

Exam #3

Chemistry 333

Principles of Organic Chemistry I

Friday November 18, 2005

Name: _____ **KEY** _____.

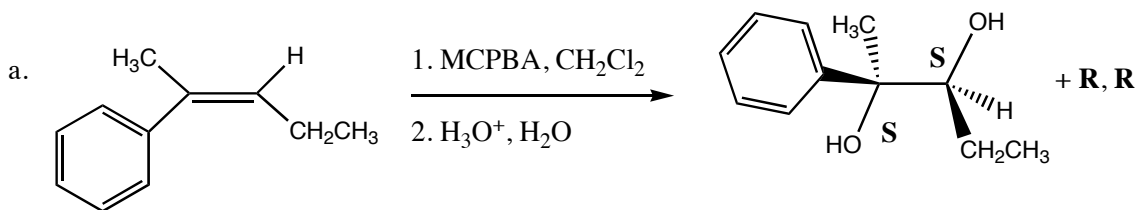
The exam is worth a total of 100 points; there are six questions. PACE YOURSELF! Please show all work to receive full credit for an answer.

By putting your name on this exam, you agree to abide by California State University, Northridge policies of academic honesty and integrity

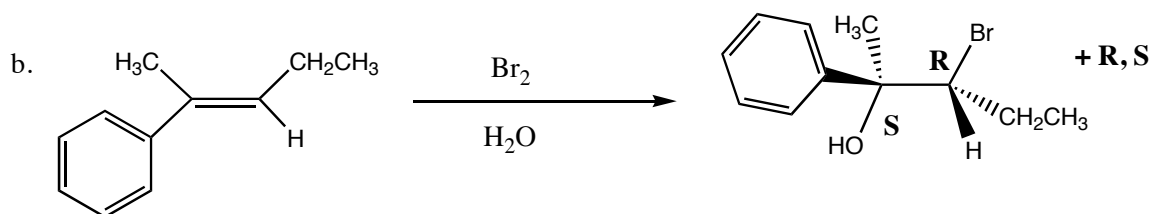
Molecular models are allowed for this exam. Calculators are not needed.

Good Luck!

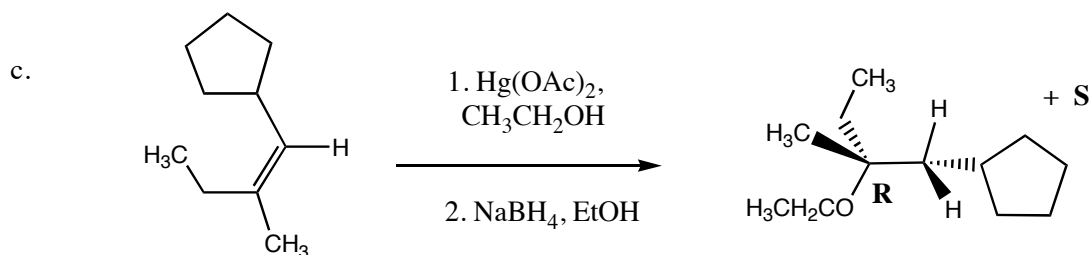
1. Draw the structure of the products of the following reactions, noting R or S configurations for asymmetric carbon atoms. If a racemic mixture is formed, indicate why. (20 pts)



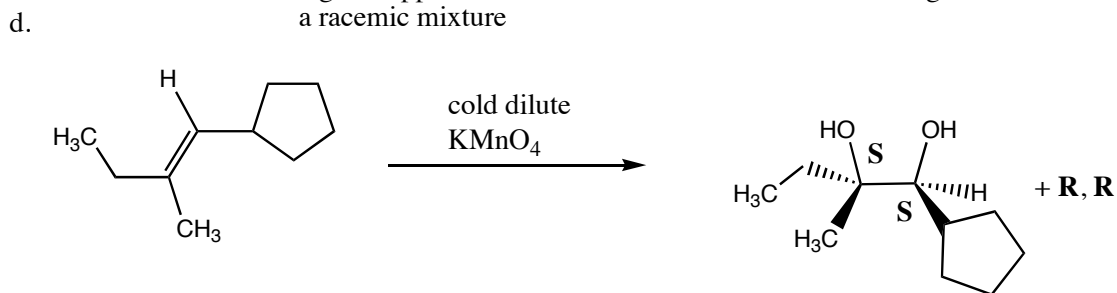
Reagent can deliver oxygen from either face of the alkene, leading to a racemic mixture of products.



Br₂ can approach from either face of the alkene, leading to a racemic mixture of products.

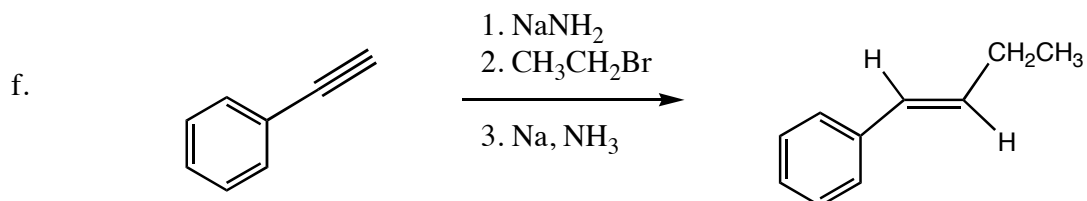
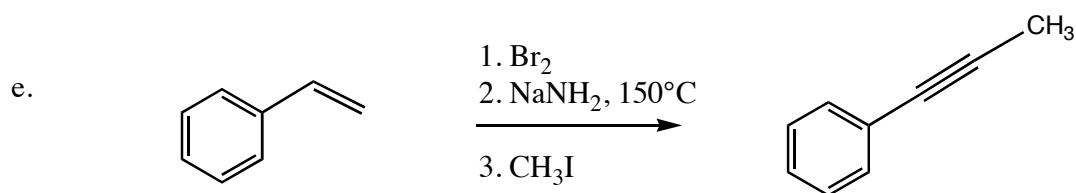
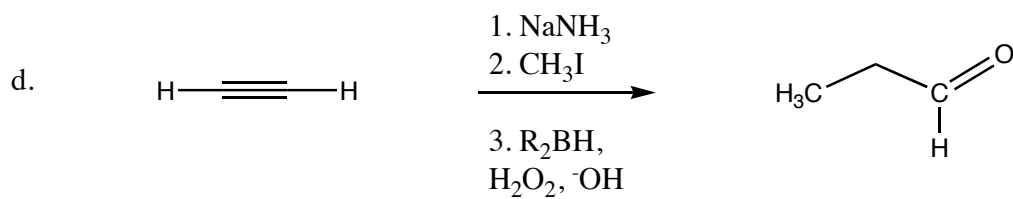
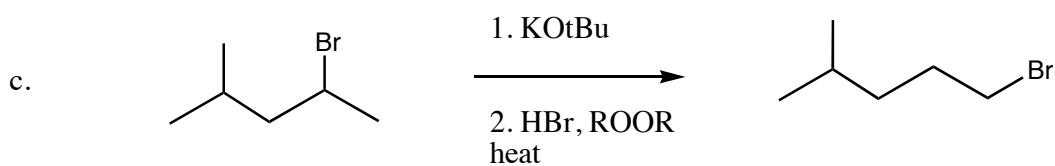
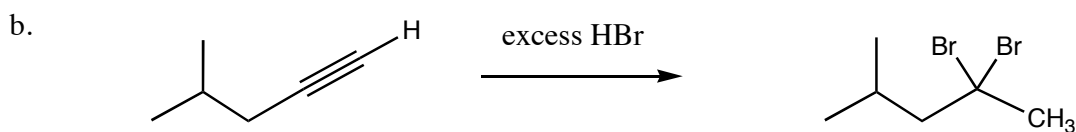
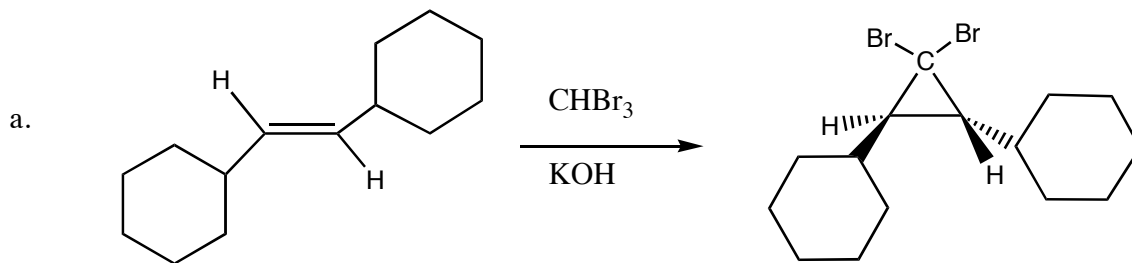


Hg can approach from either face of the alkene, leading to a racemic mixture



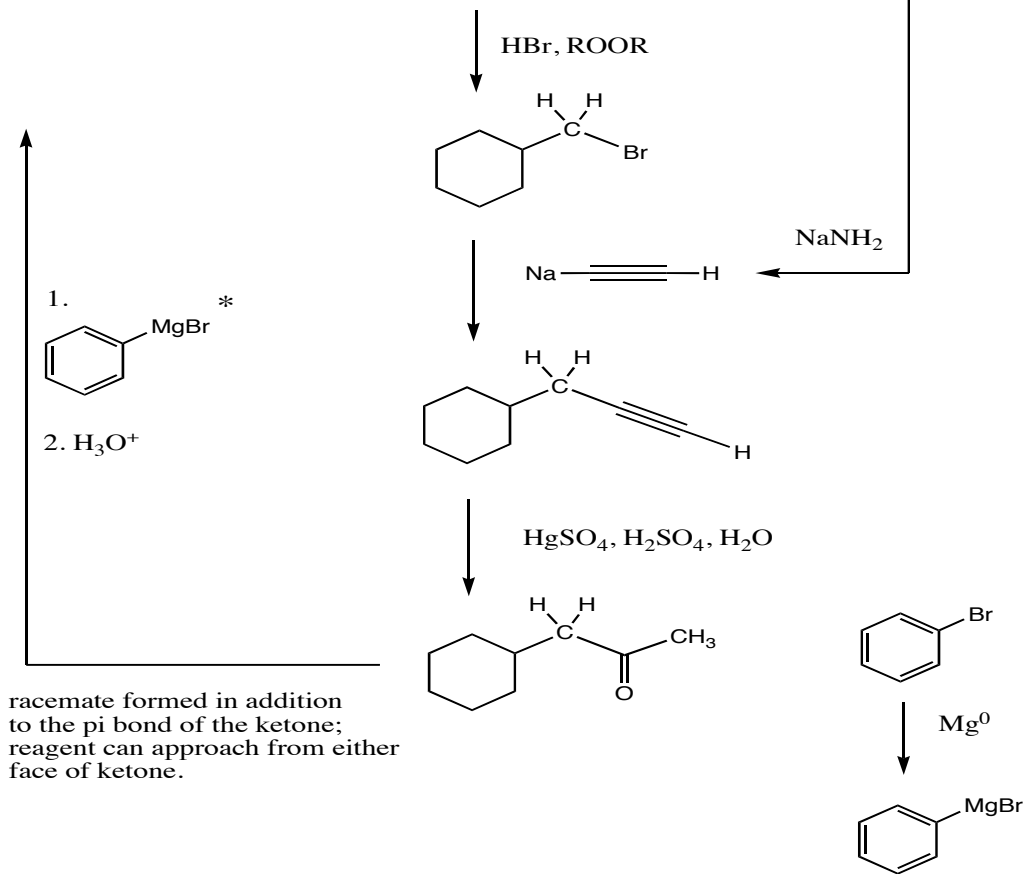
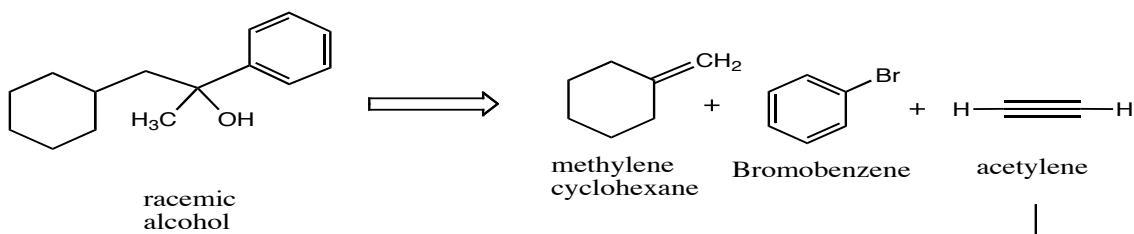
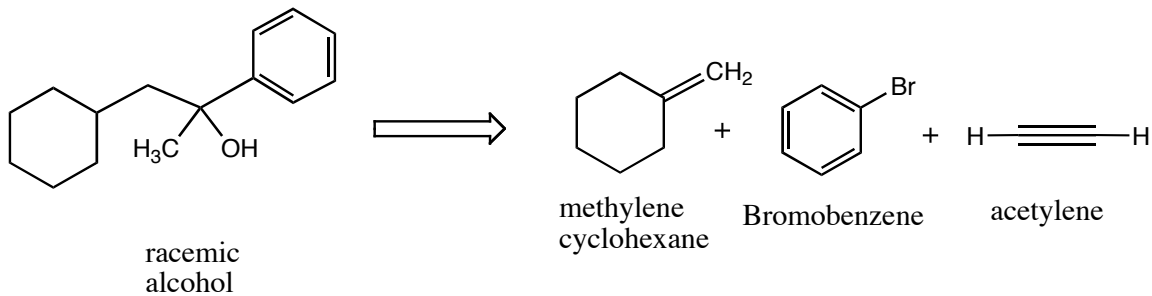
Reagent can approach from either face of the alkene, leading to a racemic mixture

2. Indicate reagent(s) or a sequence of synthetic steps to accomplish the following transformations; in some cases, more than one step may be required (5 pts each)

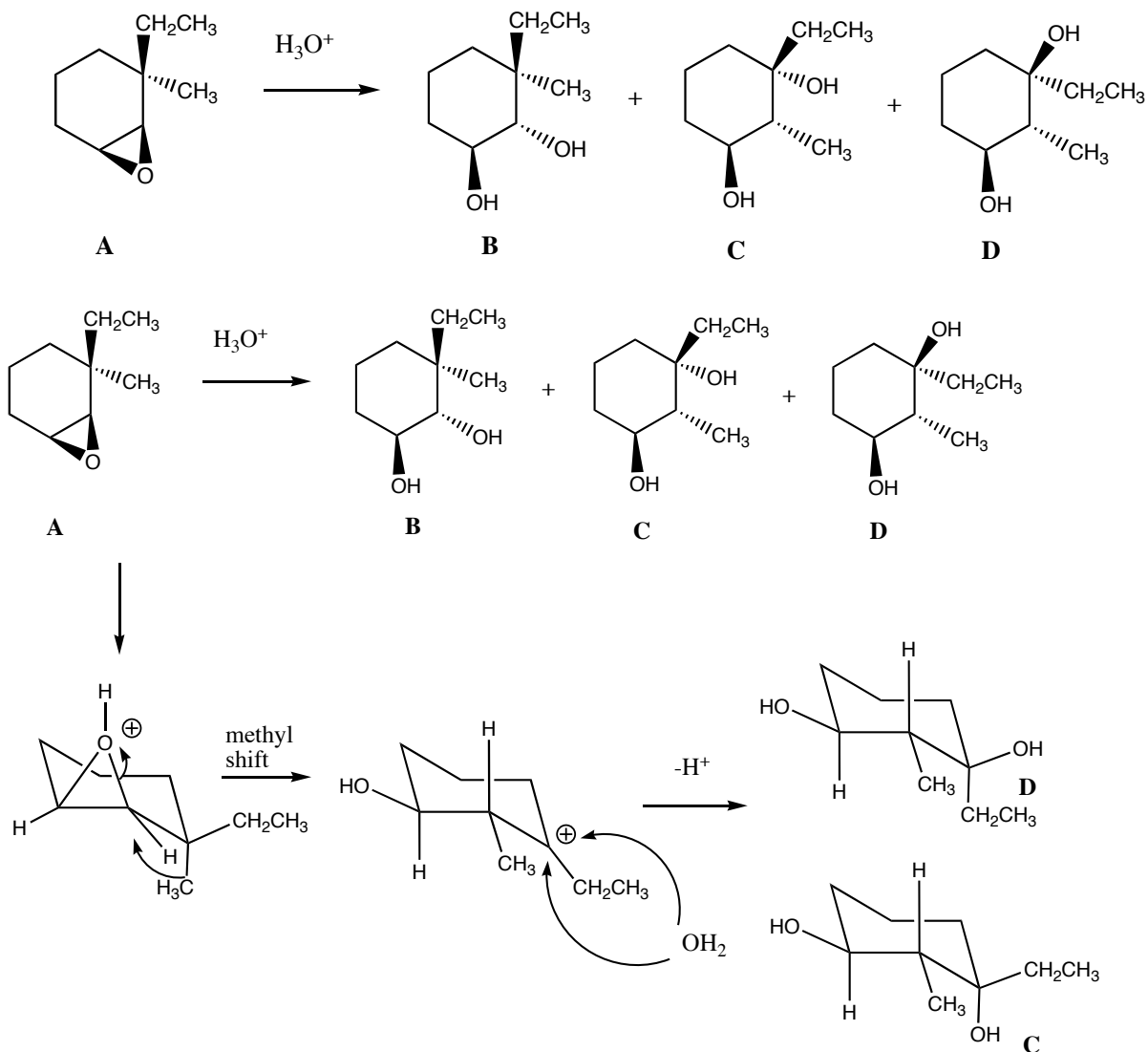


3.

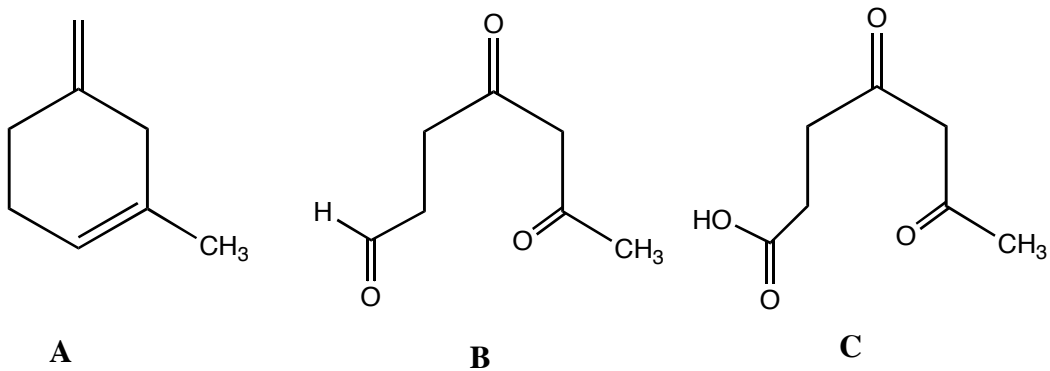
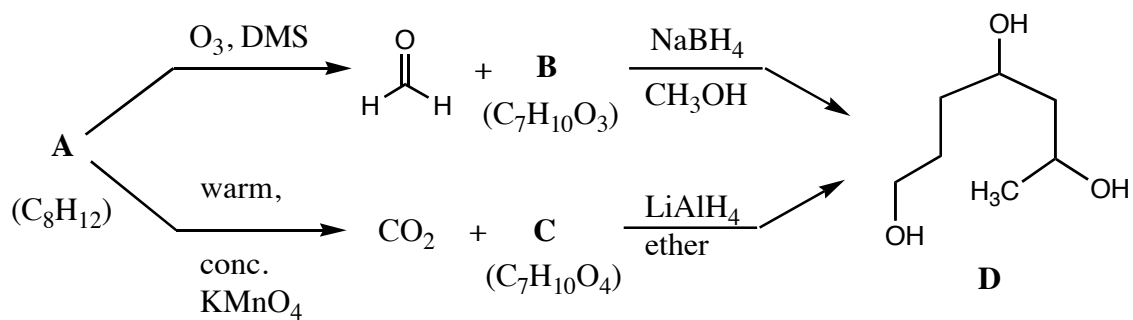
3. Devise a synthesis of the following racemic alcohol starting from acetylene, methylene cyclohexane, and bromobenzene; more than one step is needed. Mark with a star any step where a chiral product is formed; indicate why a racemate is obtained. The following reagents may be useful in your synthesis: Mg, NaNH₃, HgSO₄, HBr. (30 points)



4. Treatment of epoxide **A** with aqueous acid (H_3O^+) leads not only to the expected 1,2 diol **B** but also to a mixture of 1,3-diols **C** and **D**. Draw a mechanism that rationalizes the formation of 1,3-diols **C** and **D**. (20 points)



Bonus: (10 points). Ozonolysis of diene **A** (C_8H_{12}) leads to compound **B** ($C_7H_{10}O_3$) and formaldehyde. Treatment of **B** with $NaBH_4/CH_3OH$ leads to triol **D**. Warm, concentrated $KMnO_4$ treatment of diene **A** furnishes compound **C** ($C_7H_{10}O_4$) and CO_2 . Treatment of **C** with $LiAlH_4$ also leads to triol **D**. Draw the structures of compounds **A**, **B**, and **C**.



Congratulations!

Score:

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Page 2. _____/30

Page 3. _____/30

Page 4. _____/20

Bonus: _____/10

Total: _____/100