

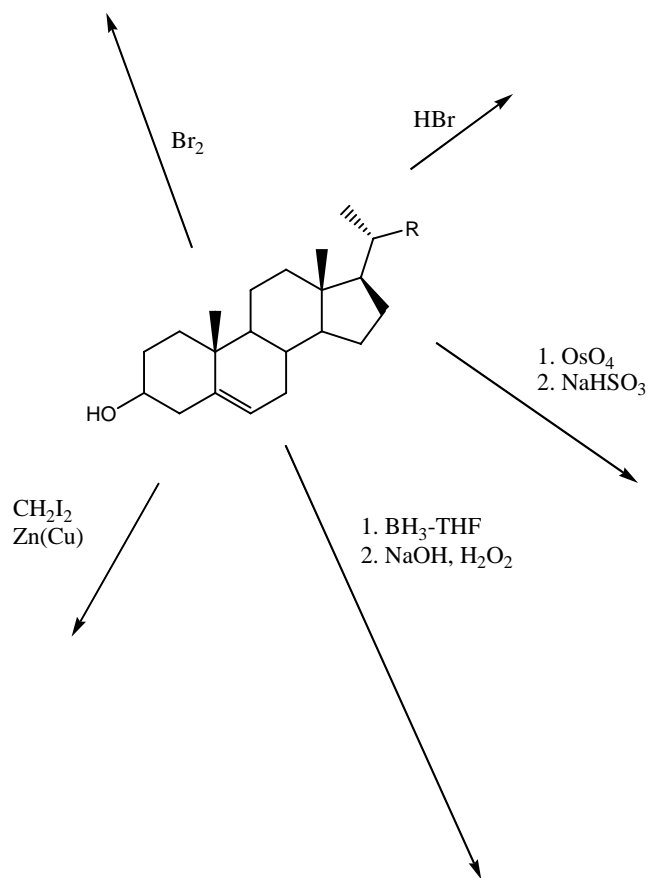
Name: _____

Student ID# _____

CH 231 Test 3 Chapters 7, 8, 9 (Nov. 7, 2006)

- You have 105 minutes to complete the exam.

1.(10 pts) Predict the products of the following reactions. Include any important stereochemical information in your answers.

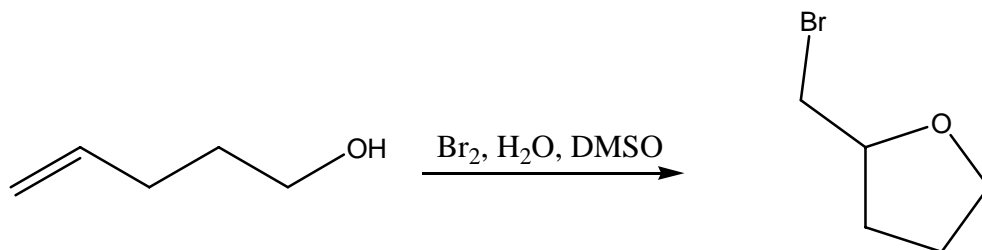


See McMurry Study Guide and Student Solutions Manual Problem 7.43

Score: _____/100

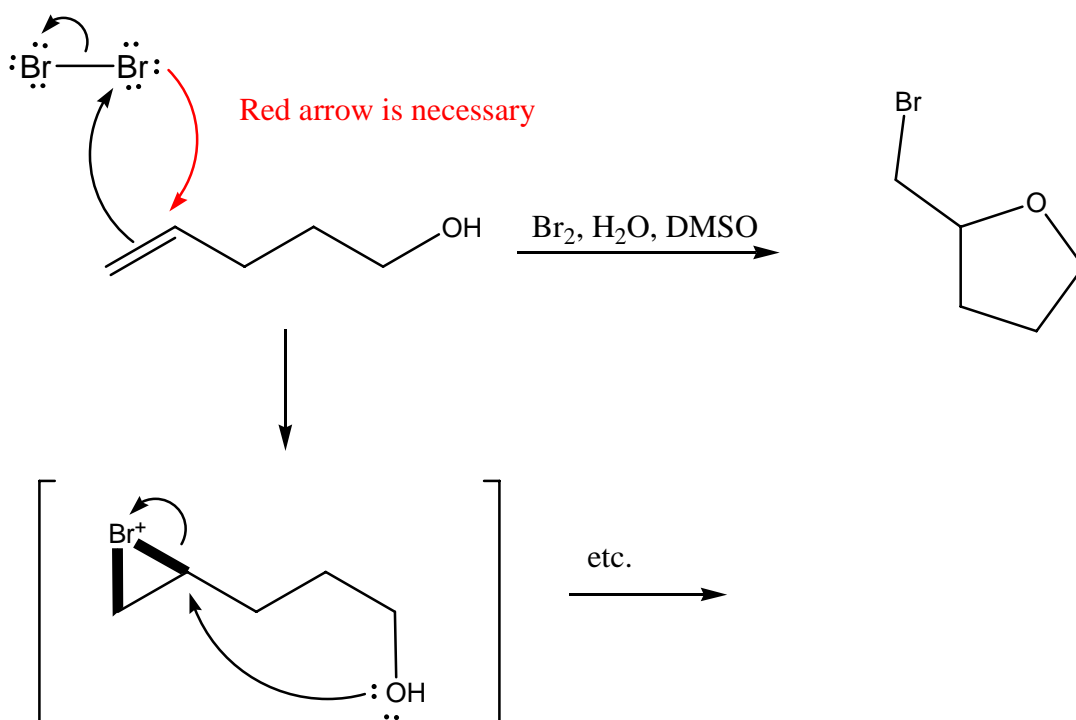
Combined Avg. through Test III: _____%

2. (15 pts) When 4-Penten-1-ol is treated with aqueous bromine, a cyclic bromo ether is formed, rather than the expected bromohydrin. Provide a *complete* electron-pushing mechanism:



See McMurry Study Guide and Student Solutions Manual Problem 7.49 [^](#)

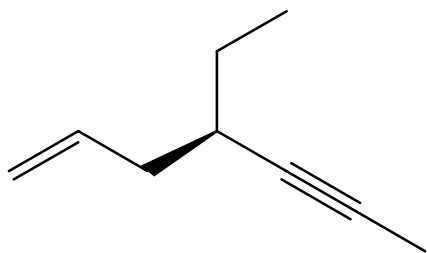
- As stated in class both before and after the test, the electron pushing for the first mechanistic step is incorrect as depicted in the Solutions Manual. It should be shown as:



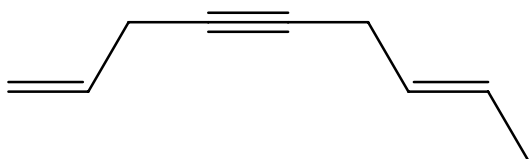
Remember that intramolecular processes are usually faster than intermolecular reactions, especially when a 5- or 6-membered ring may be formed. Thus, the attached hydroxyl group (intramolecular) outcompetes the H_2O (intermolecular) that would otherwise serve as the nucleophile in the addition to the bromonium intermediate.

3. (8 pts) Draw the appropriate structure of each molecule named below:

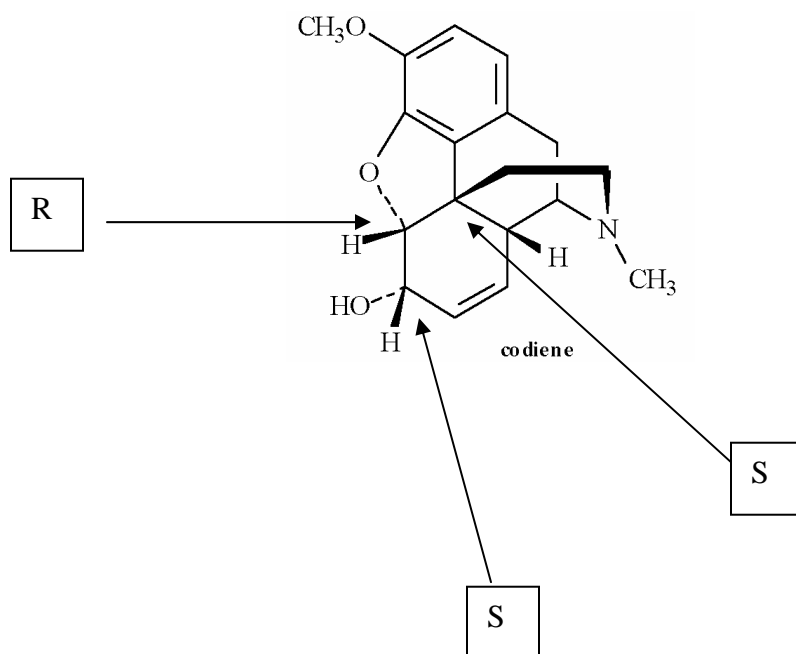
(S)-4-ethylhept-1-en-5-yne



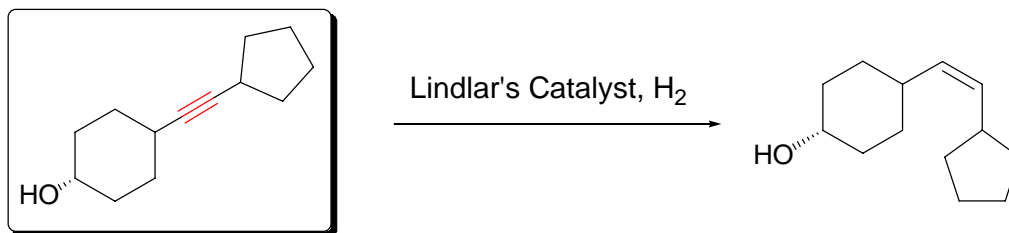
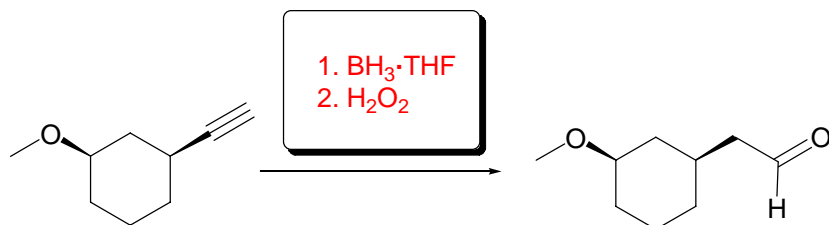
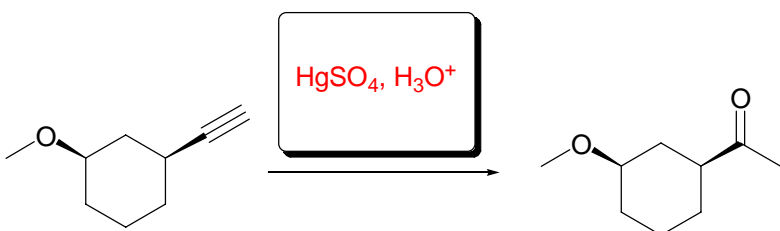
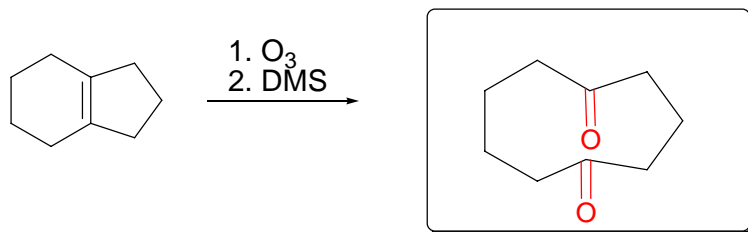
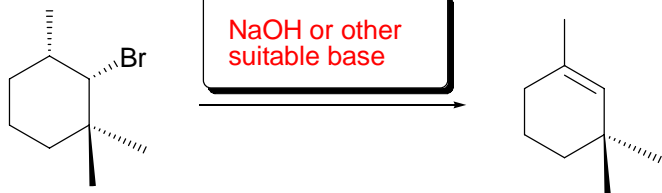
(E)-nona-1,7-dien-4-yne



4. (12 pts) Shown below is the structure of the opiate analgesic codeine (i.e., methylmorphine). Assign *R* or *S* configurations to *each* of the indicated chirality centers in the molecule:

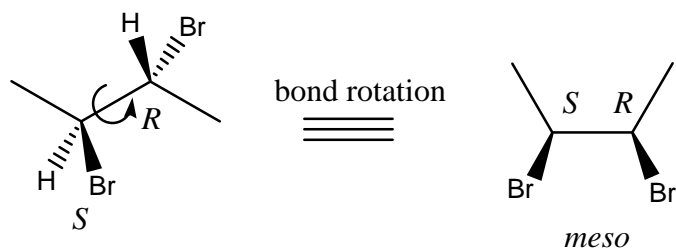


5. (12 pts) Supply the missing reactant, reagent(s), or products in the schemes below. Indicate stereochemistry when appropriate. Be careful!

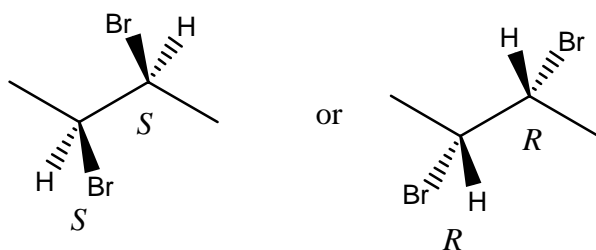


6. (12 pts)

A. Draw a wedge-dash projection of (2*R*,3*S*)-dibromobutane.



B. Draw a *diastereomer* of (2*R*,3*S*)-dibromobutane.

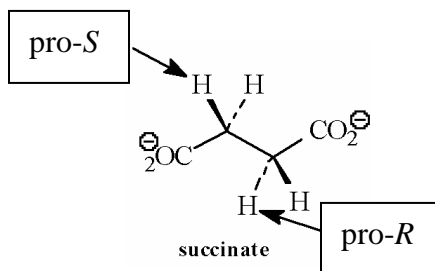


both are chiral (and enantiomers of each other)

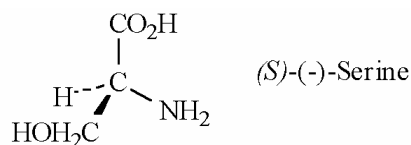
C. Are both compounds chiral? Explain.

No. (2*R*,3*S*)-dibromobutane possesses a mirror plane and is therefore *meso* and achiral despite its two chirality centers.

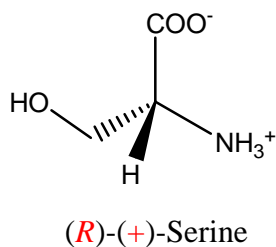
7. (6 pts) Identify the indicated hydrogens in the following molecule as *pro-R* or *pro-S*.



8. (9 pts) Refer to the structure below to answer the following questions.



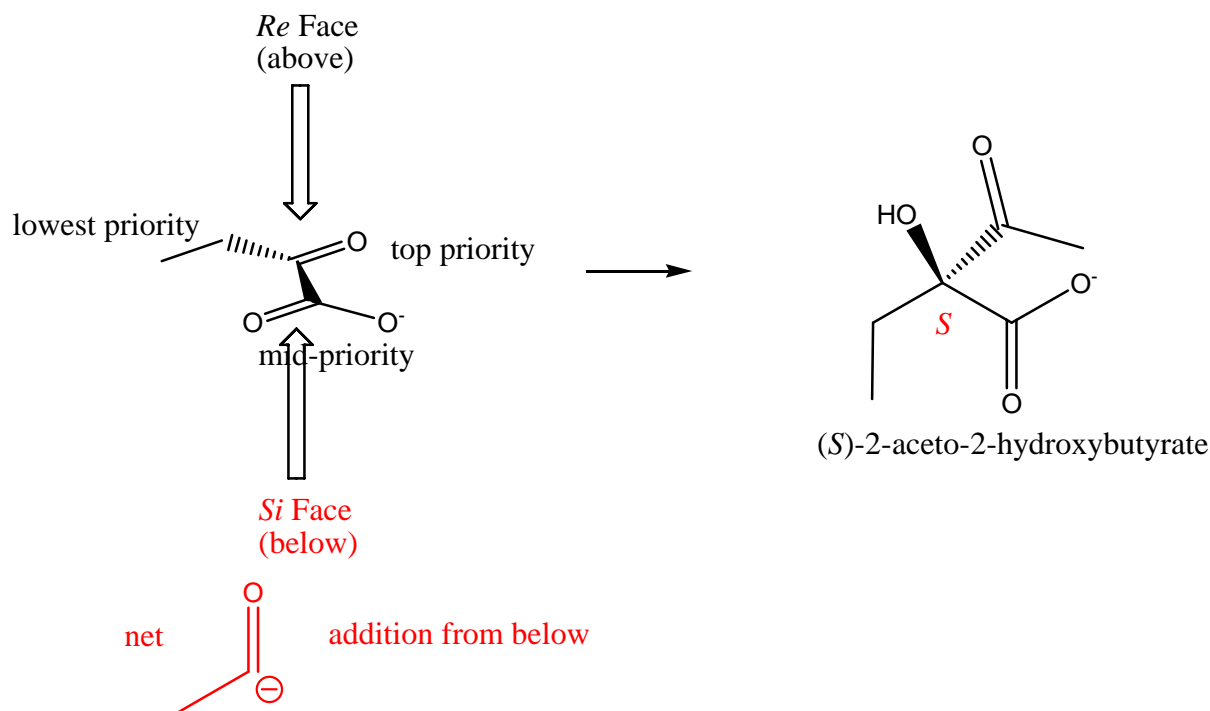
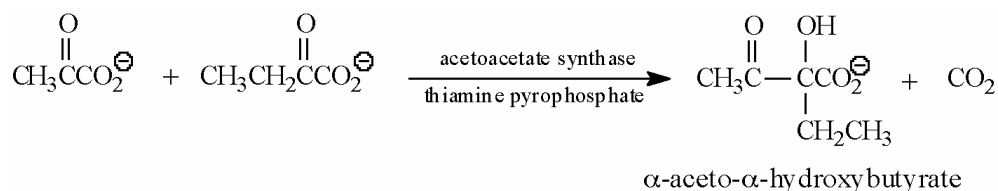
Draw the enantiomer of (S)-(-)-serine in a wedge-dash projection. Correctly name the enantiomer.



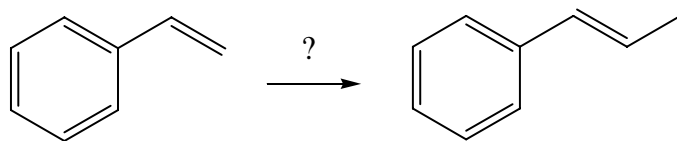
If enantiopure (S)-(-)-serine has a specific rotation of $[\alpha]_D = -40.3^\circ$ which of the following statements is/are true? (Circle all true statements):

- A. The measured solution is racemic
- B. The compound is dextrorotatory
- C. The compound is optically active
- D. Its pure enantiomer will have a specific rotation of $[\alpha]_D = +40.3^\circ$
- E. The $[\alpha]_D$ value will change if a different concentration of (S)-(-)-serine is analyzed
Note that the observed rotation value, α , is concentration dependent, but the specific rotation value, $[\alpha]_D$, is calculated to be independent of both analyte concentration and polarimeter cell path length.
- F. The compound is meso

9. (6 pts) Acetoacetate synthase catalyzes the addition of pyruvate to α -ketobutyrate to yield α -aceto- α -hydroxybutyrate. If the addition occurs from the *si* face of α -ketobutyrate, what is the stereochemistry of the product? Depict using a wedge-dash projection:



10. (10 pts) How would you carry out the following transformation? Multiple steps are needed. (You need not show electron-pushing mechanisms, but all reagents and intermediate structures must be indicated.)



See McMurry Study Guide and Student Solutions Manual Problem 8.35