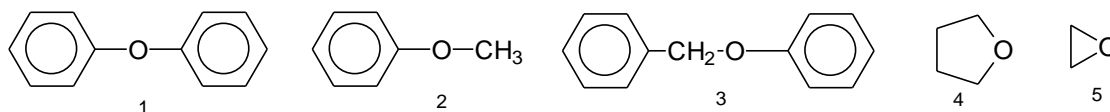


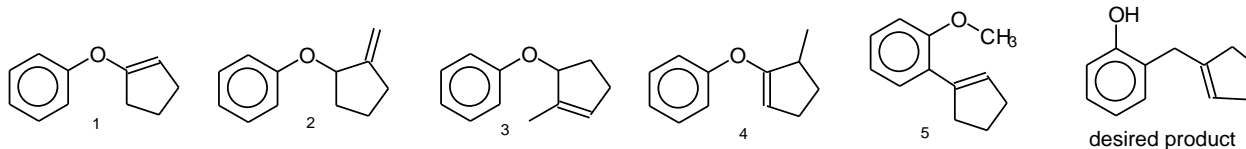
Problem Set 3 Chem 2032

1. One of the ethers below can not be cleaved with HI or HBr. Which one?



- A. 1    B. 2    C. 3    D. 4    E. 5

2. The desired product can be prepared by Claisen rearrangement of one of compounds 1-5. Which one?



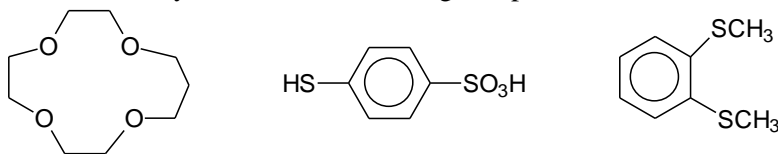
- A. 1    B. 2    C. 3    D. 4    E. 5

3. The naming of the smallest cyclic ether ( $C_2H_4O$ ) is confusing because several names are in use, both common and systematic. How many of the following names are acceptable?

a. Ethylene oxide    b. 1,2-epoxyethane    c. oxolane    d. oxirane    e. oxoethylene    f. oxoethane

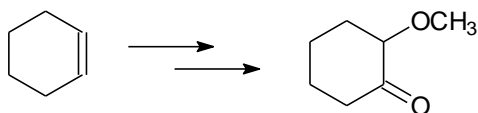
- A. two    B. three    C. four    D. five    E. all

4. How would you name the following compounds?



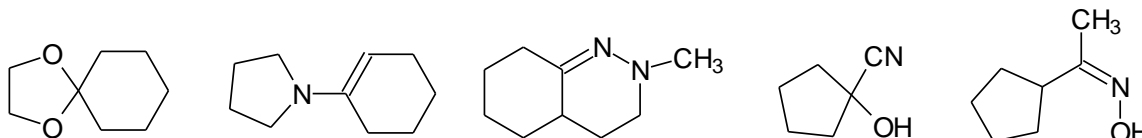
- A. 12-crown-4 ether, 4-thiophenylsulfuric acid, 1,2-di(methylthio)benzene  
 B. 9-crown-4 ether, 4-thiobenzenesulfuric acid, 1,2-di(methylsulfo)benzene  
 C. 13-crown-4 ether, 4-thiophenylsulfuric acid, 1,2-di(methylsulfur)benzene  
 D. methylene-12-crown-4 ether, 4-thiophenylsulfuric acid, ortho-di(methylthio)benzene  
 E. 13-crown-4 ether, 4-mercaptobenzenesulfonic acid, 1,2-di(methylthio)benzene

5. The conversion below can be accomplished in three steps, using 1. PCC, 2. m-chloroperoxybenzoic acid, and 3. sodium methoxide as reagents. Sketch out a plausible reaction sequence and decide in which order these reagents will be needed!



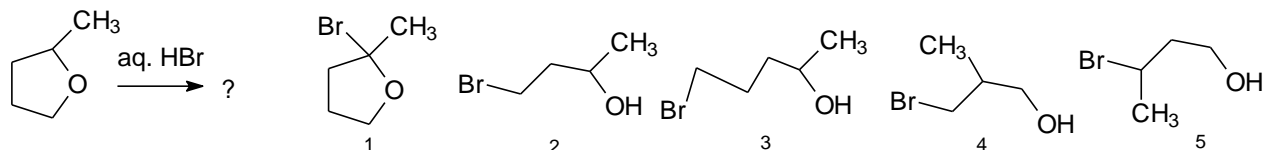
- A. 1, then 2, then 3    B. 1, then 3, then 2    C. 3, then 2, then 1    D. 2, then 3, then 1    E. 2, then 1, then 3

6. One of the following: 1. cyanohydrin, 2. hemiacetal, 3. hydrazone, 4. enamine 5. oxime is **not** present among the compounds below. Which one?



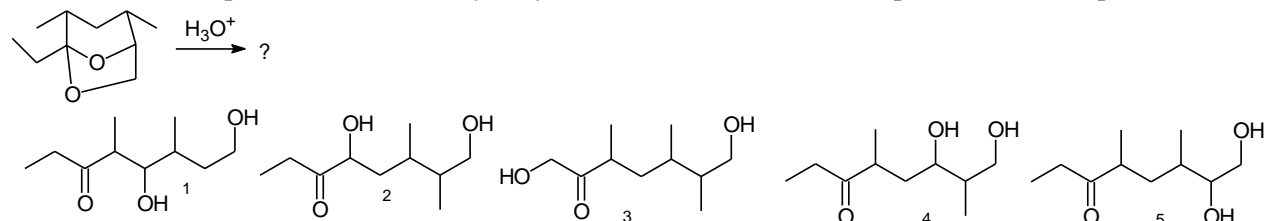
- A. 1    B. 2    C. 3    D. 4    E. 5

7. What product results from the ether cleavage below?



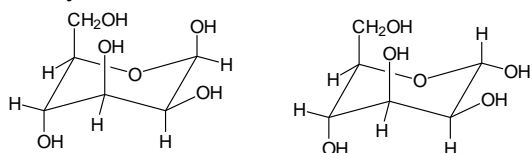
A. 1    B. 2    C. 3    D. 4    E. 5

8. The natural compound multistriatin hydrolyzes in acidified water. What product do we expect?



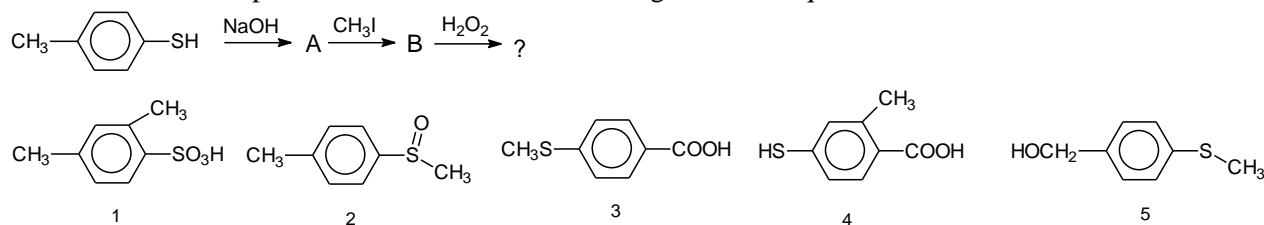
A. 1    B. 2    C. 3    D. 4    E. 5

9. The structures below are both hemiacetals (actually, these are sugars). What is their relationship? They both can be hydrolyzed with water to the corresponding aldehydes. What is the relationship of the aldehydes?



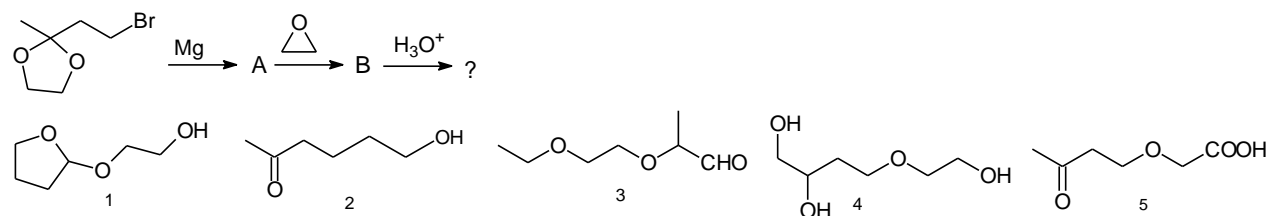
- A. The hemiacetals are enantiomers, the aldehydes will be as well.  
 B. The hemiacetals are identical, the aldehydes will be as well.  
 C. The hemiacetals are diastereomers, the aldehydes will be as well.  
 D. The hemiacetals are diastereomers, the aldehydes will be enantiomers.  
 E. The hemiacetals are diastereomers, the aldehydes will be identical.

10. What is the most plausible outcome of the following reaction sequence?



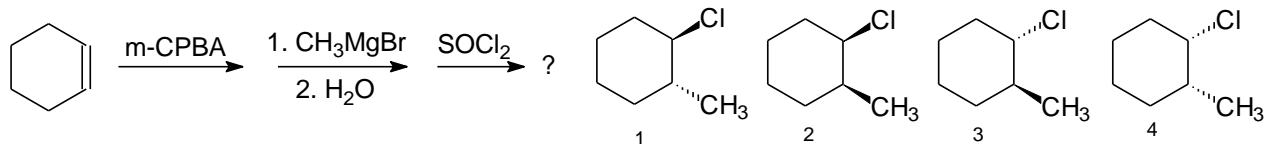
A. 1    B. 2    C. 3    D. 4    E. 5

11. What is the most plausible outcome of the following reaction sequence?



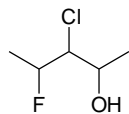
A. 1    B. 2    C. 3    D. 4    E. 5

12. What is the most plausible outcome of the following reaction sequence?



- A. 1    B. 2    C. both 1 and 3    D. both 2 and 3    E. both 2 and 4

13. What would be the most appropriate name for the compound below?



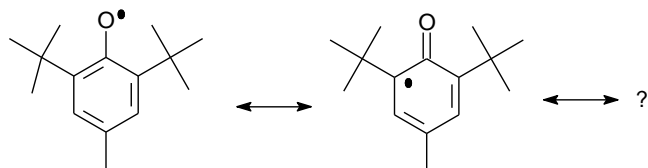
- A. 2-fluoro-3-chloro-4-pentanol    B. 3-chloro-2-fluoro-4-pentanol    C. 3-chloro-4-fluoro-2-methylbutanol  
D. 2-(1-chloro-2-fluoropropyl) ethanol    E. 3-chloro-4-fluoro-2-pentanol

14. 2-Phenyl-2-propanol can be prepared in various ways, by Grignard reaction. Which of the following sets of reactions **cannot** be used to generate 2-phenyl-2-propanol?

- the reaction of acetone with phenylmagnesium bromide
- the reaction of acetophenone with methylmagnesium bromide
- the reaction of methylbenzoate (ester of benzoic acid and methanol) with excess methylmagnesium bromide
- the reaction of methylacetate (ester of acetic acid and methanol) with excess phenylmagnesium bromide

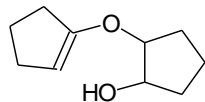
- A. 1    B. 2    C. 3    D. 4    E. 2 and 4

15. BHT is a common radical scavenger because it easily sheds  $H\bullet$ , forming a highly resonance stabilized radical. How many additional resonance forms of BHT are plausible?



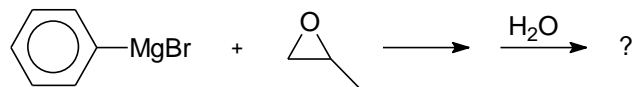
- A. 1    B. 2    C. 3    D. 4    E. 5

16. Enols can form ethers just like other alcohols, but these ethers are easily hydrolyzed by acidic water. The nucleophile is  $H_2O$  in this case. What product(s) would the enol ether below produce upon hydrolysis?



- A. two moles of cyclopentanol  
B. one mole of cyclopentanone and one mole of 1,2-cyclopentanediol  
C. one mole of cyclopentanone and one mole of 1,3-cyclopentanediol  
D. one mole of cyclopentanol and one mole of 2-hydroxycyclopentanone  
E. one mole of cyclopentanone and one mole of 1-cyclopentenol

17. What would be the most plausible product for the reaction below?



- A. cis-2-methyl-3-phenyloxirane    B. trans-2-methyl-3-phenyloxirane    C. 2-phenyl-1-propanol  
D. 1-phenyl-2-propanol    E. 3-phenyl-1-propanol

Key pr2032\_3:

1. A
2. B
3. B
4. E
5. D
6. B
7. C
8. E
9. E
10. B
11. B
12. E
13. E
14. D
15. B
16. B
17. D