300 MHz NMR:

1. Why do the different hydrogens have different chemical shifts? What causes their frequencies to be different?

2. What is coupling? What causes spins to couple to each other and what causes some nuclei to couple, while others do not?

3. What impact does concentration have on your spectrum? How does this relate to the relaxation pathways present in the sample?

4. List three features on the modern NMR spectrometers that are not present in the 15 MHz TeachSpin spectrometer. Explain one of them in a paragraph or less and describe how it improves the spectrum.

EXTRA CREDIT:

NMR spectroscopy is most commonly applied to the spectroscopy of ^{1}H, though it may be applied to other systems such as ^{13}C, ^{19}F, ^{31}P and other spin-active nuclei. How is the spectroscopy of these nuclei different from the ^{1}H NMR studies that we did in class (especially the more nuclei such as ^{129}Xe, or the dilute-spins like ^{13}C)? Explain at least one technique that is used to enhance the signal of a low-signal spin-active nucleus.

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