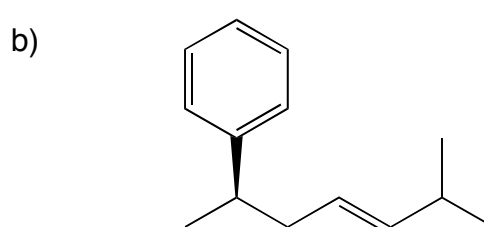
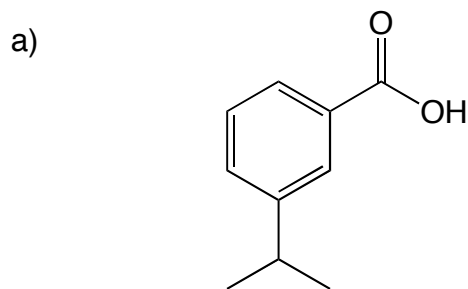
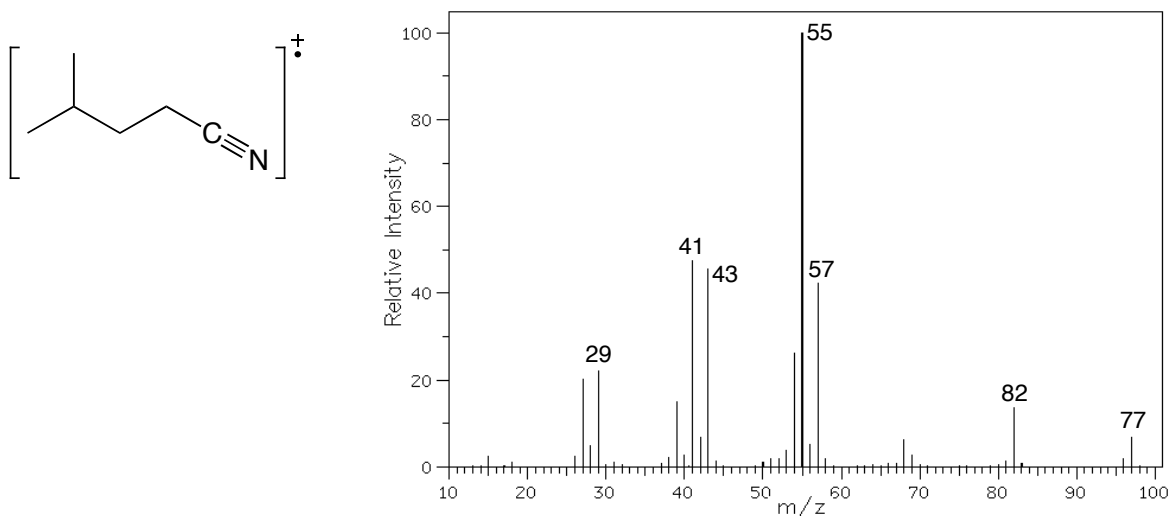


1. Provide an unambiguous name (IUPAC or common) for each of the following molecules. (12 pts)

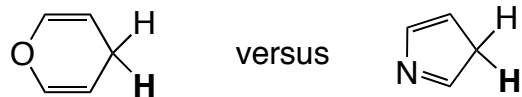


2. The following nitrile undergoes a McLafferty-like fragmentation to yield one of the peaks in the mass spec. shown below. Provide a mechanism for this rearrangement, show both fragments, and circle the number above the peak that is represented by this fragmentation. (9 pts)

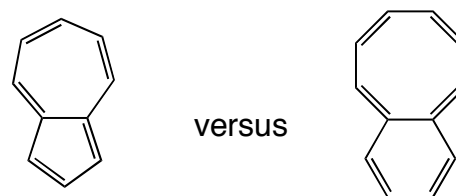


3. Circle the compound that best fits the description provided and provide an explanation for your choice using both pictures and words. (12 pts).

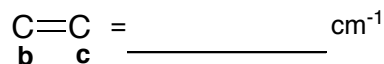
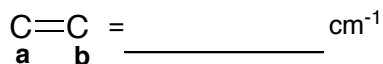
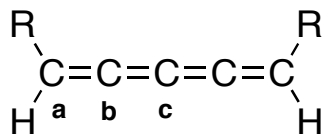
The most acidic proton (of the ones in **bold**)



The most polar molecule

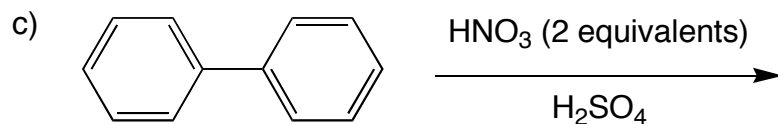
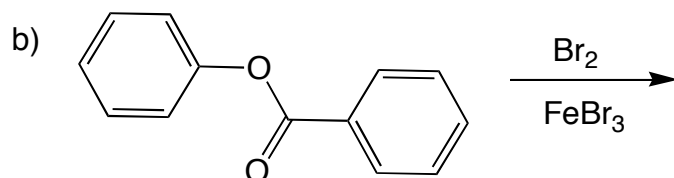
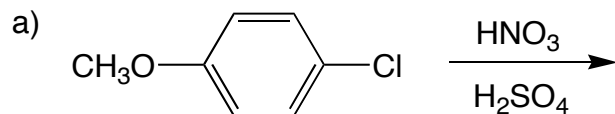


4. The following structure is known as a cumulene. Using your knowledge of IR stretching values for other functional groups, predict the IR stretching values (in cm^{-1}) for the two bonds indicated below. If your predictions are not identical provide a reason for their differences in the box provided. (10 pts)

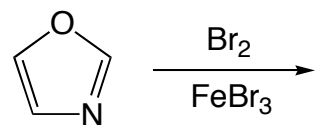


Explanation

5. Predict the *major* organic product of each of the following reactions. You may draw other products for partial credit, however if you do, you must *circle* the major product for full credit. (18 pts)



6. Use resonance theory (by drawing the resonance structures of all the possible intermediates leading to products) to predict the major product of the following hypothetical electrophilic aromatic substitution reaction. Circle the major product and provide an explanation for your decision. (14 pts)



oxazole

7. Propose a synthesis for the following transformation. Provide the products of each step for full credit. (10 pts)



8. Determine the structure represented by the spectra provided. The molecular formula of the unknown compound was determined to be $C_5H_{10}O_2$. For full credit, you must assign significant peaks in each of the spectra. (15 pts)

