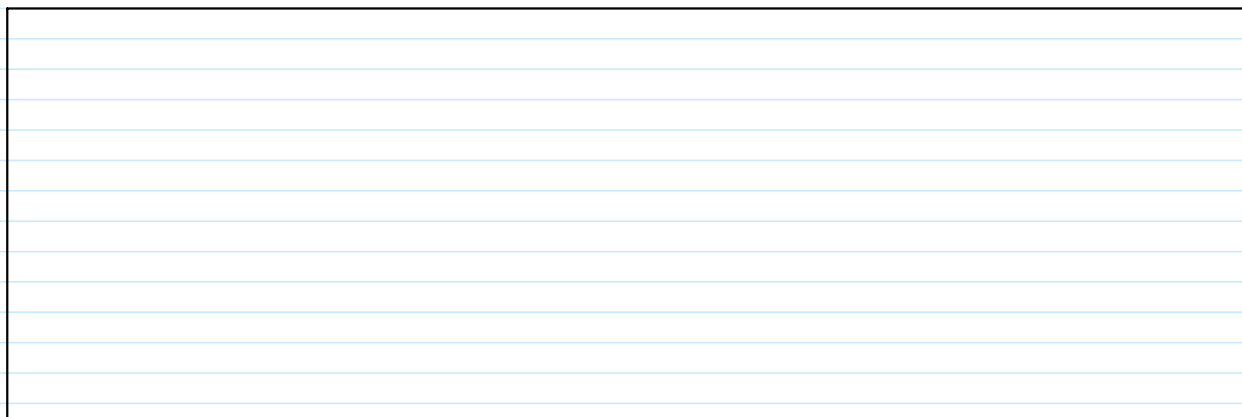
- 3) If the integration of a peak that occurs at 1.2ppm is 6 what might this peak consist of?

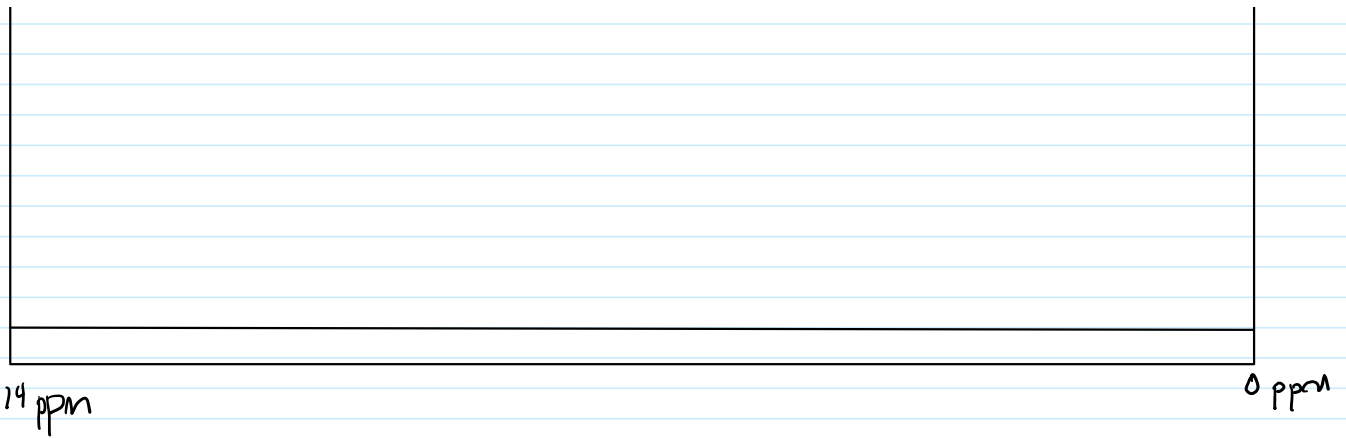
- 4) Consider the following molecule

- a. Draw the pascals triangle for the following molecule (indicated hydrogen) estimate relative J values based on your knowledge of Hz values.
b. What is the multiplicity of the peak

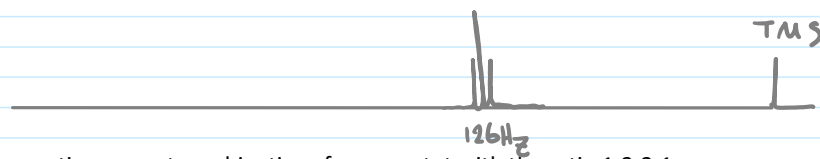


- 5) Draw the full H NMR spectrum of 4,4'-dinitro-3-methyl-butan-2-one, include ppm data, multiplicity and integration on your spectrum. Label each hydrogen as a different letter and write that letter over the appropriate peaks



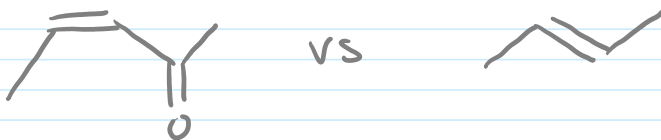


5) What ppm value does the following peak occur if the peak is 126Hz away from TMS and the instrument is operating at 60MHz.



6) Draw all the magnetic moment combinations for a quartet with the ratio 1:3:3:1.

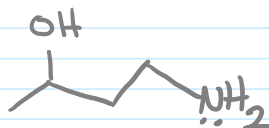
8) Compare the two C=C in the molecules below
 a. What one is easier to stretch?
 b. what cm^{-1} value will each of the C=C stretches occur



9) In a C-13 NMR spectrum the solvent CDCl_3 appears as a 1:1:1 triplet centered at 77ppm. However, the solvent CD_2Cl_2 appears as a pentet. Explain this using pascals triangle.

10) The C=O stretch of $\text{F-CO-CH}_2\text{CH}_3$ appears at 1685cm^{-1} is this true or false explain your answer

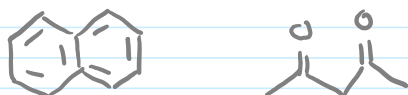
11) Consider the molecule below
 a. What is the integration of the "acidic" hydrogen peak on a H NMR



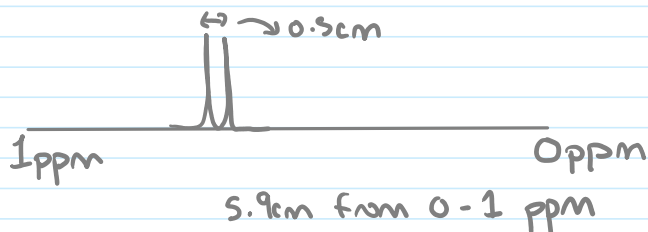
12) How many unique carbon signals would be observed in the following molecules



12) How many unique carbon signals would be observed in the following molecules



13) The J value for the doublet is 7.5 Hz. Calculate and circle the resonance frequency for the NMR instrument



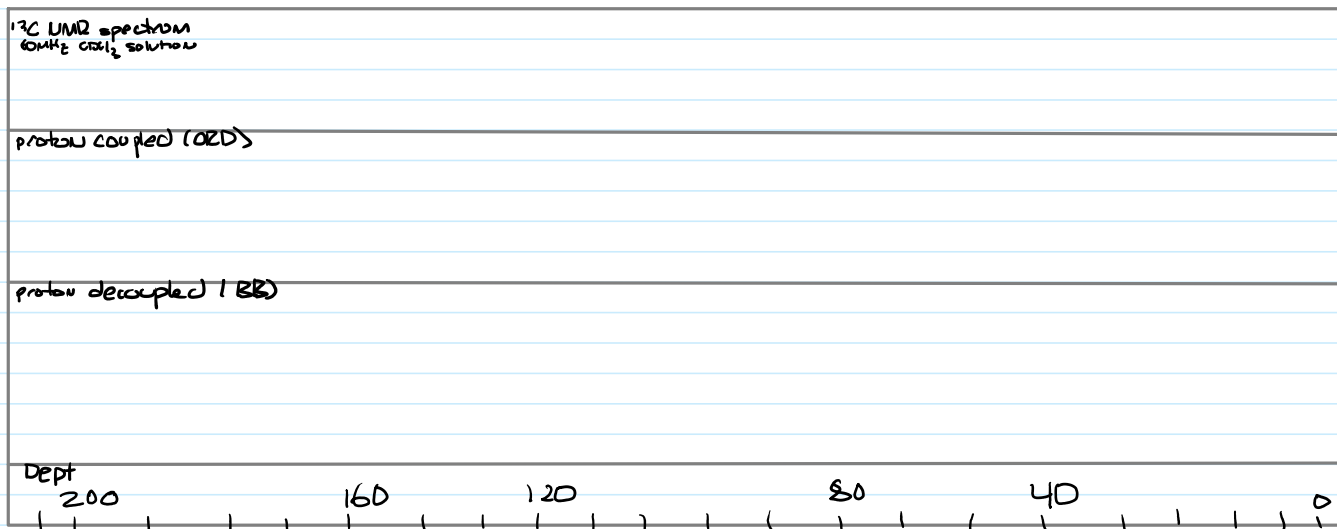
- a) 40 MHz
- b) 90 MHz
- c) 600 MHz

14) T/F

- a. the C-13 DEPT NMR spectrum shows only methyl carbon peaks
- b. In an H NMR spectrum a pentet has peak heights in a relative ratio of 1:3:6:3:1
- c. P-32 is an NMR active nucleus

15) In a mass spectrum, draw the appearance of the molecular ions (m/z values and intensities) for CH₂Cl₂ (12-C) (1-H) (Cl has isotopes Cl-35 and Cl-37)

17) Draw the expected ¹³C NMR ORD spectrum and DEPT spectrum and BB spectrum of the molecule below



18) The parent ion from a mass spectrum is 14mm high and a second peak (one mass unit heavier) is 2.15mm high. Calculate the number of carbon atoms present in this hydrocarbon molecule.

$$\frac{\% \text{ (height) } M+1}{\% \text{ (height) } M} = 1.1 \times \# C$$

19) Meal deal question

Problem 27

