Organic Chemistry 32-335
Exam #3- 2001

Printed Name:_____

Signature:_____

SS#:_____

1. Be sure your exam has 7 pages, including this page.

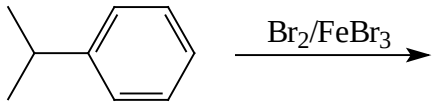
2. Read each problem carefully. Write **clearly;** illegible answers will be considered incorrect.

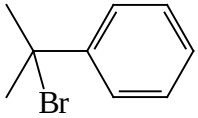
3. Avoid looking or glancing at other students' exams.

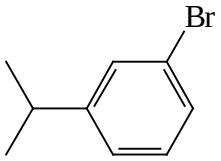
4. Please leave quietly if you finish early.

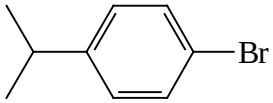
Part 1. (4 point each)---Circle only one answer for any multiple choice questions!

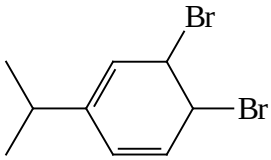
1. The following reaction is expected to yield which as the major product: (chapter 17)



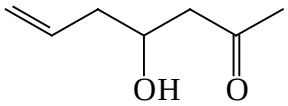
(A) 

(B) 

(C) 

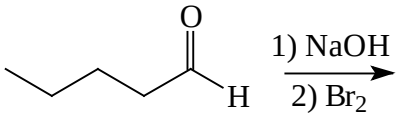
(D) 

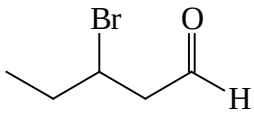
2. The correct systematic name for the following compound is: (chapter 18)

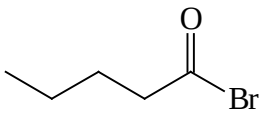


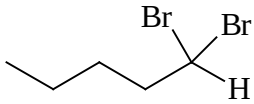
(A) 4-Hydroxy-6-hepten-2-one
(B) 4-Hydroxy-1-hepten-6-one
(C) 4-Hydroxy-6-methyl-1-hexenal
(D) 2-Oxo-6-hepten-4-ol

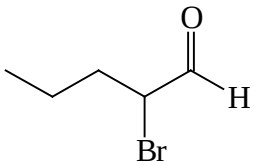
3. Predict the organic product for the following reaction sequence: (chapter 22)



(A) 

(B) 

(C) 

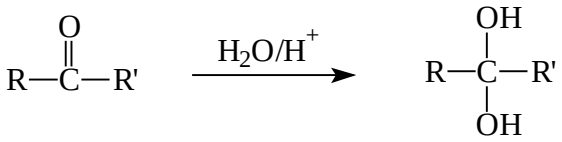
(D) 

4. In the Mass Spectrum of 3-Octanone (M+=128), the expected ion due to McLafferty Rearrangement should be observed at m/z of: (chapter 18)

$$CH_3CH_2-\overset{\overset{\displaystyle O}{\|}}{C}-CH_2CH_2CH_2CH_2CH_3$$

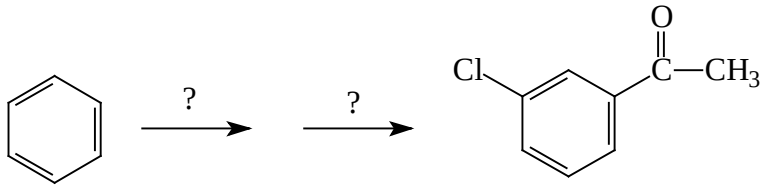
(A) 113
(B) 58
(C) 72
(D) 43

5. Hydration of ketones gives poor yield of hydrates. However, the yield can be improved by: (chapter 18)



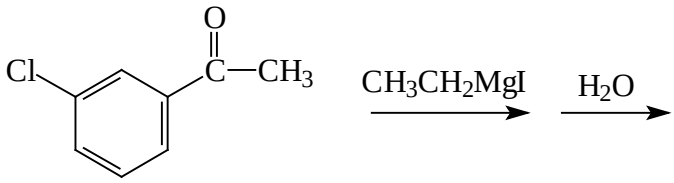
(A) Changing R and R' to electron-withdrawing groups
(B) Increasing the concentration of acid used
(C) Changing R and R' to electron-donating groups
(D) Using smaller amount of the ketone

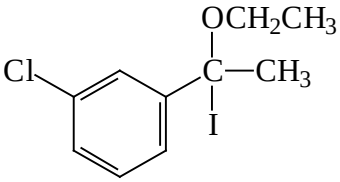
6. What is the best condition for carrying out the following synthetic transformation? (chapter 17)



(A) HCl, then CH_3CHO
(B) $Cl_2/AlCl_3$, then $CH_3COCl/AlCl_3$
(C) CH_3CHO, then Cl_2
(D) $CH_3COCl/AlCl_3$, then $Cl_2/AlCl_3$

7. The most preferred product expected from the following reaction sequence is: (chapter 18)



(A)


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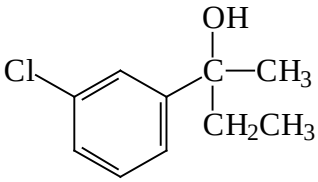

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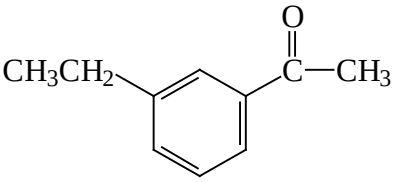
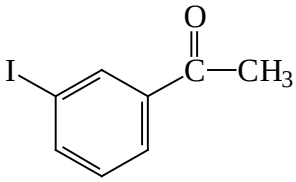
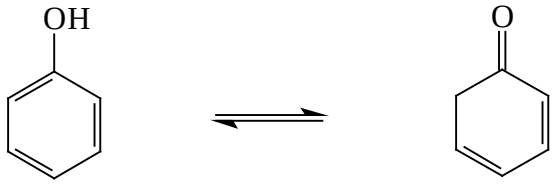


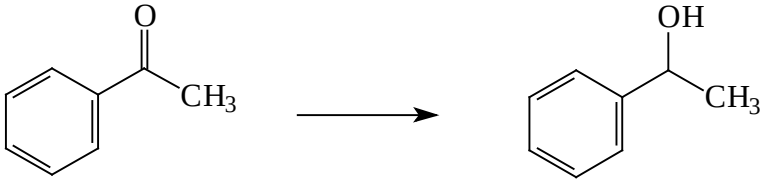
(D)


8. The phenomenon of two compounds interconverting, as shown below, is best described as: (chapter 22)



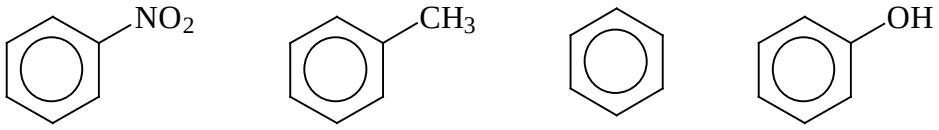
(A) Dehydration
(B) Hydroxylation
(C) Tautomerization
(D) Aldol Condensation

9. To accomplish the following synthesis, the best condition would be: (chapter 18)



(A) H_2O/H^+
(B) $K_2Cr_2O_7/H_2SO_4$
(C) NaOH, then H_3O^+
(D) $NaBH_4$, then $H3O^+$

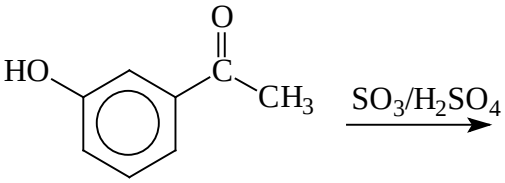
10. When the following compounds are subject to nitration, the relative rate of the reaction is expected to increase in this order (slowest first) (chapter 17)

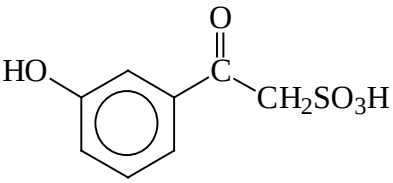


I II III IV

(A) I, III, II, IV
(B) IV, I, II, III
(C) III, II, IV, I
(D) I, IV, III, II

11. Predict the major product expected from this reaction: (chapter 17)



(A)


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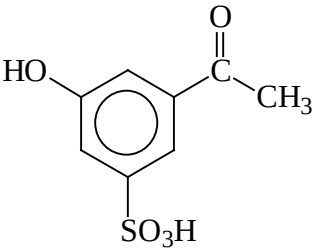

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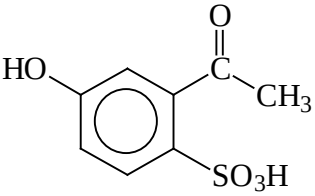
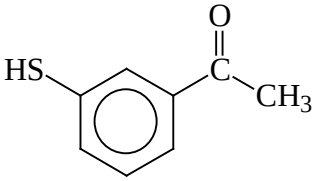
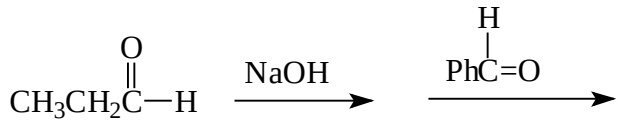
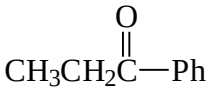
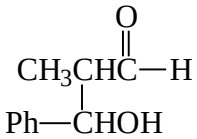


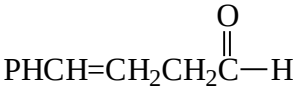
(D)


12. Predict the product expected from the following reaction sequence: (chapter 22)



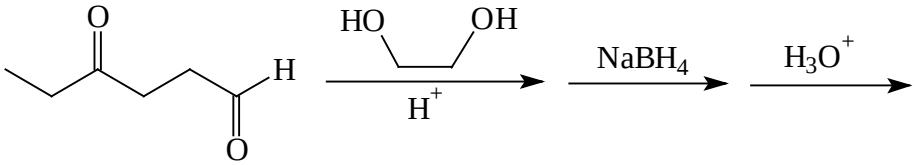
(A) 

(B) 

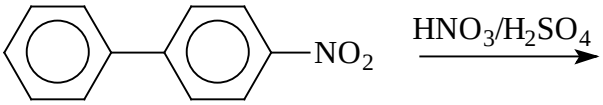
(C) 

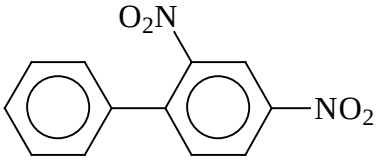
(D) $CH_3CH_2CH{=}CHPh$

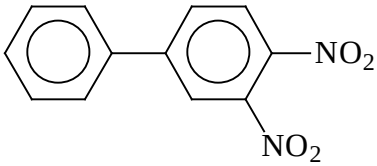
13. Derive the final product structure expected from the following synthetic steps: (chapter 18)

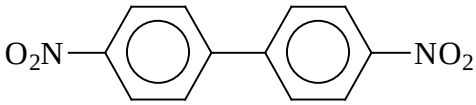


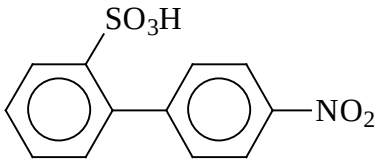
14. The most favored product for this reaction is: (chapter 17)



(A) 

(B) 

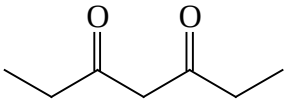
(C) 

(D) 

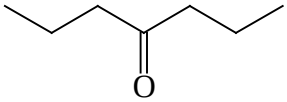
End of Part 1.

Part 2:

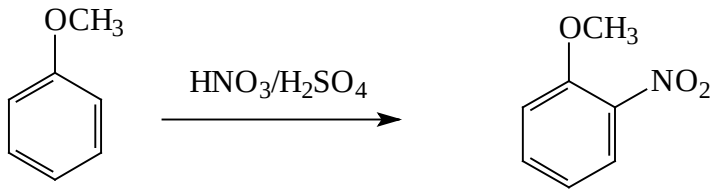
1. (8 points) Explain which proton (label each proton as a, b, c…) is expected the most acidic, **using chemical structures and equations to illustrate your point**. Be brief but to the point. (chapter 22)



2. (12 points) Synthesize the following target molecule starting from any compounds with 5 carbons or less. Specify reagents needed for each step. (chapter 18)



3. (12 points) The following example illustrates the nitration of anisole (electrophile is NO_2^+): (chapter 17)



Draw the two step mechanism leading to the product including all resonance structures for the intermediate. Which step is the rate determining, why? (use correct electron arrow pushing)

4. (12 points) Synthesize the following compound from any starting material with 6 carbons or less. (chapter 22 and chapter 18)