CHEM 203

Midterm Exam 1
October 15, 2013

ANSWERS

Your name: _____

This a closed-notes, closed-book exam

You may use your set of molecular models

This exam contains 6 pages

Time: 1h 30 min

1. _____ / 15
2. _____ / 15
3. _____ / 15
4. _____ / 15
5. _____ / 20
6. _____ / 20

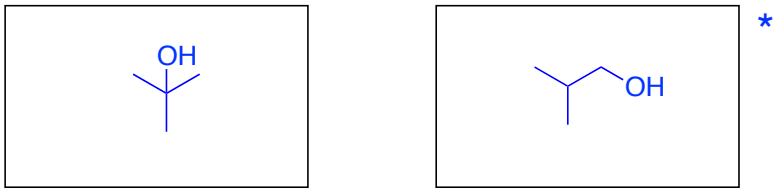
TOTAL _____ / 100

This exam counts for 18.75% of your CHEM 203 final grade

1. (15 pts.) Draw accurate structures of (write your answers in the appropriate boxes):

a. Two isomeric alcohols that produce the same alkene upon reaction with H_2SO_4 at 180 °C:

alcohol 1 **alcohol 2**



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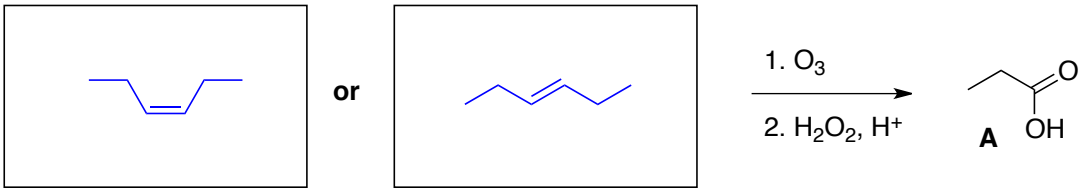
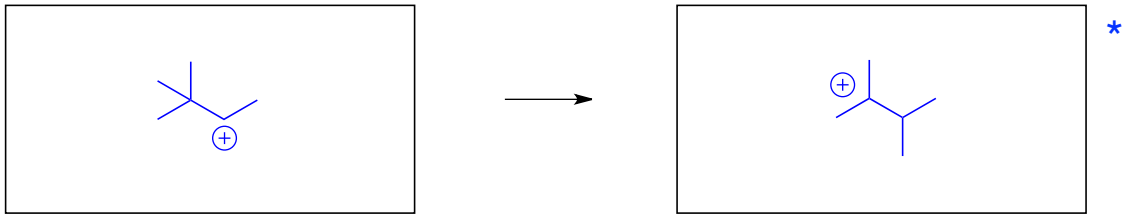
b. Two isomeric alkenes that produce only compound **A** upon reaction with O_3 followed by H_2O_2 and H^+:



c. A carbocation stabilized by 3 hyperconjugative interactions with C–H bonds that rearranges to give a new carbocation stabilized by 7 hyperconjugative interactions with C–H bonds:

stabilized by 3 C–H hyperconjugations **stabilized by 7 C–H hyperconjugations**



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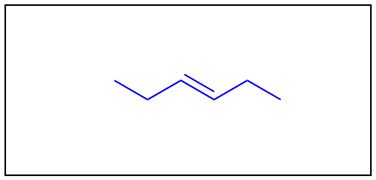
d. An alkene that contains at least 5 carbon atoms and that produces a *meso* dichloride upon reaction with Cl_2:



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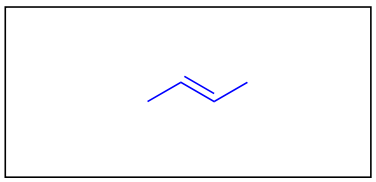
e. An alkene that forms an achiral product upon reaction with Br_2, but a chiral product upon reaction with Br_2 and H_2O:



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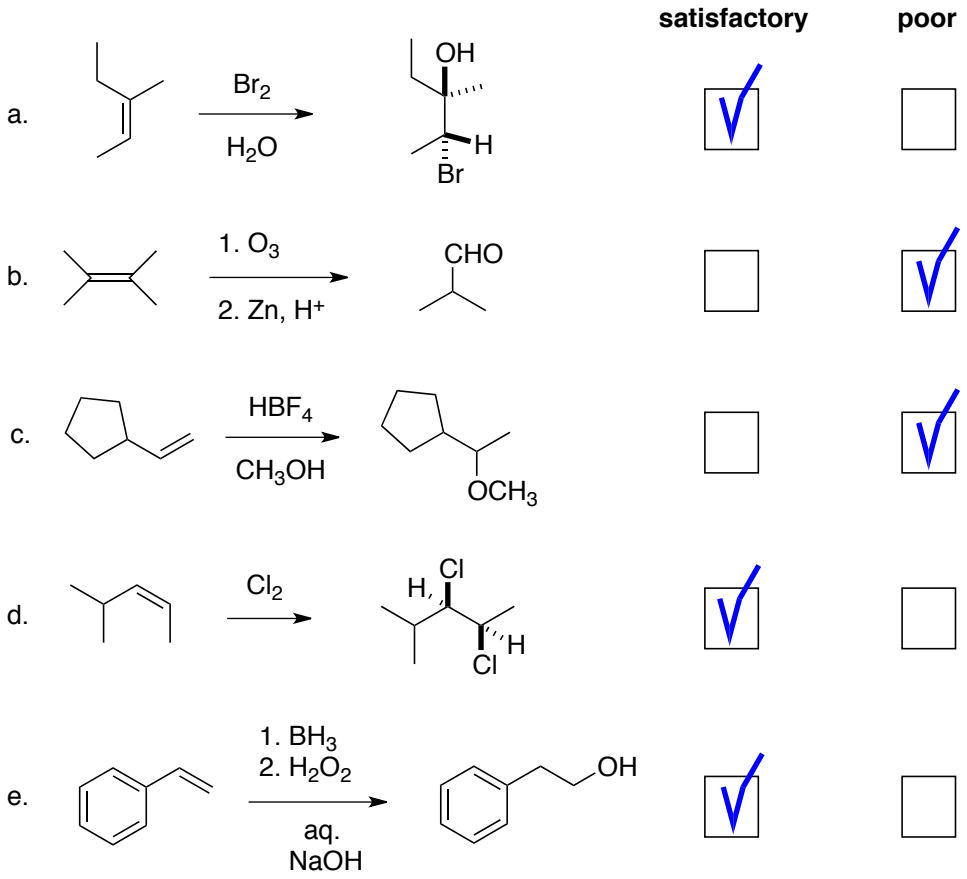
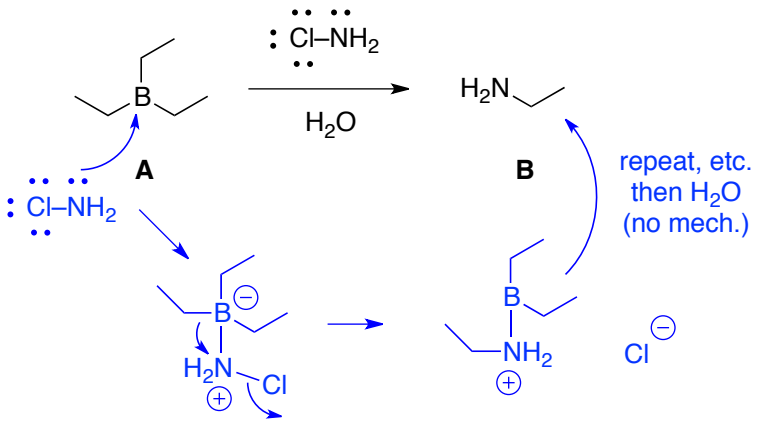
*** other answers are possible**

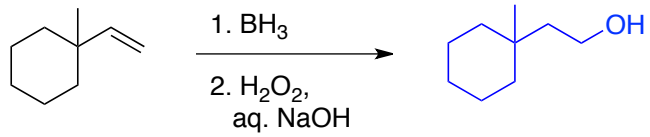
2. (15 pts.) Check the appropriate box to indicate whether the following reactions represent satisfactory or poor methods for the preparation of the products shown:

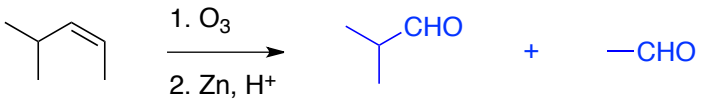


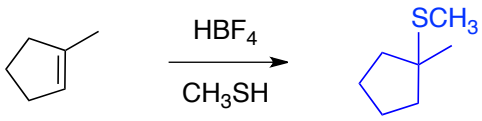
3. (15 pts.) Triethylborane, **A**, reacts with chloramine, Cl–NH_2, in the presence of water to give ethylamine, **B**. Write a plausible mechanism (curved arrows, formal charges, etc.) for this reaction (one round only; also, no mech. for the final reaction of the intermediate product with H_2O):

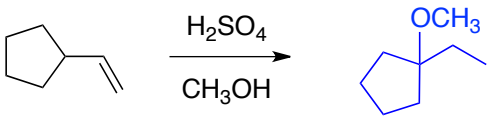


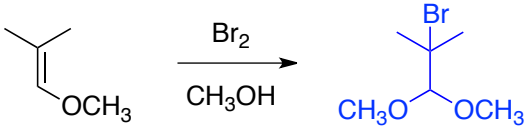
4. (15 pts.) Provide the structure of the major product(s) expected from the following reactions. If no reaction is expected, answer "NO REACTION". **Important**: compounds incorporating multiple stereogenic centers must be drawn with the correct relative configuration.

a. 

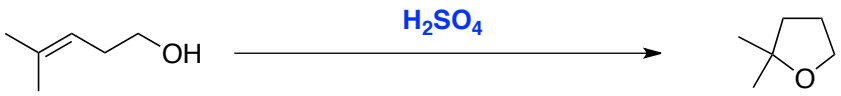
b. 

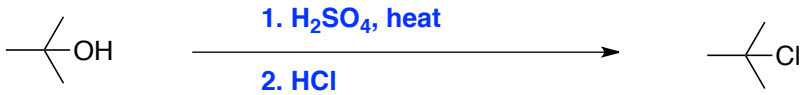
c. 

d. 

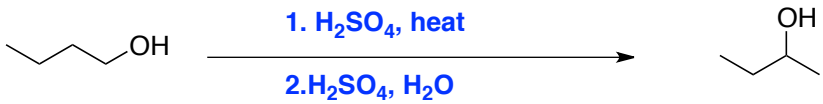
e. 

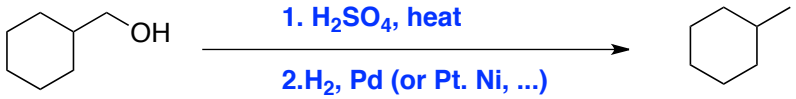
5. (20 pts.) Complete the following chemical equations by indicating all reagents / catalysts, in the correct order, that are required to convert the substrates into the products. Provide your answer as a numbered list drawn above / below the reaction arrows. If you should conclude that a product cannot be obtained from the starting compound shown by any method known to you, write "INACCESSIBLE" on the reaction arrow.

a. 

b. 

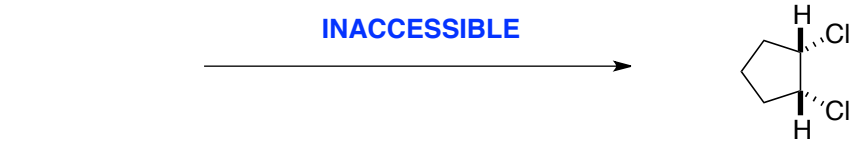
c. 

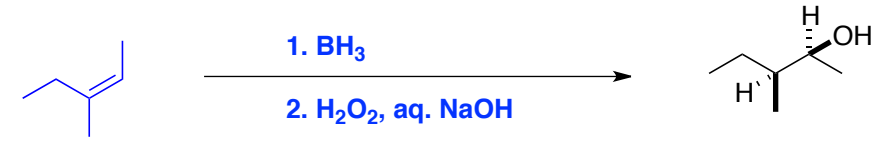
d. 

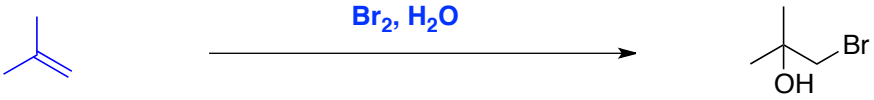
e. 

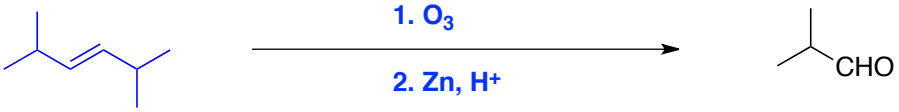
6. (20 pts.) Propose a method for the preparation of compounds a. – e. below starting from appropriate alkenes. Draw a clear structure of your proposed starting olefin on the left side of the reaction arrow. Above/below the reaction arrow, list all reagents / catalysts, in the correct order, that are required to induce the desired transformation. **Important**: the desired compound must be the major product of your reaction(s). If a product does not appear to be available by any reaction known to you, write "INACCESSIBLE" on the reaction arrow.

Note: it is understood that chiral compounds will be obtained as racemic mixtures.

a. 

b. 

c. 

d. 

e.