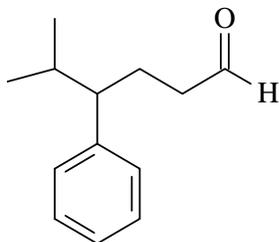
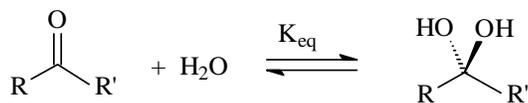


1. Identify the correct IUPAC name of the compound below?

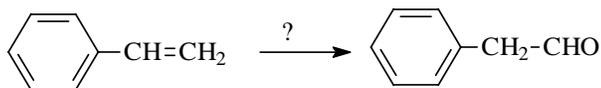


- 1) 4-benzyl-5-methylhexanal
  - 2) 5-isopropyl-5-phenylbutanal
  - 3) 2-methyl-3-phenylhexanal
  - 4) 5-methyl-4-phenylhexanal
2. Which of the following has the largest  $K_{eq}$  for the formation of the hydrate (as shown below)?



- 1) 1                                      2) 2                                      3) 3                                      4) 4
3. Which of the reagents below will oxidize a secondary alcohol to a ketone?
- 1)  $\text{LiAlH}_4$
  - 2)  $\text{HIO}_4$
  - 3)  $\text{K}_2\text{Cr}_2\text{O}_7, \text{H}_2\text{SO}_4/\text{H}_2\text{O}$
  - 4)  $\text{HgSO}_4, \text{H}_2\text{SO}_4/\text{H}_2\text{O}$

4. Which one of the following works best as the reaction steps to carry out the conversion below?



1) (1) Br<sub>2</sub>                      (2) NaNH<sub>2</sub>(xs)              (3) H<sub>2</sub>O, HgSO<sub>4</sub>/H<sub>2</sub>SO<sub>4</sub>

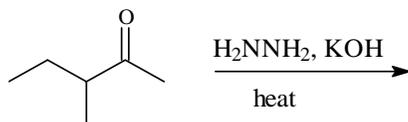
2) (1) B<sub>2</sub>H<sub>6</sub>/diglyme              (2) H<sub>2</sub>O<sub>2</sub>, NaOH              (3) PCC/CH<sub>2</sub>Cl<sub>2</sub>

3) (1) H<sub>2</sub>O, H<sub>2</sub>SO<sub>4</sub>              (2) CrO<sub>3</sub>/H<sub>2</sub>SO<sub>4</sub>

4) (1)  $\text{CH}_3\overset{\text{O}}{\parallel}\text{COOH}$               (2) NaOH, H<sub>2</sub>O

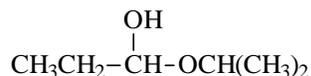
1) 1                                      2) 2                                      3) 3                                      4) 4

5. What is the product of the following reaction?



1) 3-methylpentane                                      2) 3-methyl-2-pentanol  
3) 3-methyl-2-pentene                                      4) 3-methyl-1-pentyne

6. The compound shown to the right is the hemiacetal formed between:



1) propanal and 2-propanol  
2) 2-methylpropanal and ethanol  
3) acetone and 1-propanol  
4) ethanal and 2-methyl-1-propanol

7. Identify the products of the hydrolysis of the following compound.

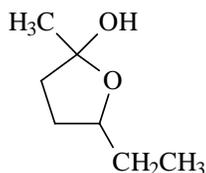


1)  $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{CH} + 2 \text{CH}_3\text{OH}$               3)  $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\text{O}}{\parallel}\text{COCH}_3 + \text{CH}_3\text{OH}$

2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} + 2 \text{H}_2\text{C}=\text{O}$               4)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH} + 2 \text{CH}_3\text{OH}$

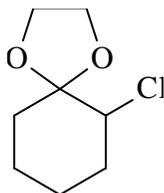
1) 1                                      2) 2                                      3) 3                                      4) 4

8. The compound shown below is the cyclic hemiacetal of:

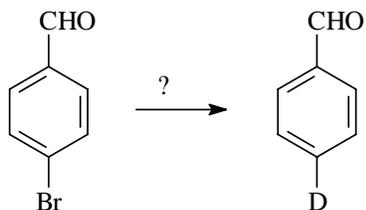


- 1) 5-hydroxyheptanal                      2) 5-hydroxy-2-heptanone  
3) 6-hydroxy-3-heptanone                4) 6-hydroxyheptanal

9. Acid-catalyzed hydrolysis of the cyclic acetal below gives:

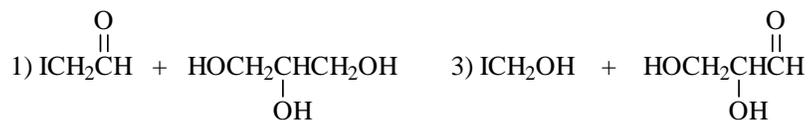
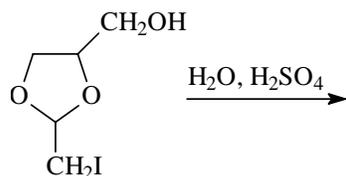


- 1) ethanal and 2-chlorocyclohexanol  
2) 1,2-ethanediol and 2-chlorocyclohexanol  
3) ethanol and 2-chlorocyclohexanol  
4) 1,2-ethanediol and 2-chlorocyclohexanone
10. The acid-catalyzed reaction of propanal with methanol goes from the hemiacetal to the acetal. This can mechanistically be thought of as:
- 1) an addition reaction followed by a substitution reaction.  
2) a substitution reaction followed by an addition reaction.  
3) an elimination reaction followed by a substitution reaction.  
4) an addition reaction followed by an elimination reaction.
11. Which synthetic method below correctly does the following conversion?



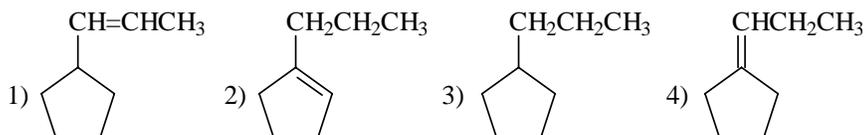
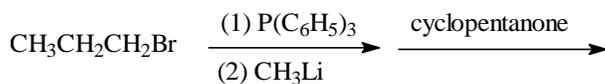
- 1) (1) Mg, diethyl ether            (2) D<sub>2</sub>O  
2) (1) LiAlD<sub>4</sub>, diethyl ether    (2) D<sub>2</sub>O  
3) (1) HOCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>OH, H<sup>+</sup>    (2) Mg, diethyl ether    (3) D<sub>2</sub>O    (4) H<sub>2</sub>O, H<sup>+</sup>  
4) (1) HOCH<sub>2</sub>CH<sub>2</sub>OH, H<sup>+</sup>        (2) DCl                      (3) H<sub>2</sub>O, H<sup>+</sup>

12. Domiodol, shown below, is used medicinally as a mucolytic agent. What are the acidcatalyzed hydrolysis products of Domiodol?



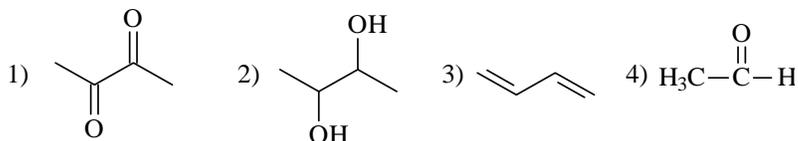
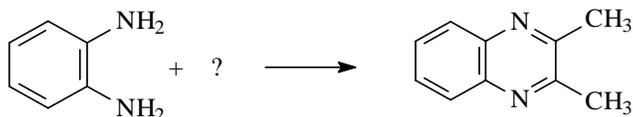
- 1) 1                                      2) 2                                      3) 3                                      4) 4

13. What is the product of the following reaction sequence?



- 1) 1                                      2) 2                                      3) 3                                      4) 4

14. Identify the missing reagent for the reaction below.



- 1) 1                                      2) 2                                      3) 3                                      4) 4

