

EXAM 3
CHEMISTRY 220a
Friday, November 10, 2000

NAME (print): _____

TA: _____ Day: _____ Time: _____

Take a few moments to look over the exam. Answer each question on the exam paper.

Write your name on the top of each page where indicated.

Important items are in **bold**.

A **Periodic Table** is on page 10.

Do all **preliminary** drawing or computations on the **work sheets** (pgs. 7-9). The work sheets will not be graded.

The exam is 55 minutes.

STOP writing and hand in your exam when you are asked to do so.

REMEMBER: Neatness is to your advantage.

1. (20 pts) _____

2. (20 pts) _____

3. (20 pts) _____

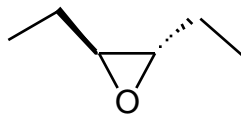
4. (20 pts) _____

5. (20 pts) _____

Total (100 pts)

- 1) (20 pts.) Optically-active compound **A** ($C_{10}H_{16}$) reacts with Pt/H_2 to afford optically-active compound **B** ($C_{10}H_{20}$). Ozonolysis of **A** and dimethyl sulfide reduction provides a **single** compound **C** ($C_5H_8O_2$), (R)-2-methylbutanedial [i.e., (R)-2-methyl butane **dialdehyde**]. What are the structures of **A-C**? Explain your reasoning.

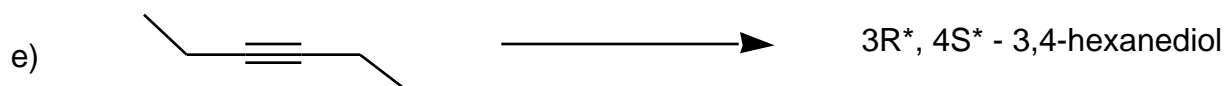
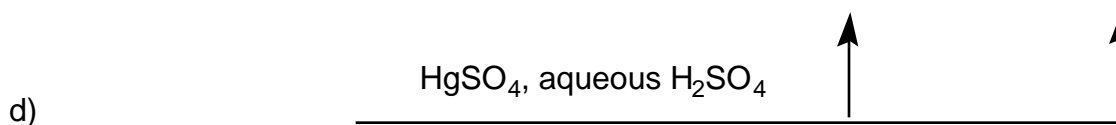
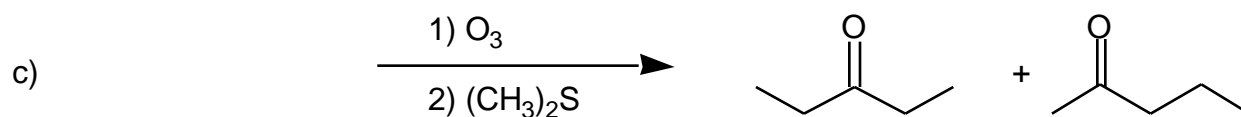
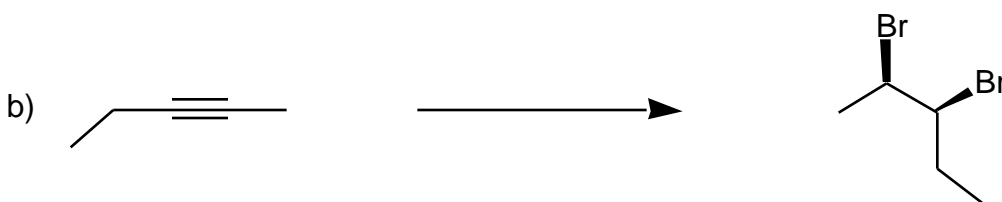
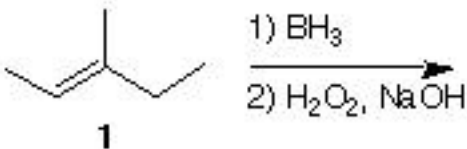
- 2) (20 pts.) Design a synthesis of **racemic** epoxide **1** starting from 2-butyne and ethylene as your only sources of carbon. You are obliged to use **both** of these sources of carbon in your synthesis. All other reagents are available to you.



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4) (5 x 4 pts. = 20 pts.) In each of the following reactions, provide **either** the reactant, reagents, or product as required. When reagents are missing, more than one reagent may be required to prepare the product. **Pay attention to stereochemistry.**

a) ORGO
Alkene 5:



- 5) (20 pts.) Provide a mechanism for **one** of the following reactions. Use the curved arrow formalism. **Pay attention** to stereochemistry where it applies.
- The conversion of (E)-2-butene to 2-butanol (*sec*-butanol) via hydroboration.
 - The epoxidation of (Z)-butene via the halohydrin route.
 - The formation of 2-butanone (methyl ethyl ketone) by the mercuric ion catalyzed hydration of 1-butyne.

Work Sheets

Work Sheets

Work Sheets

Periodic Table