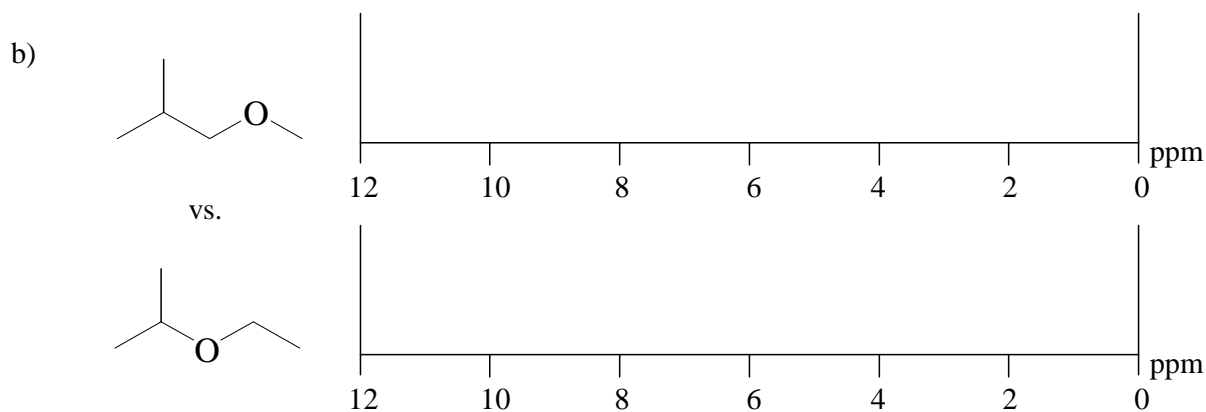
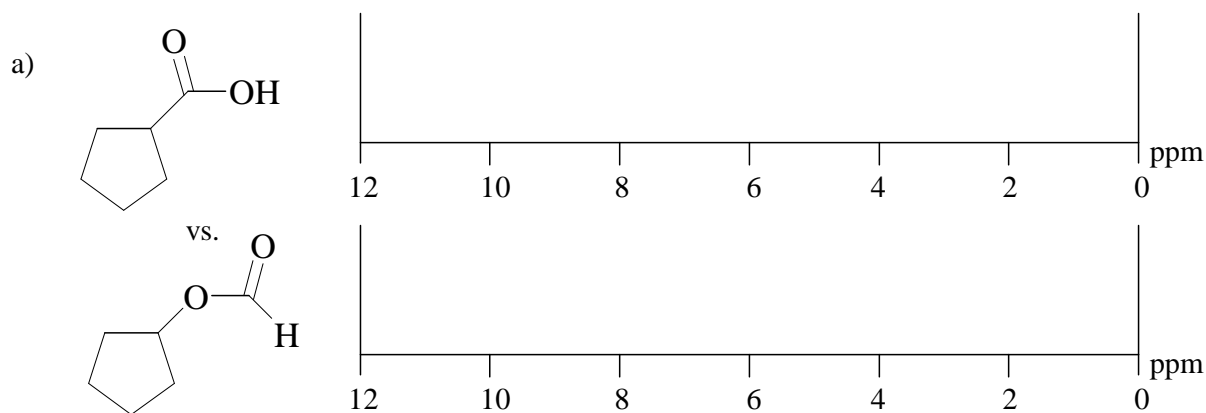
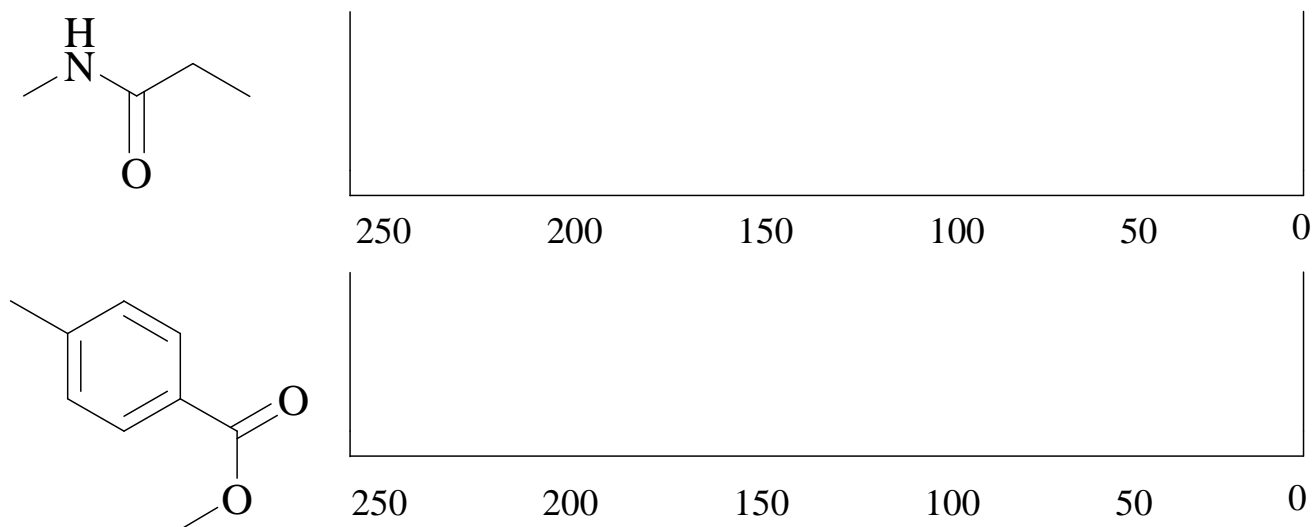


Chemistry 247B Sample Exam 2 -- You may use a clean copy of the NMR tables handed out in class.

- (20) 1. In each case below, identify at least TWO aspects of the  $^1\text{H}$  NMR spectrum of each compound that would decisively distinguish between the two compounds. Do this by drawing on the right the spectral characteristics of JUST THE FEATURES YOU ARE IDENTIFYING (expected chemical shift, integration, and splitting pattern).



- 20) 2. Predict the proton-decoupled (just sharp lines)  $^{13}\text{C}$  spectra of the two compounds shown below.



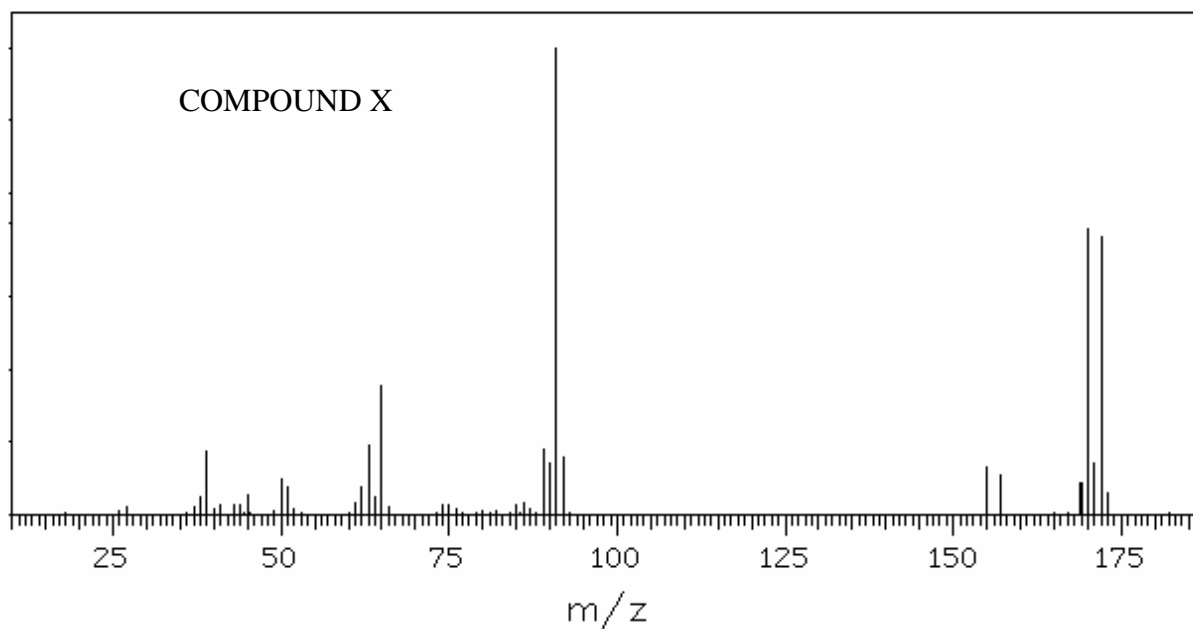
(15) 3. Briefly explain:

- What is meant by the “fingerprint” region in IR spectroscopy, why it takes that name, and what can be learned from peaks in this region.
- Why a C–C stretch appears significantly to the right of a C=C stretch in an IR spectrum.
- Why OH peaks in IR spectra are so broad.

(15) 4. Define the following terms and explain how they can be useful in structure determination.

- Base peak
- Molecular ion
- Coupling constant

(10) 5. Indicate TWO pieces of information about unknown “Compound X” that are definitively indicated by its mass spectrum.



(20) 6. Identify the compound having molecular formula  $C_6H_{12}O_2$  and the spectra shown. In doing so, identify at least two features each of the  $^{13}C$ , IR, and MS spectra that support to your choice, and correlate all  $^1H$  NMR signals to specific hydrogen atoms in the structure. (Only the region of the NMR structure with peaks is shown; use the blank sheet on the next page to show your work.)

