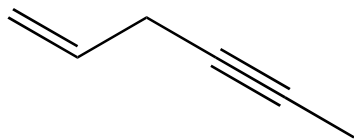
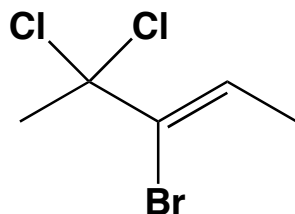
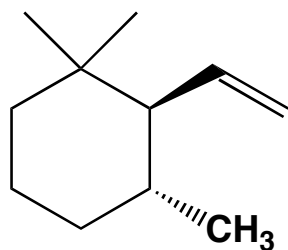


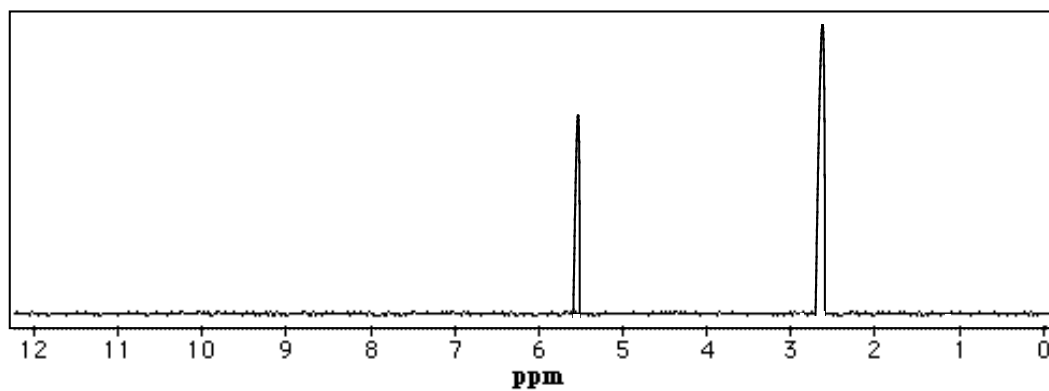
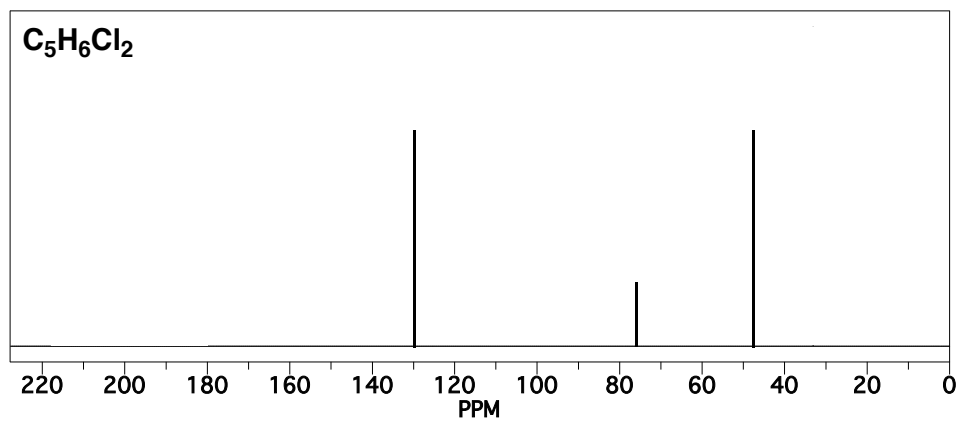
1) Provide an unambiguous name for each of the following structures. (15 points)



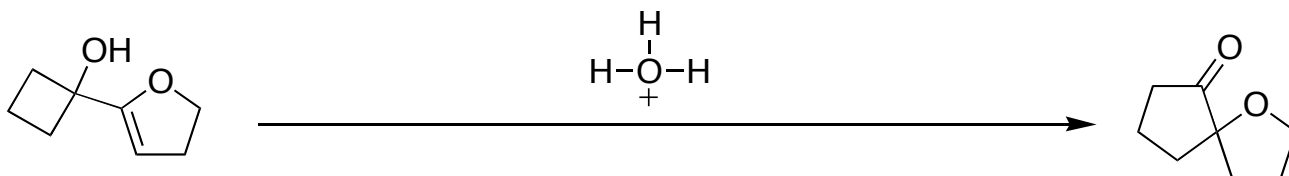




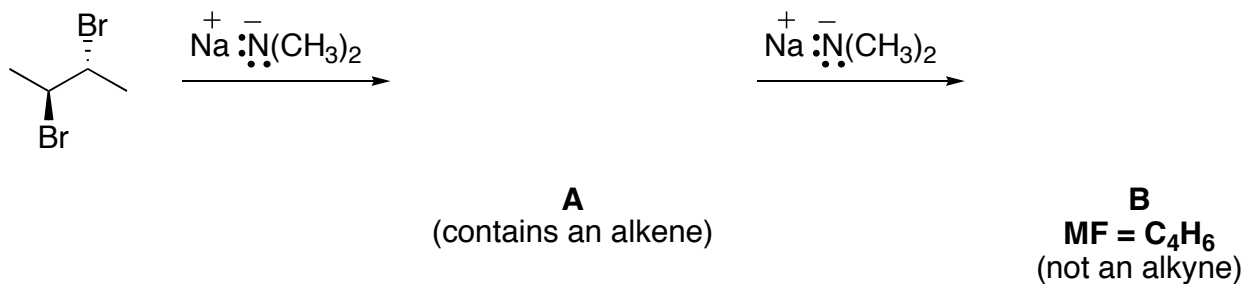
2) Determine the structure of the compound that produces the following spectra. For full credit, assign all peaks in each spectrum. (7 points) *Note: ¹H NMR signals do not show splitting.*



- 3) The alkene below reacts with a strong acid such as H_3O^+ to yield the carbonyl product shown. Using your knowledge of alkene addition reactions, provide a mechanism for this transformation. For full credit, you need to show all steps, intermediates, and formal charges in your mechanism. (8 points)

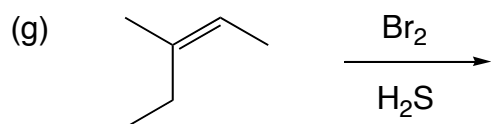
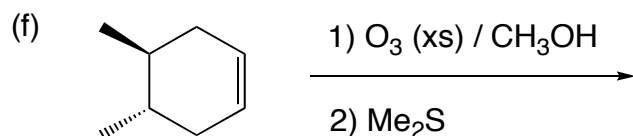
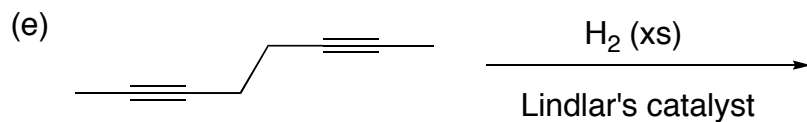
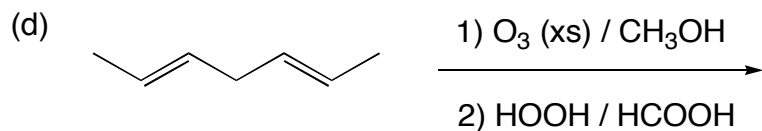
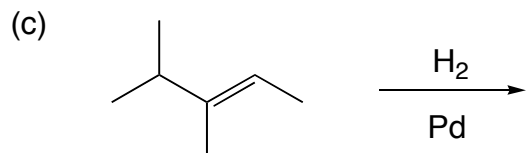
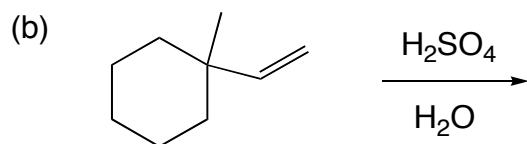
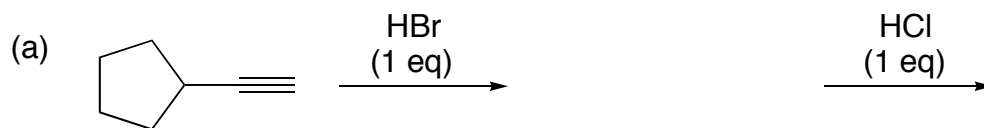


- 4) When the dihalide shown was reacted with one equivalent of sodium dimethylamide, a strong base, the expected alkene (**A**) was formed. However, upon reaction with a 2nd equivalent of base, an unexpected elimination product (**B**) was formed. Propose structures for **A** and **B** and provide a mechanism that accounts for their formation. *Provide an explanation for the favored formation of B over the expected alkyne product.* For full credit, you need to show all steps, intermediates, and formal charges in your mechanism. (11 points)

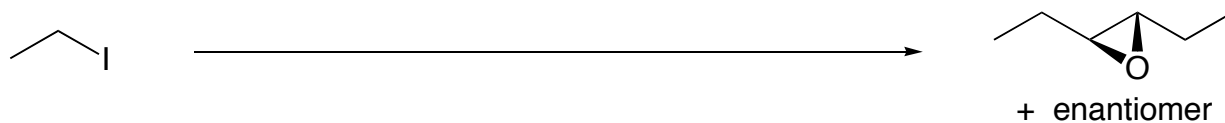


Did you remember to provide an explanation for the formation of B over the expected alkyne?

5) Draw and circle the **major product** of each of the following reactions. *Be sure to include stereochemistry in your answers where appropriate.* (35 points)



- 6) Propose a synthesis (sequence of reactions) that will accomplish each of the following transformations. *Be sure to include the products of each step.* (24 points)



Uncharged hydrocarbons of 4 carbons or less (i.e. show how to make all carbon containing compounds whose carbons end up in your final product)

