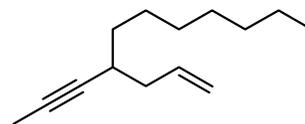
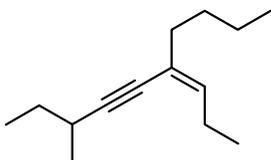
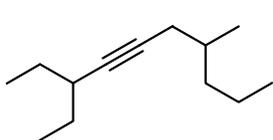
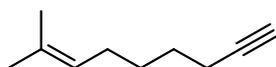


HOMEWORK PROBLEMS: ALKYNES

1. Provide the complete IUPAC name for the following compounds:



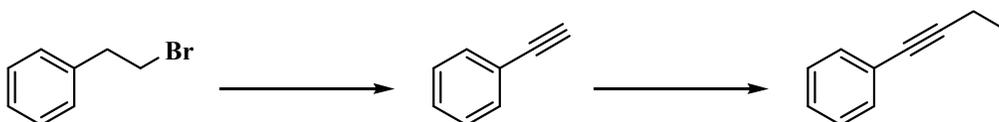
2. When the compound below is treated with one equivalent of BH_3 , where does it react? Explain. Where would one equivalent of O_3 react? Explain.



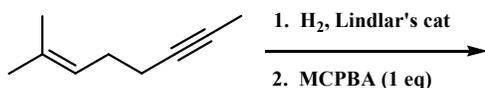
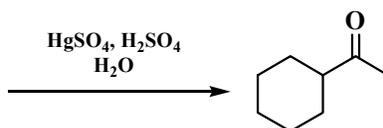
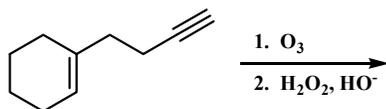
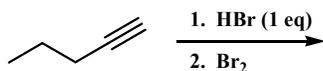
3. We did not cover the reaction of a terminal alkyne with Br_2 , H_2O (in class or in text) like we did for an alkene. What product do you think would form under these conditions?

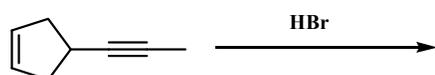
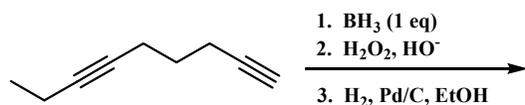
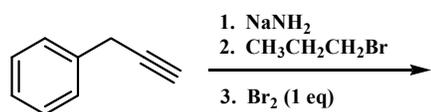
4. Alkynes do not react with MCPBA or carbenes, why?

5. Alkyne synthesis. Alkynes are typically prepared from alkenes, which are in turn prepared from an alkyl halide. How would you convert the following alkyl bromide into a terminal alkyne? How would you convert the terminal alkyne into an internal alkyne?

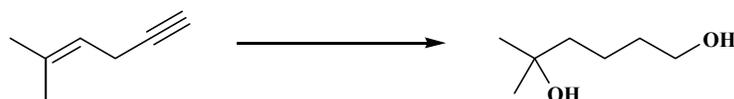


6. **Reactions.** Give the structure of the major organic product(s) expected from each of the following reactions. If necessary, indicate product stereochemistry.





7. Synthesis. Show how you would carry-out a synthesis of the following molecules from the indicated starting material. You may use any other organic or inorganic reagent you need. Show your product after each step in the synthesis.

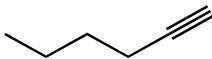


8. Draw the skeletal structure corresponding to each of the following names. Make sure that stereochemistry is clearly indicated.

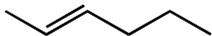
- 2-methyl-3-hexyne
- (*Z*)-2-butene
- 5-methyl-2-heptyne

9. Name the following molecules. Make sure to include *E/Z* designations as appropriate.

a.

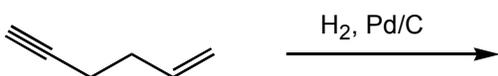


b.



10. Give the missing products, reactants, or reagents for the following reactions. (some sub and elim review also included)

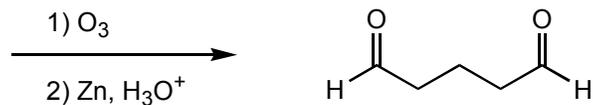
a.



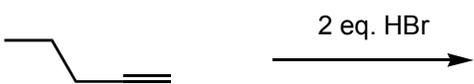
b.



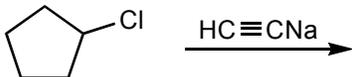
c.



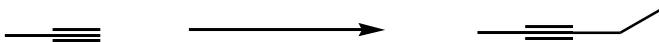
d.



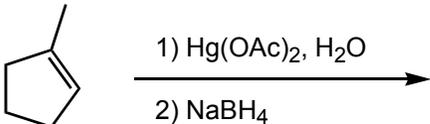
e.



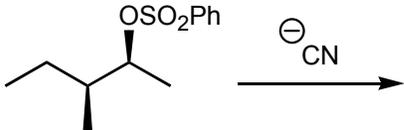
f.



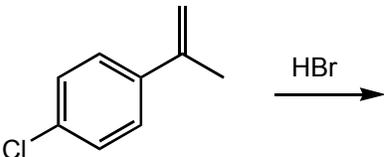
g.



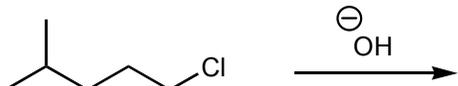
h.



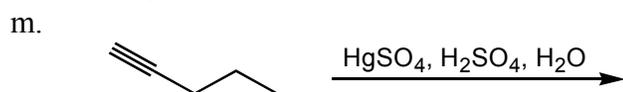
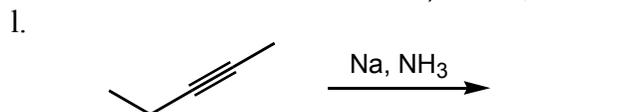
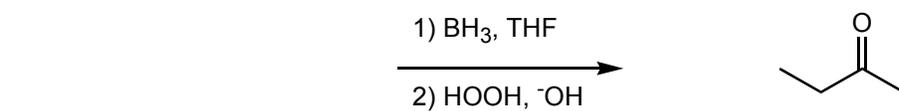
i.



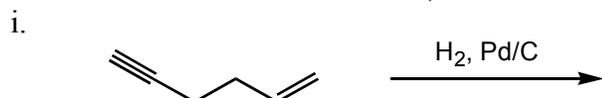
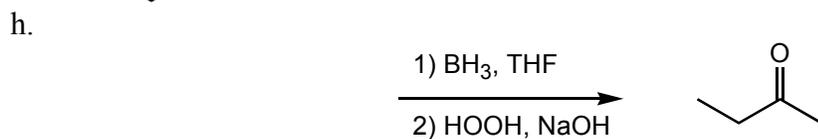
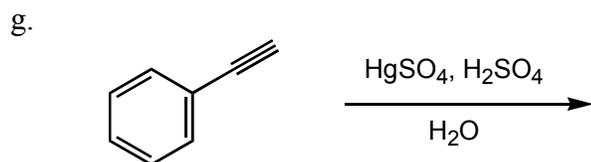
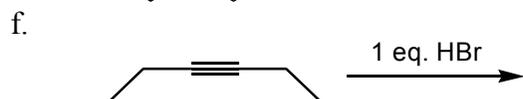
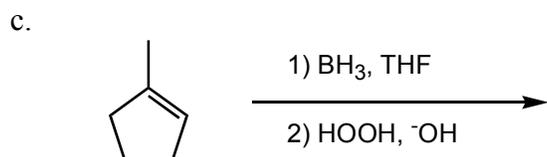
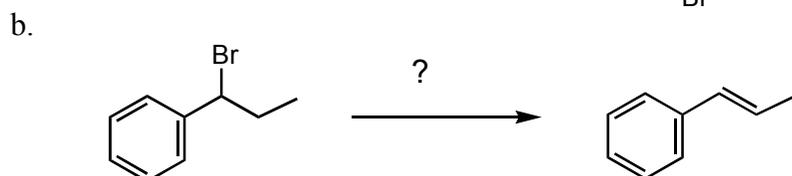
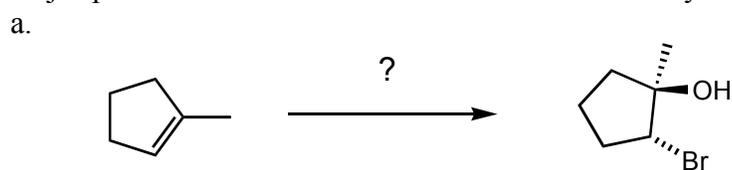
j.



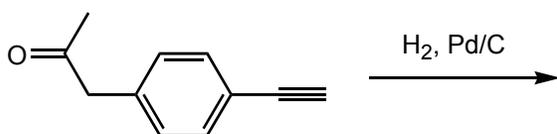
k.



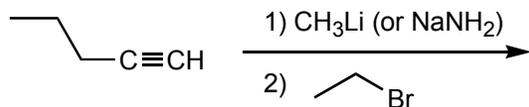
11. Give the missing reagent(s), reactant(s), or product(s) for the following reactions. If more than one product would be formed, provide all expected products, and when possible indicate which would be the major product. Be sure to indicate the stereochemistry and regiochemistry of the products as appropriate.



j.

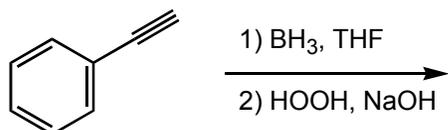


k.



12. Give the missing reagent(s), reactant(s), or product(s) for the following reactions. For stereoselective reactions, indicate the relative stereochemistry of the products.

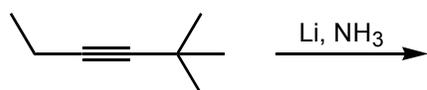
a.



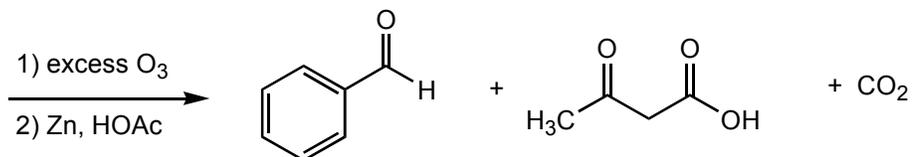
b.



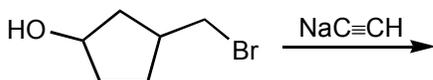
c.



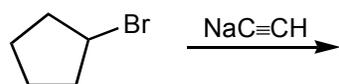
d.



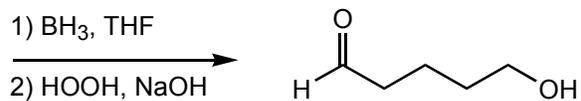
e.



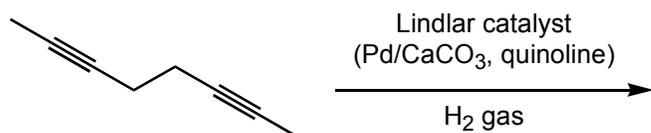
f.



g.

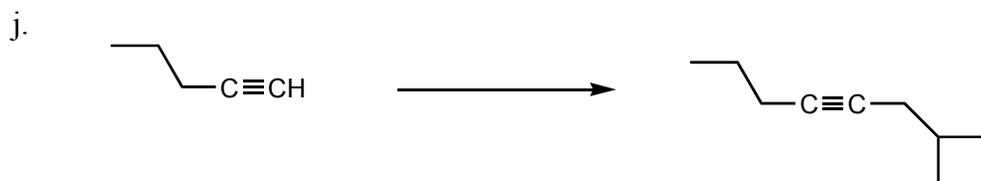


h.



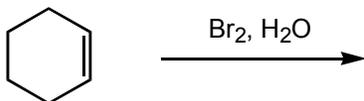
i.





13. Supply the missing reagents, products, or starting materials for each of the reactions shown below. Make sure to indicate stereochemistry and regiochemistry when appropriate.

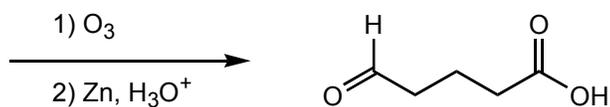
a.



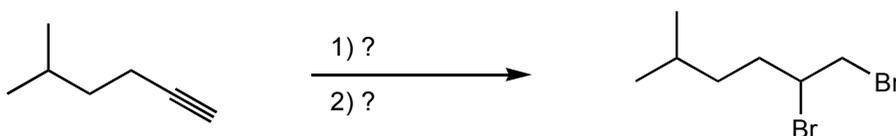
b.



c.



d.



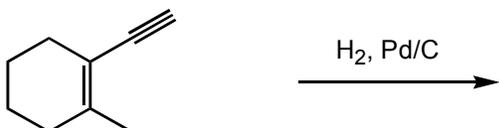
e.



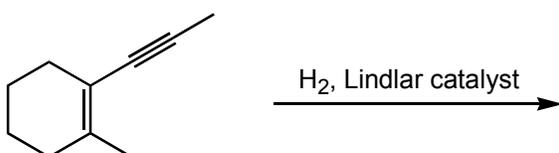
f.



g.

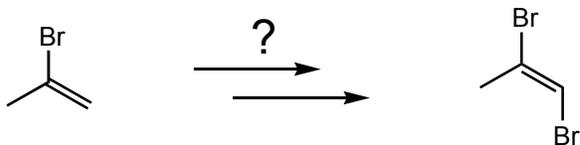


h.

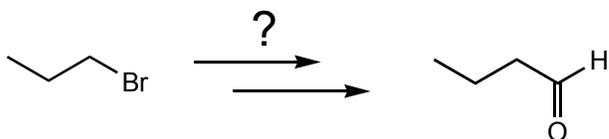


14. Provide a synthetic sequence to go from the given starting material to the desired product. Show all reagents and synthetic (not reaction) intermediates. All these syntheses can be accomplished in two or three steps.

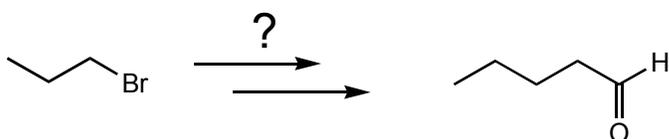
a.



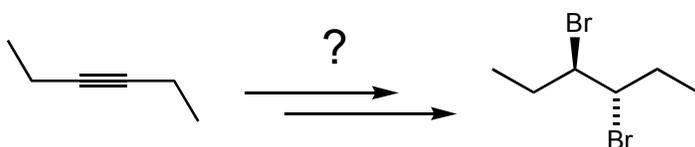
b.



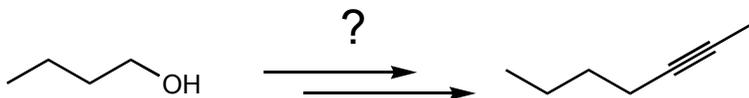
c.



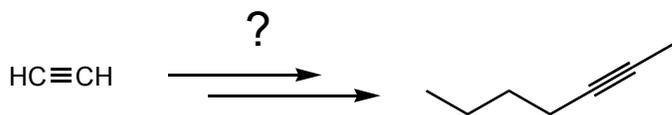
d.



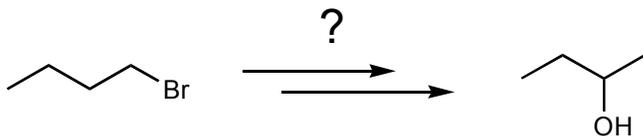
e.



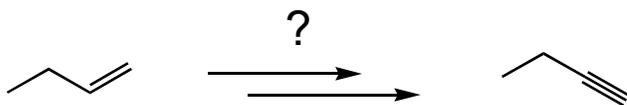
f.



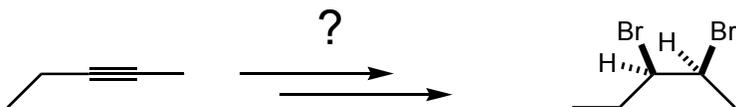
g.



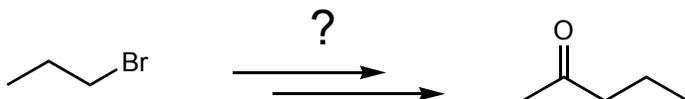
h.



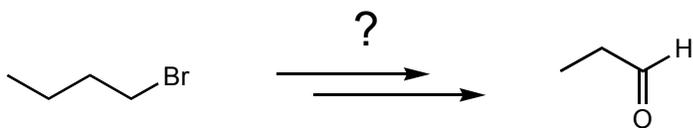
i.



j.

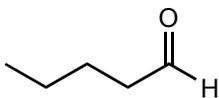


k.

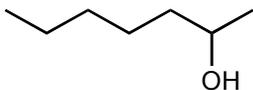


15. Synthesize the following compounds from acetylene ($\text{HC}\equiv\text{CH}$) and any primary (1°) alkyl halide(s) (RCH_2X , where $\text{X} = \text{Cl}, \text{Br}, \text{or I}$).

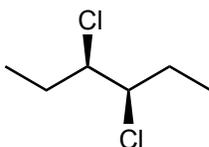
a.



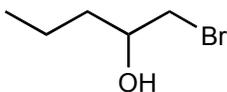
b.



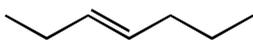
c.



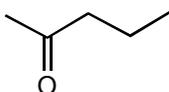
d.



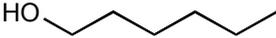
e.



f.

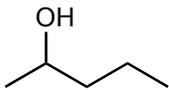


g.

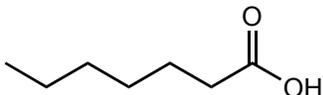


16. Synthesize the following molecules using acetylene and any alkyl halide(s).

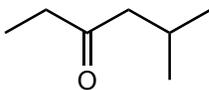
a.



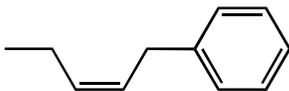
b.



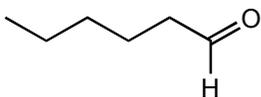
c.



d.



e.



17. Compound **A** (C_4H_6) absorbs two molar equivalents of H_2 gas on catalytic hydrogenation with palladium on carbon. Upon reaction with H_2SO_4 and H_2O , a ketone is formed. Give the two possible structures for compound **A**.

18. Compound **B** has the molecular formula C_4H_6O . When treated with H_2 and a palladium catalyst, **B** absorbs one equivalent of H_2 . Compound **B** also has a strong IR peak at 1715 cm^{-1} . Draw a possible structure for **B** that is consistent with this information.