Name: _____

CHEMISTRY 353

G. S. Kriz

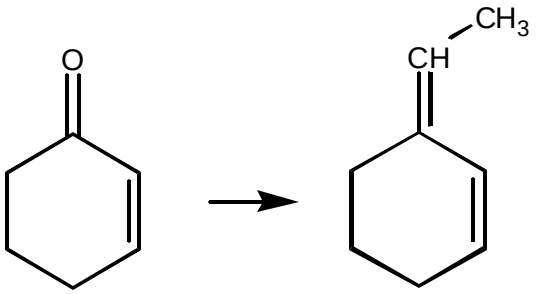
SECOND HOUR EXAMINATION

May 12, 2004

30 Points (3 each)

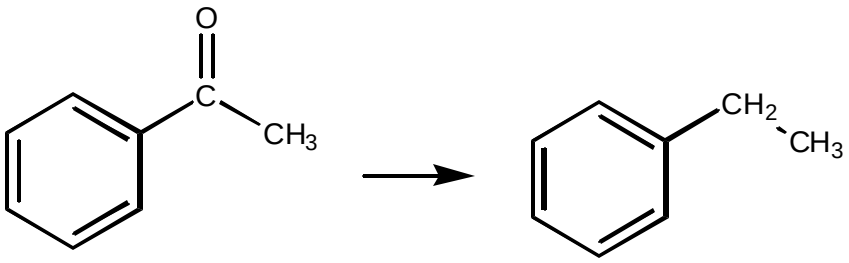
Answer each of the following questions by selecting the response that you feel is most correct. Write the letter corresponding to your selection in the blank provided. Note that there is only one correct response for each question.

1. _____ Choose the *best* reagent from the list provided for carrying out the transformation shown.



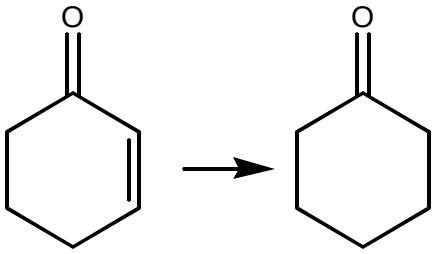
A. CH_3CH_2MgBr in ether, followed by aqueous acid
B. $(CH_3CH_2)_2CuLi$ in ether, followed by aqueous acid
C. $(C_6H_5)_3P{=}CH\text{-}CH_3$
D. $NaBH_4$ in methanol, followed by CH_3CH_2MgBr
E. CH_3CH_2Br, followed by KOH in ethanol with heat

2. _____ Which of the following reduces acetophenone to ethylbenzene?



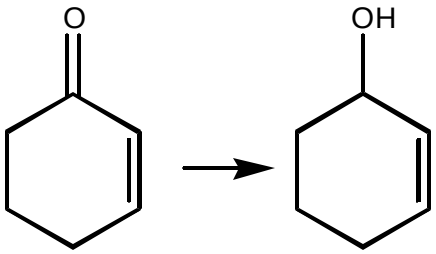
A. Zn(Hg) and concentrated hydrochloric acid
B. $KMnO_4$ and base
C. $K_2Cr_2O_7$ and sulfuric acid
D. H_2 at high pressure and heat, Ni catalyst

3. _____ Choose the *best* reagent from the list provided for carrying out the transformation shown.



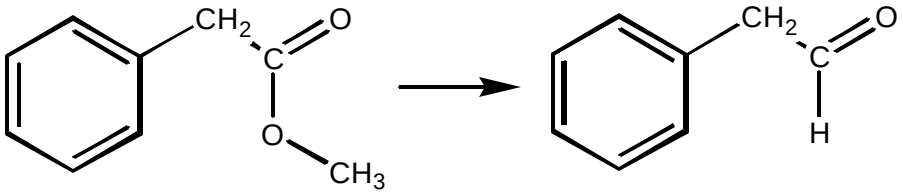
A. DIBALH in toluene, followed by aqueous acid
B. $LiAlH_4$ in THF
C. $NaBH_4$ in methanol
D. (1) 1,2-Ethanediol + HOTs catalyst;
   (2) H_2 over Pd; and
   (3) aqueous acid
E. H_2 at high pressure and temperature over a nickel catalyst

4. _____ Choose the *best* reagent from the list provided for carrying out the transformation shown.



A. BH_3 in THF, followed by H_2O_2 and NaOH
B. $NaBH_4$ in methanol
C . H_2 at high pressure and temperature over a nickel catalyst
D. $LiAlH_4$ in THF
E. Chromic oxide and pyridine in CH_2Cl_2

5. _____ Choose the *best* reagent from the list provided for carrying out the transformation shown.



A. BH_3 in THF, followed by H_2O_2 and NaOH
B. $(C_6H_5)_2CuLi$ in ether, followed by aqueous acid
C. DIBALH in toluene, followed by aqueous acid
D. $LiAlH_4$ in THF
E. Pyridinium chlorochromate in CH_2Cl_2

6. _____ Which of the following reduces cyclohexanone to cyclohexanol?

A. Zn(Hg) and concentrated hydrochloric acid
B. $KMnO_4$ and base
C. $K_2Cr_2O_7$ and sulfuric acid

D. H_2 at high pressure and heat, Ni catalyst

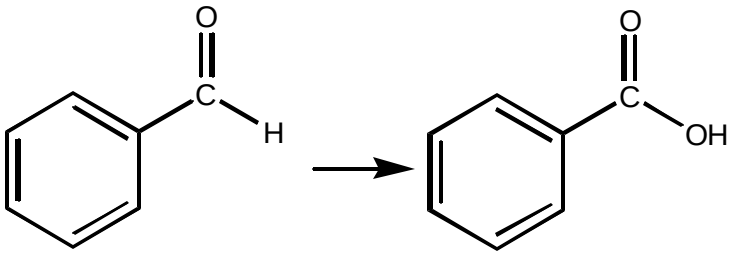
7. _____ Which of the following reactions will yield a ketone?

A. R_2CuLi and an acid chloride
B. R_2CuLi and an alkyl halide
C. An aldehyde and $LiAlH_4$
D. An aldehyde and $K_2Cr_2O_7$

8. _____ Which of the following reagents will oxidize acetaldehyde to acetic acid?

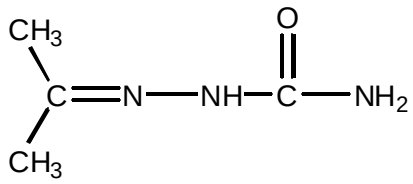
A. $LiAlH_4$
B. H_2, Ni
C. CrO_3, H_2SO_4
D. N_2H_4, KOH

9. _____ Which of the following sequences will yield benzoic acid starting from benzaldehyde?



A. $Ag(NH_3)_2^+$, then dilute HCl
B. CH_3MgBr, then dilute HCl
C. $LiAlH_4$, then dilute HCl
D. BH_3, followed by basic hydrogen peroxide

10. _____ The molecule



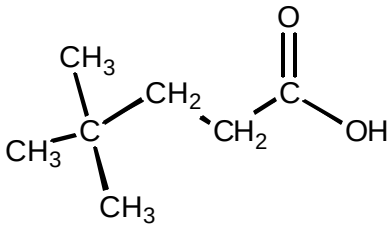
is an example of a(n):

A. semicarbazone
B. hydrazone
C. cyanohydrin
D. hemiacetal

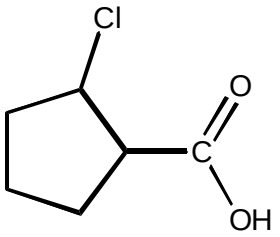
20 Points (4 for each name)

11. Provide acceptable names for each of the following compounds, as indicated:

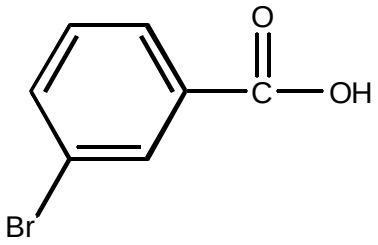
a) IUPAC names, only



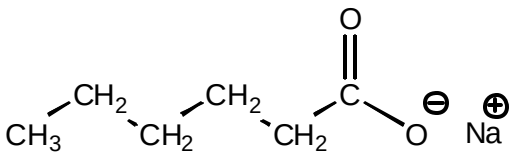
b) IUPAC name, only



c) IUPAC name, only



d) IUPAC name, only



8 Points (2 each)

12. Draw structural formulas for each of the following carboxylic acids.

a) valeric acid

b) isovaleric acid

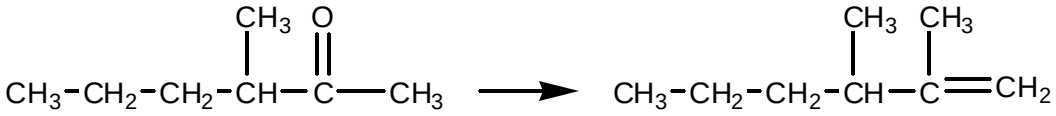
c) γ-chlorobutyric acid

d) δ-methylcaproic acid

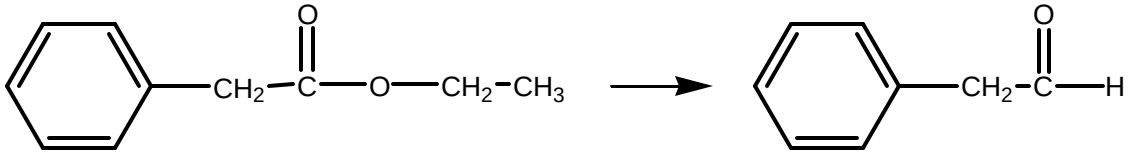
20 Points (5 each)

13. Outline a sequence of reactions to achieve the conversions shown. You may use any needed organic or inorganic reagents or solvents, but if you need an organometallic compound, an enamine, or a phosphorus ylide, you will have to make it.

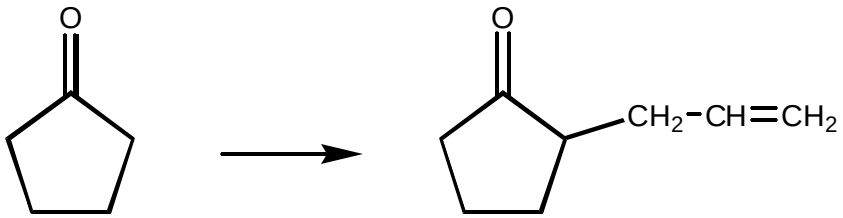
a)



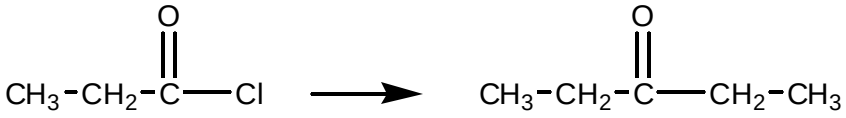
b)



c)

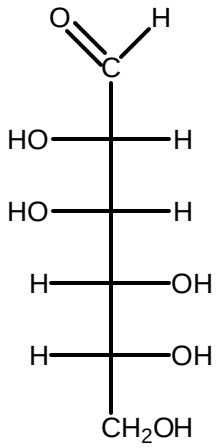


d)



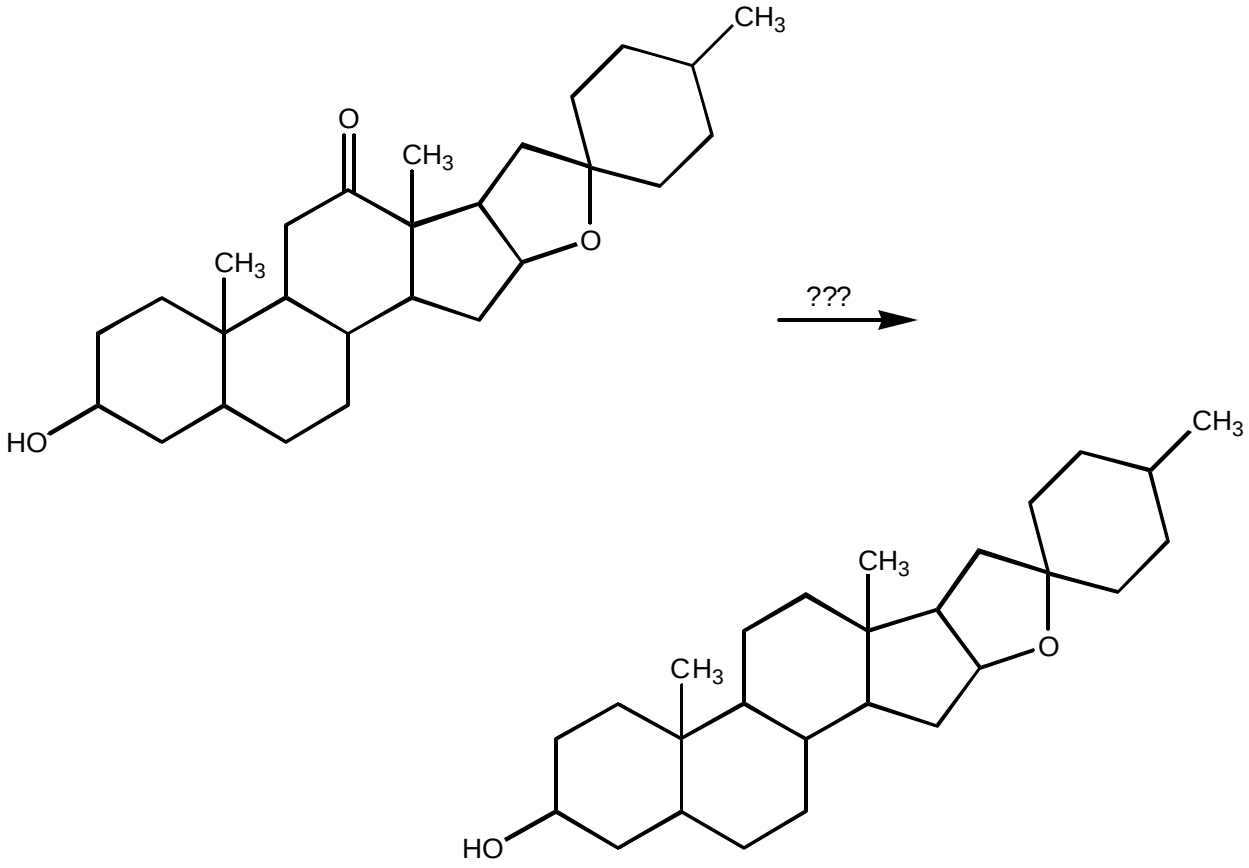
5 Points

14. The structure shown is **D-(+)-mannose**. Draw the Haworth projection formula of the ***alpha*** anomer of D-(+)-mannose.



5 Points

15. How would you carry out the following transformation? Be careful to consider the other functional groups in the molecule before you formulate your plan of attack. The compounds shown are members of a class of natural products known as the **sapogenins**. The sapogenins are toxic compounds found in a variety of desert plants (*e.g.*, agave plants). Their name derives from their ability to form soapy solutions in water.



NOTE: Please use the following page for your answer to this question.

Please use this space for your answer to question 15

Total Points = 88

88 x 1.14 = 100 points

_____ x 1.14 = _____ points