

Chem 220a

Problem Set 8

Chapter 9

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1. Do the Alkyne Module in [ORGO](#).

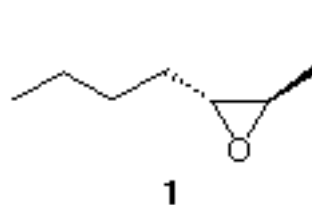
2. Two bottles are found on a laboratory shelf labeled "alkyne **A**" and "alkyne **B**". Hydrogenation of **A** or **B** over a platinum catalyst gives the same alkane **C**. Compound **A** reacts with H_2 in the presence of Lindlar's catalyst to form **D**. Compound **D** reacts with O_3 to form a single compound **E**, C_3H_6O . On the other hand, compound **B** reacts with Na/NH_3 to give **F**, which itself reacts with Br_2/H_2O to give a pair of constitutional isomers, **G** and **H**. Treatment of either **G** or **H** with aqueous $NaOH$ gives the same compound **I**, $C_6H_{12}O$, that is also formed by the reaction of **F** with peracid. What are the structures of **A-I**? Explain and illustrate. [Note: **G** and **H** cannot be distinguished Pay attention to stereochemistry.]

3. Alkyne (*R*)-**A** does not react with $NaNH_2$ at the boiling point of ammonia. (What is the boiling point of ammonia?) However, stoichiometric $NaNH_2$ at $150^\circ C$ converts **A** to a new compound **B**, which, upon the addition of water, liberates (*R*)-**C**. 'Hydrogenation' of **C** with D_2/Pt gives 4-methylheptane (**D**) that is discernably optically active.

- What are the structures **A-D**? Explain and illustrate.
- What does the optical active say about the reaction **A** \rightarrow **B**?
- Why is **D** optically active?

4. Design an efficient synthesis of 4-octanone from compounds of three or fewer carbons. All reagents are available to you. [Note: Efficient means that you are not separating mixtures of compounds or constitutional isomers.]

5. Design an efficient synthesis of (\pm)-epoxide **1** from 2-butyne. All reagents are available to you.



6. Provide the reaction conditions **A-S** for the transformations shown below. provide a brief commentary where stereochemical or related issues are involved.

