

Chem 1120

Midterm 2

100 points

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Name _____

Instructions:

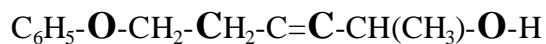
This is a closed book, closed notebook test. You may not discuss this exam with anyone, either during or after the exam, until it has been graded and returned to you in class. You may not use any outside materials - including Periodic Tables - on this exam, except a single 3" x 5" index card and an English-foreign language dictionary if necessary. A calculator is not necessary and may not be used.

There are 25 questions. Each question is worth 4 points. All questions are of equal value.

Note: a t-butyl group is a 2-methylpropyl group with the functional group of interest bonding to C-2 on the propyl group

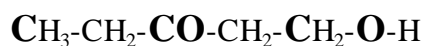
1. Consider the molecular formula C_5H_8O . Which of the following statements is (are) true?
- A. The compound may have two double bonds and no rings or triple bonds
 - B. The compound may have one double bond and one ring but no triple bonds
 - C. The compound may have three double bonds and no rings or triple bonds
 - D. The compound may have two double bonds and one ring but no triple bonds
 - E. A and B
2. Which of the following alcohols will undergo dehydration to form two products?
- I. 2-pentanol II. 3-methyl-2-butanol III. 2-methyl-2-propanol
- A. I and II
 - B. II and III
 - C. I and III
 - D. All of them
 - E. None of them
3. What is the major product of the dehydration of 2-methyl-3-hexanol?
- A. 2-methyl-1-hexene
 - B. 2-methyl-2-hexene
 - C. Equal amounts of both
 - D. Impossible to predict without additional information
 - E. None of the above
4. Choose the correct set of answers for the oxidation of the following compounds
- I. 1-pentanol II. 2-methyl-2-pentanol III. 2-methyl-1-propanol
- A. I and II will produce an aldehyde under the proper conditions
 - B. I will produce a ketone and III will produce an aldehyde under the proper conditions
 - C. II and III produce an aldehyde under the proper conditions
 - D. All of the compounds produce an aldehyde under the proper conditions
 - E. All of the compounds produce a ketone
5. The complete combustion of 25.0 grams of 2,3,4-trimethyl-1,2,4-pentanetriol will result in the formation of _____ grams of carbon dioxide gas.

6. Which of the following is the major product of the reaction of 1-propanol with sulfuric acid at 180°C?
- Propene and water
 - Dipropyl ether and water
 - Both of the above
 - Impossible to predict without additional information
 - None of the above
7. Which of the following compounds is capable of hydrogen bonding to itself?
- I. Ethanol II. Diethyl ether III. bromophenol
- I
 - II
 - III
 - I and III
 - I and II
8. What is the approximate bond angle between the bonds of the atoms in boldface type in the following compound? Note than numbering is from left to right.



	O-1	C-1	C-2	O-2
A.	120	109	120	105
B.	120	109	180	105
C.	180	109	180	105
D.	105	109	120	105
E.	None of the above is correct			

9. 1-propanol and 2-propanol yield the same product on dehydration, propene, but 2-propanol reacts faster than 1-propanol. This is because
- The carbocation formed by the reaction of 2-propanol is secondary while the carbocation formed by 1-propanol is primary
 - The carbocation formed by the reaction of 2-propanol is primary while the carbocation formed by 1-propanol is secondary
 - Because a secondary carbocation is less stable than a primary carbocation, the less stable carbocation is formed faster, which results in a faster overall rate for the dehydration
 - B and C are true
 - All of the above are true
10. What is the hybridization of the atoms in boldface type in the following structure? Note that numbering is from left to right.



- | | C-1 | C-2 | O-1 | C-3 | O-2 |
|----|------------------------------|------------|------------|------------|------------|
| A. | sp^2 | sp^3 | sp^3 | sp^2 | sp^3 |
| B. | sp^3 | sp^2 | sp^2 | sp^3 | sp^3 |
| C. | sp^3 | sp^3 | sp^2 | sp^2 | sp^3 |
| D. | sp^3 | sp^2 | sp | sp^3 | sp^3 |
| E. | None of the above is correct | | | | |
11. Choose the correct statement:
- Hexanal has a higher boiling point than that of 1-hexanol
 - 1-Hexanol is less soluble in water than 2-hexanone
 - Hexanal is more soluble in water than heptane
 - B and C
 - A, B, and C

12. Which of the following compounds will not undergo oxidation with potassium permanganate?

I. 2-pentanone II. Pentanal III. 1-pentanol IV. Ethyl methyl ether

- A. I and IV
- B. I and II
- C. II and III
- D. I and III
- E. None of the above (all will undergo oxidation with KMnO_4)

13. Which of the following compounds will undergo reduction with H_2/Pt ?

- A. $\text{CH}_3(\text{CH}_2)_3\text{COCH}_3$
- B. $\text{CH}_3(\text{CH}_2)_3\text{CHO}$
- C. $\text{CH}_3(\text{CH}_2)_3\text{CH}_2\text{OH}$
- D. A and B
- E. All of the above

14. Which of the following can be synthesized from a ketone by reduction?

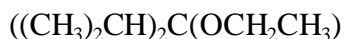
I. 2-methyl-2-propanol II. 2-methyl-1-propanol III. 2-butanol IV. Pentane

- A. I
- B. II
- C. III
- D. IV
- E. None of the above

15. Which of the following is an acetal?

- A. $(\text{C}_6\text{H}_5)_2\text{C}(\text{OCH}_3)_2$
- B. $(\text{CH}_3)_2\text{COHCH}_3$
- C. $(\text{CH}_3)_2\text{COHOCH}_3$
- D. $(\text{C}_5\text{H}_{11})_2\text{C}(\text{OCH}_3)\text{OCH}_3$
- E. A and D

16. What are the products of hydrolysis of the following compound?



- A. CH_3CHO
 - B. $((\text{CH}_3)_2\text{CH})_2\text{CO}$
 - C. $\text{CH}_3\text{CH}_2\text{OH}$
 - D. A and C
 - E. B and C
17. What is the correct IUPAC name for a compound that is incorrectly named 2-keto-3-ethyl-1-cyclopentylbutane?
- A. 2-ethyl-4-cyclopentyl-3-butanone
 - B. 5-cyclopentyl-3-methyl-4-pentanone
 - C. 1-cyclopentyl-3-methyl-2-pentanone
 - D. 1-cyclopentyl-3-ethyl-2-pentanone
 - E. None of the above
18. How many carboxylic acids have the molecular formula $\text{C}_5\text{H}_{10}\text{O}_2$?
- A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. More than 4
19. Which of I. 2-butanol; II. Isopropanol; III. 2-methyl-2-propanol will form a carboxylic acid if the proper reagents and conditions are chosen?
- A. I
 - B. II
 - C. III
 - D. I and II
 - E. None of the above

20. Given I. Methanoic acid; II. Ethanal; III. ethanol, the arrangement of these three compounds in order of decreasing boiling point is
- A. I > III > II
 - B. II > I > III
 - C. I > II > III
 - D. I < II < III
 - E. None of the above
21. What is the correct IUPAC name for $(\text{CH}_3)_2\text{CHCOONa}$?
- A. Sodium isopropyl propanoate
 - B. Sodium 2-methylpropanoate
 - C. Sodium methyl isopropanoate
 - D. Sodium isobutanoate
 - E. None of the above
22. Which of the following compounds can react together to form an ester?
- I. Ethanol II. Propanal III. Propanoic acid IV. 2-butanone
- A. I and II
 - B. I and III
 - C. II and III
 - D. I and IV
 - E. II and IV
23. What compounds are required to synthesize $(\text{CH}_3)_3\text{CCH}_2\text{COOCH}(\text{CH}_3)_2$?
- A. 3,3-dimethylbutanoic acid and 2-propanol
 - B. T-butyl alcohol and isopropyl acid
 - C. T-butyl acid and isopropyl alcohol
 - D. 2-propanoic acid and 3,3-dimethylbutanol
 - E. None of the above

24. What is the correct IUPAC name for $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCl}$?

- A. Butyl chloride
- B. Butanoic chloride
- C. Butanoyl chloride
- D. Butanone chloride
- E. None of the above

25. What is the correct IUPAC name for $\text{C}_6\text{H}_5\text{COOCOC}_6\text{H}_5$??

- A. Benzylic anhydride
- B. Benzoic anhydride
- C. Dibenzoic ether
- D. Benzoic benzoate
- E. Benzylic benzoate

Answers Chem 1120 MT2

1. E
2. A
3. B
4. B
5. x g of carbon dioxide
6. A
7. D
8. D
9. A
10. B
11. C
12. A
13. D
14. C
15. E
16. E
17. C
18. D
19. E
20. A
21. B
22. B
23. A
24. C
25. B