

Chem 1120
Midterm 1
100 points
Dr. Luther Giddings

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.

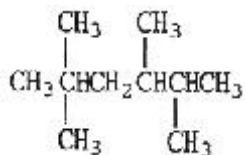
There are 23 questions. Each question is worth 4 points. All questions are of equal value. Select the best single answer of those available. Eight bonus points will be awarded for turning in the completed exam.

1. Which of the following statements about the behavior of carbon atoms in organic molecules is incorrect?
- A. Carbon can be involved in polar covalent bonds
 - B. Carbon can form single, double, or triple bonds with other carbon atoms
 - C. Carbon nearly always forms four bonds
 - D. When carbon forms four single bonds the bond angle is 90°
 - E. In addition to other carbon atoms, carbon is likely to form bonds with hydrogen, nitrogen, and oxygen
2. Which of the following atoms is most likely to form a polar covalent bond with carbon?
- A. C
 - B. H
 - C. Na
 - D. S
 - E. O
3. Which functional group does not contain oxygen?
- A. Alcohol
 - B. Amine
 - C. Carboxylic acid
 - D. Ester
 - E. Ketone
4. Which family of organic compounds does not contain any multiple bonds?
- A. Alkyl halides
 - B. Acyl halides
 - C. Alkenes
 - D. Alkynes
 - E. Aldehydes
5. Given the molecule 2,4-dimethylhexane, C-2 is a _____ carbon atom.
- A. Primary
 - B. Secondary
 - C. Tertiary
 - D. Quaternary
 - E. None of the above answers is correct

6. Which of the following molecules is an isomer of 3-methylhexane?

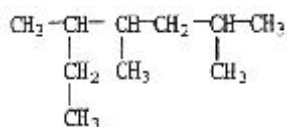
- A. 2-methylpentane
- B. 4-methylhexane
- C. n-octane
- D. 2-methylhexane
- E. 2,2-dimethylbutane

7. The molecule shown is named is a substituted _____ because _____



- A. Decane; it contains a total of 10 carbon atoms
- B. Hexane; it contains six carbon atoms in its longest carbon chain
- C. Tetramethane; it contains four methyl groups as branches
- D. Hexamethane; it contains six methyl groups all together
- E. Butane; four carbon groups are substituted onto the main carbon backbone

8. What is the IUPAC name of the compound shown?



- A. 2-ethyl-3,5-dimethylhexane
- B. 3,5-dimethyl-2-ethylhexane
- C. 2,4,5-trimethylheptane
- D. 3,4,6-trimethylheptane
- E. 5-ethyl-2,4-dimethylhexane

9. Which of the following is not characteristic of alkanes?

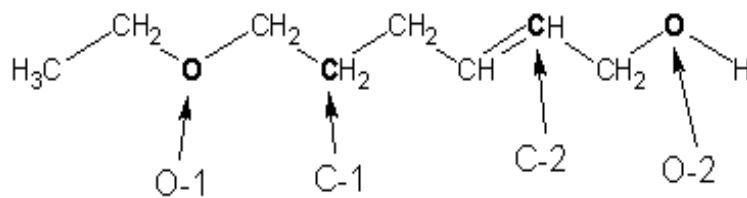
- A. Their melting points increase with molecular weight
- B. They are generally less dense than water
- C. They are not particularly reactive
- D. They form strong hydrogen bonds with water and alcohols
- E. None of the above is correct

10. When an alkane reacts with an element from the group immediately next to the noble gases the reaction is called
- A. Combustion
 - B. Decomposition
 - C. Displacement
 - D. Oxidation
 - E. Halogenation
11. How many atoms are there in a single molecule of 1,2-dimethylcyclobutane?
- A. 6
 - B. 8
 - C. 14
 - D. 16
 - E. None of the above is correct
12. The molecular formula of 1,2-dichloro-1-ethyl-2-methyl-cyclooctane is _____
13. The term unsaturated refers to a molecule
- A. Which has the maximum number of carbon-hydrogen bonds possible
 - B. With a specific six-membered ring structure
 - C. Which contains one or more multiple bonds between two or more carbon atoms
 - D. Which can react by taking up one or more water molecules
 - E. Which is formed from the breakdown of natural fat molecules
14. How many hydrogen atoms are there in a single molecule of 1,4-hexadiene?
- A. 6
 - B. 10
 - C. 12
 - D. 14
 - E. 18

15. A student incorrectly identified a compound as 2,3-diethyl-6,6-dimethyl-4-hexyne. The correct name for the compound is
- A. 5-ethyl-2,6-dimethyl-3-octyne
 - B. 4-ethyl-3,7-dimethyl-5-octyne
 - C. 4-ethyl-3,7,7-trimethyl-5-heptyne
 - D. 4,5-diethyl-1,1-dimethyl-2-hexyne
 - E. None of the above
16. Selective oxidation of a primary alcohol yields either a(n) _____ while oxidation of a secondary alcohol yields a(n) _____.
- A. Aldehyde, ketone
 - B. Ketone, aldehyde
 - C. Acid, ester
 - D. Ketone, acid
 - E. None of the above
17. The product of the reaction of 1-butene with an excess of HCl is
- A. 1-chlorobutane
 - B. 2-chlorobutane
 - C. 1,2-dichlorobutane
 - D. 1,2-dichloro-1-butene
 - E. None of the above
18. The product of the reaction of 2-pentyne with an excess of chlorine gas is
- A. 2,3-dichloro-2-pentene
 - B. 2,3-dichloropentane
 - C. 2,2,3,3-tetrachloro-2-pentene
 - D. 2,2,3,3-tetrachloropentane
 - E. None of the above

19. The reaction of water with 2,4-dimethyl-2-pentene in the presence of an acid catalyst yields mainly
- A. 1,1,3,3-tetramethyl-1-propanol
 - B. 1-isopropyl-2-methyl-2-propanol
 - C. 2,4-dimethyl-2-pentanol
 - D. 2,4-dimethyl-3-pentanol
 - E. None of the above
20. Which one of the following molecules can have cis-trans isomers?
- A. $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2$
 - B. $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$
 - C. $(\text{CH}_3)_2\text{C}=\text{C}(\text{CH}_3)_2$
 - D. $\text{CH}_3\text{CH}=\text{CHCl}$
 - E. $\text{CH}_3\text{CH}=\text{CCl}_2$
21. According to Markovnikov's rule when hydrogen chloride reacts with 2-methyl-2-butene the major product will be
- A. 2-chloro-3-methylbutane
 - B. 2-chloro-2-methylbutane
 - C. 2,3-dichloro-2-methylbutane
 - D. 1-chloro-2-methylbutane
 - E. 1,2-dichloro-2-methylbutane
22. When an alkene undergoes a hydration reaction the product is an
- A. Ether
 - B. Alkane
 - C. Acid
 - D. Alcohol
 - E. Hydroxylated hydrocarbon

23. Given the following molecule, what is the hybridization of the atoms in boldface type?



- | | O-1 | C-1 | C-2 | O-2 |
|-----------|------------------------------|---------------|---------------|---------------|
| A. | sp^3 | sp^3 | sp^2 | sp^3 |
| B. | sp^3 | sp^3 | sp | sp^3 |
| C. | sp^3 | sp^2 | sp^2 | sp^3 |
| D. | sp^2 | sp^3 | sp^2 | sp^2 |
| E. | None of the above is correct | | | |

Answers Chem 1120 MT1

1. D
2. E
3. B
4. A
5. C
6. D
7. B
8. C
9. D
10. E
11. E
12. $C_{11}H_{20}Cl_2$
13. C
14. B
15. A
16. A
17. B
18. D
19. C
20. D
21. B
22. D
23. A