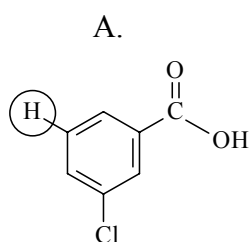


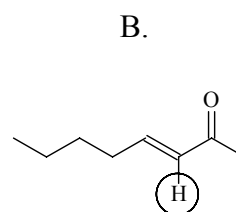
This prelab has four questions and is due Tues Feb 24 (T/R) or Wed Feb 25 (W/F).
Some sources for background information on the topics for this prelab are: your organic chemistry text; Project 2 in your lab manual; a general chemistry text; Experiment 33 in the GNS text.

1. (2 pts) Predict the chemical shift in ppm and give the expected splitting pattern for the proton circled in each molecule below:



ppm = _____

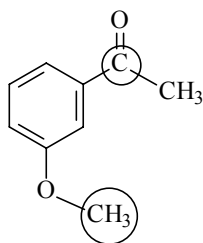
splitting pattern: _____



ppm = _____

splitting pattern: _____

2. (2 pts) Predict the chemical shift in ppm for the **carbons** circled below and give a proper name for this molecule:



ppm = _____

ppm = _____

Name this molecule: _____

3. (4 pts) The emerald green trimeric nickel(II)acetylacetonate complex $[\text{Ni}(\text{acac})_2]_3$ has been found to catalyze the aerobic Mukaiyama alkene epoxidation reaction (Feiters, M.C., et al, *Ind. Eng. Chem Res.* 2005, 44, 8631). Give the electronic configuration for both elemental Ni^0 and ionic Ni^{2+} . You may want to use a periodic table to find the orbital filling order and you can use the short hand notation starting with $_{18}[\text{Ar}]$. (Note: for the ion, first remove electrons from the orbital with the highest principle quantum number.)

a) Elemental Ni

Ni^{2+}

b) Fill in the electrons to show high spin and low spin on the following orbital diagrams for Ni^{2+}

Low Spin Case:



High Spin Case:



4. (2 pts) You are starting a project to investigate the paramagnetic behavior of $\text{Fe}(\text{acac})_3$ and want to know what to expect for the effective magnetic moment (μ_{eff}) of iron in this octahedral complex. Knowing the number of unpaired electrons, n , calculate μ_{eff} assuming a high spin orbital configuration for iron and use the “spin-only” approximation.