CHEM 2410 Fall 2018 – Mid-Term Exam 3
11-28-18

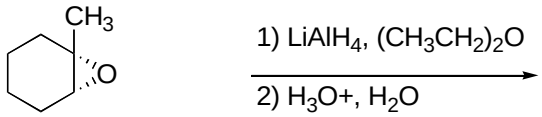
Time: 5:30pm – 6:30pm

Student Name: _____

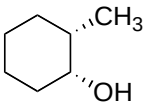
Student Number: _____

Instructor:	Prof. Andreana
Room #:	WO 1205

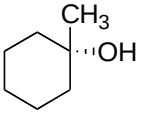
1. For the transformations below, what is the structure of the product? (H_3O^+, H_2O is just work-up conditions.



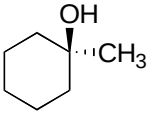
A)



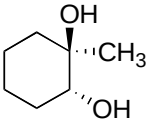
B)



C)

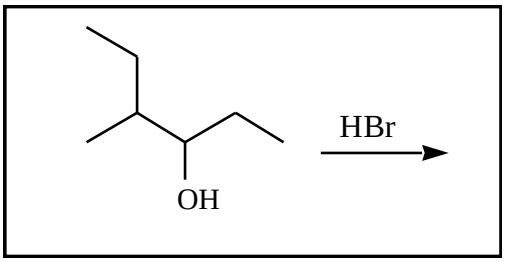


D)

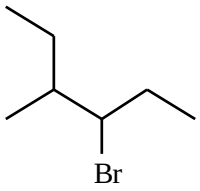


E) none of the above

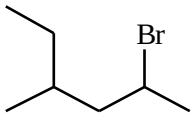
2. Predict the **major** product of the following reaction. **HINT:** Think about carbocation stability.



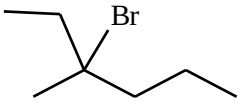
A)



B)

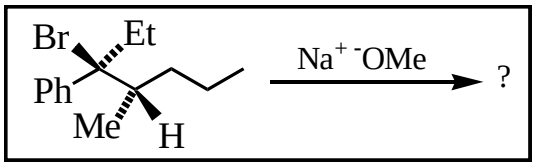


C)

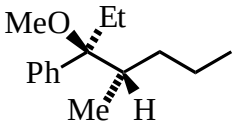


D) A and B in equal proportions
E) B and C in equal proportions

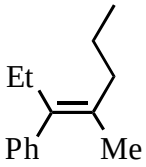
3. Predict the product of the following reaction.



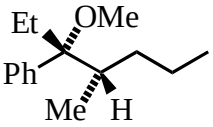
A)



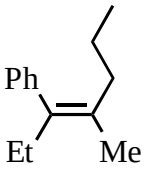
B)



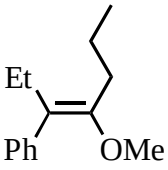
C)



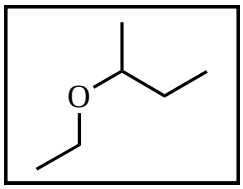
D)



E)

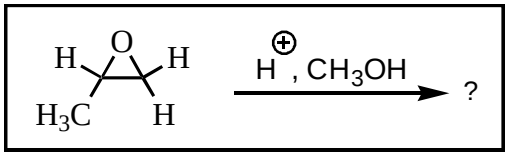


4. What would be the best name of the following compound?

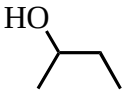


A) 3-methyl-4-oxohexane
B) 2-butoxyethane
C) 1-methy-1-ethoxypropane
D) (1-ethyl)-diethylether
E) 2-ethoxybutane

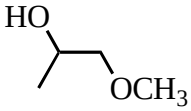
5. What is the **major** product of the following reaction? HINT: Think non-classical carbocation – covered in class.



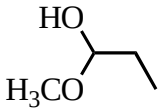
A)



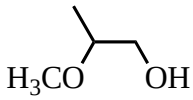
B)



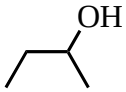
C)



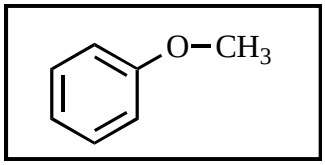
D)



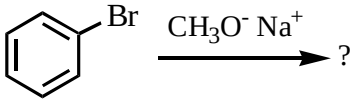
E)



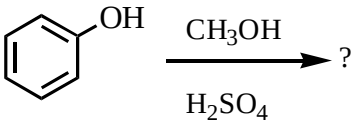
6. Which of the following reactions would be the best for the preparation of anisole (methoxybenzene)?



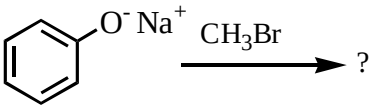
A)



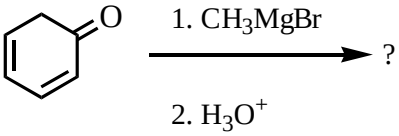
B)



C)

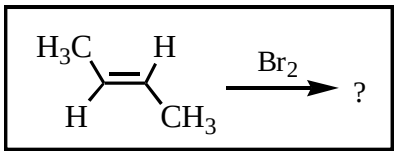


D)

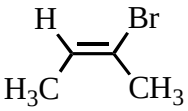


E) None of the above would work.

7. What would be the product of the following reaction?



A)



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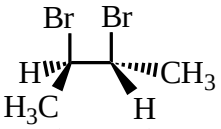
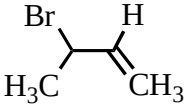
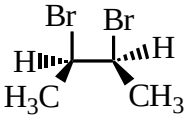


(racemic)

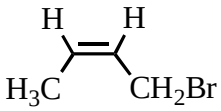
C)



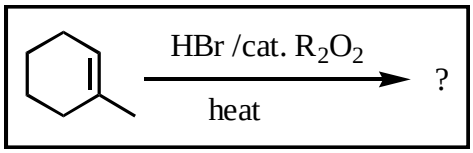
D)



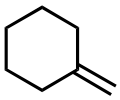
E)



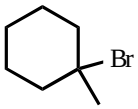
8. What is the **major** product of the following reaction? **HINT:** Homolytic process.



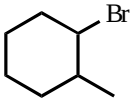
A)



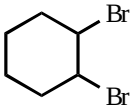
B)



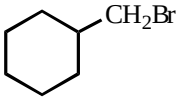
C)



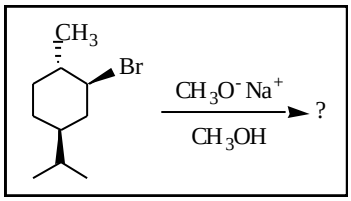
D)



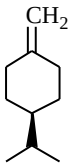
E)



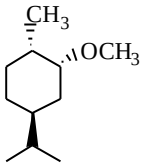
9. What product would you expect from the reaction shown below? HINT: Draw the most stable chair conformer, then you'll need to invert it.



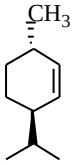
A)



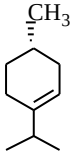
B)



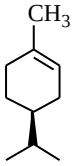
C)



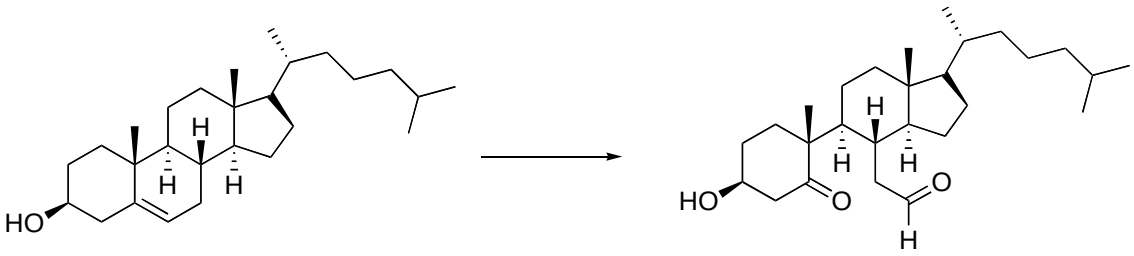
D)



E)



10. Cholesterol is a major lipid component of atherosclerotic plaques and can be present at such high concentrations that it forms a crystalline phase within a diseased artery. In addition to cholesterol, the 5,6-secosterol compound has also been isolated. 5,6-secostereol has been shown to be the product of an unforeseen oxidation reaction in the body. Which one of these reagents could be used convert cholesterol to the 5,6-secosterol? (*Science* **2003**, *302*, 1053)

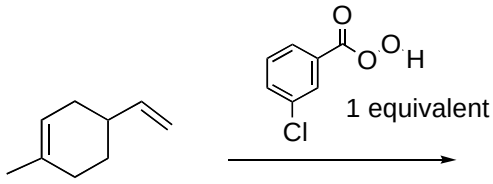


cholesterol

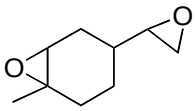
5,6-secosterol

A) $K_2Cr_2O_7$
B) O_3
C) $(CH_3)_2S$
D) HOOH
E) LiOH

11. Which of the following products is most likely to form under the reaction conditions?
Hint: Think Markovnikov.



A)



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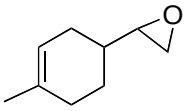
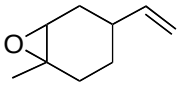
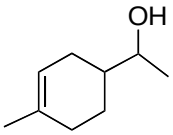


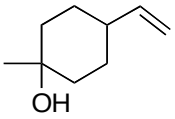
C)



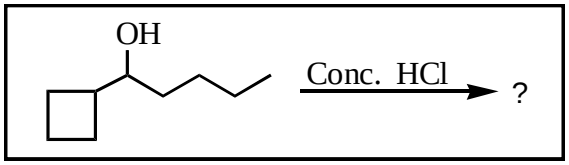
D)



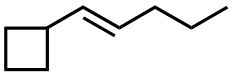
E)



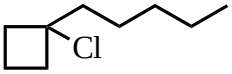
12. In the following reaction, an interesting <u>rearrangement</u> takes place. Suggest a structure for the product that is obtained.



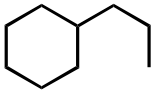
A)



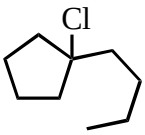
B)



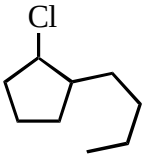
C)



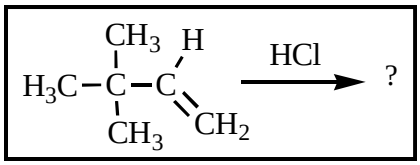
D)



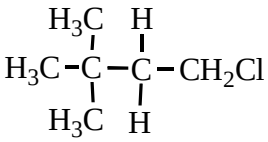
E)



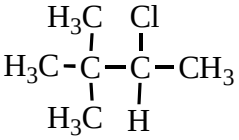
13. What would be the **major** organic product of the following reaction?



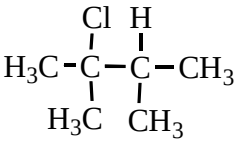
A)



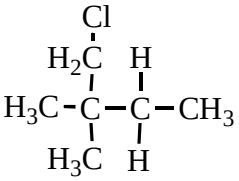
B)



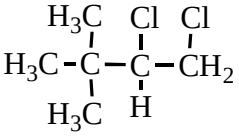
C)



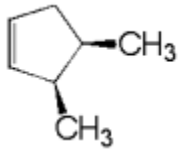
D)



E)

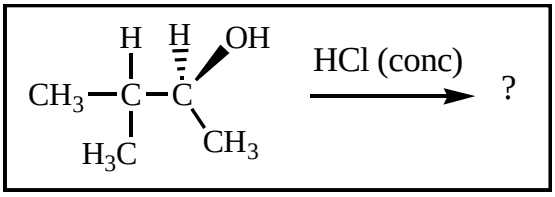


14. Choose the name of the following compound.

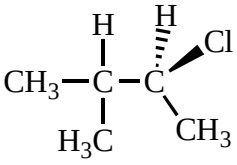


A) cis-4,5-dimethylcyclopentene
B) cis-1,2-dimethylcyclopent-3-ene
C) cis-2,3-dimethycyclopentene
D) cis-3,4-dimethylcyclopentene
E) cis-1,2-dimethylcyclopent-4-ene

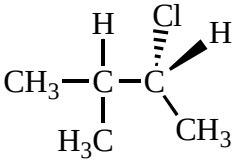
15. What would be the **major** organic product from the following reaction?



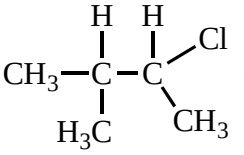
A)



B)

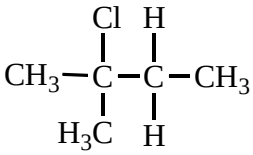


C)

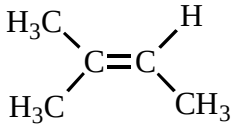


(racemic)

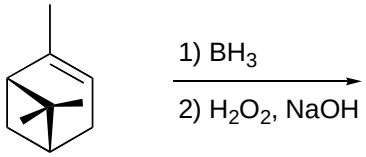
D)



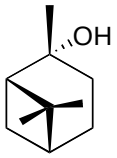
E)



16. Which of the following products is most likely to form under the reaction conditions?

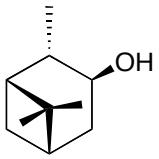


A)

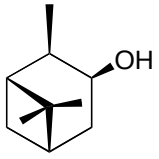


B)

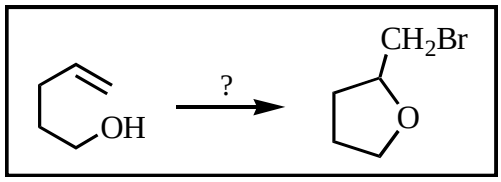
C)



D)

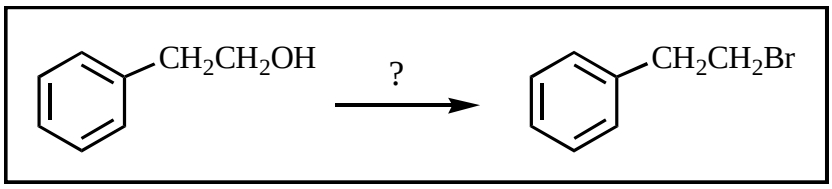


17. Based on your knowledge of the mechanisms involved, which of the reagents below would you expect to accomplish the following reaction? (Think through the mechanism!)



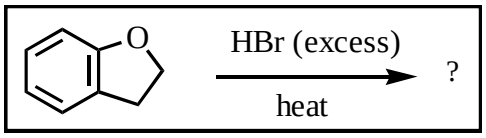
A) HBr
B) Br_2
C) PBr_3
D) NaBr
E) HBr + peroxides

18. What reagent would best accomplish the following reaction?

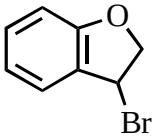


A) Br_2
B) NaBr
C) CH_3Br
D) NH_4^+ Br^-
E) PBr_3

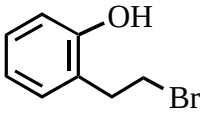
19. What product would result from the following reaction?



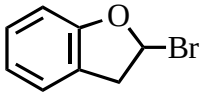
A)



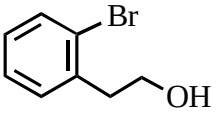
B)



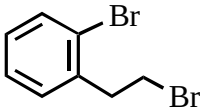
C)



D)

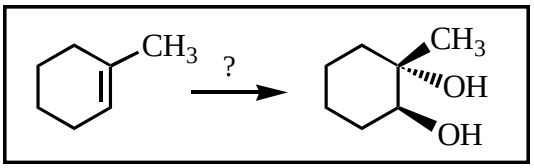


E)



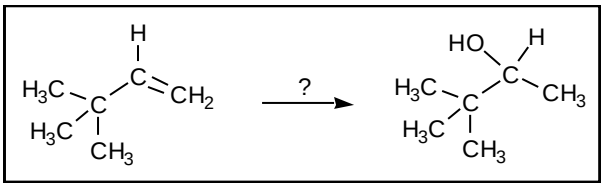
BONUS: 5 PTS Each

20. Which of the following sets of reagents would convert 1-methylcyclohexene into *trans*-1-methyl-1,2-cyclohexanediol?



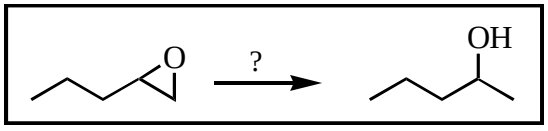
A) 1. CH_3CO_3H
   2. CH_3ONa, CH_3OH
B) $KMnO_4$, H_2O, ^-OH
C) 1. CH_3CO_3H
   2. H_3O^+
D) 1. OsO_4
   2. H_2S, H_2O
E) 1. O_3
   2. $(CH_3)_2S$

21. Which reagents would be appropriate for the chemical transformation shown below?



A) H_2O, H_2SO_4
B) BH_3, then H_2O_2, ^-OH
C) $Hg(OAc)_2$, H_2O, then $NaBH_4$
D) $NaBH_4$, CH_3OH
E) PCC

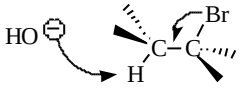
22. Which reagent(s) would accomplish the following reaction?



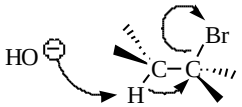
A) H_2O, H^+
B) NaH
C) 1. $LiAlH_4$
   2. H_2O
D) NaOH, H_2O
E) 1. CH_3MgBr
   2. H_2O

23. Which sets of arrows correctly represents the electron movements during an E2 reaction?

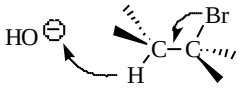
A)



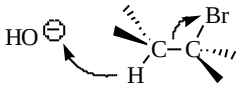
B)



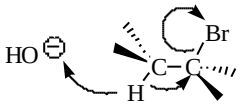
C)



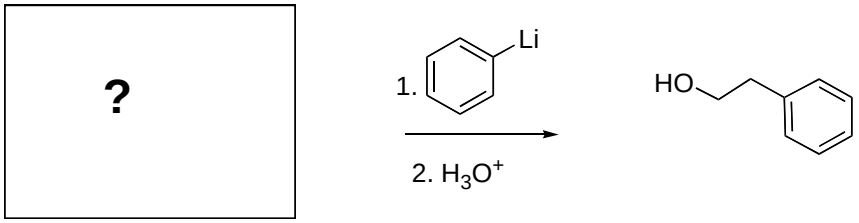
D)



E)



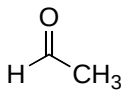
24. For the transformations below, what is the structure of the starting material? HINT: H_3O^+ is just work-up.



A)

B) CH_3CH_2OH

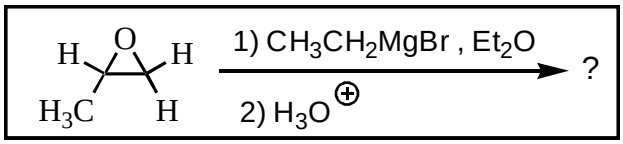
C)



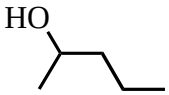
D)

E)

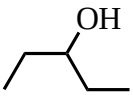
25. What is the **major** product of the following reaction? HINT: H_3O^+ is just work-up.



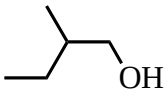
A)



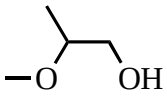
B)



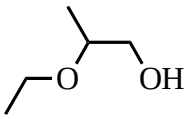
C)



D)



E)



Answer Key

1. B
2. C
3. D
4. E (Most Correct) & B
5. D
6. C
7. D
8. C
9. C (Most Correct) & B
10. B
11. C
12. D B E
13. C
14. D
15. D
16. C
17. B (Most Correct) & E
18. E
19. B
20. C
21. C
22. C
23. B
24. D
25. A