

20. Which of the following is a structural isomer of 2-methylbutane?

- A) *n*-propane    B) 2-methylpropane    C) *n*-butane    D) *n*-pentane

21. Chirality occurs when stereoisomers have mirror images that are

- A) superimposable.    B) the same.    C) not superimposable.    D) not visible to one another.    E) identical.

Use these answers for questions 22-24.

- A)     B)     C)     D)     E) More than one answer is correct.    AB) None is correct.

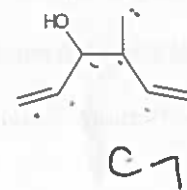
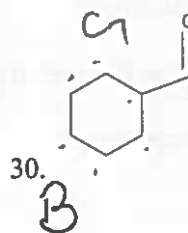
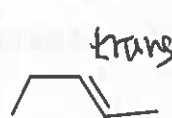
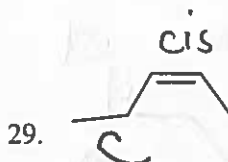
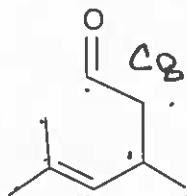
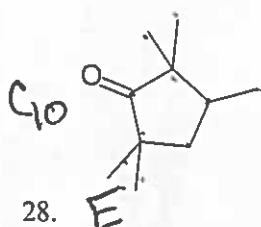
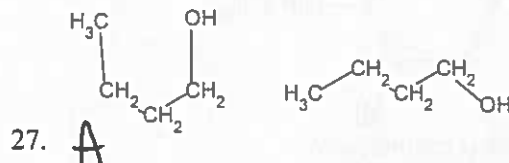
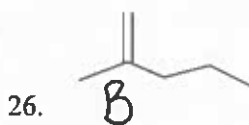
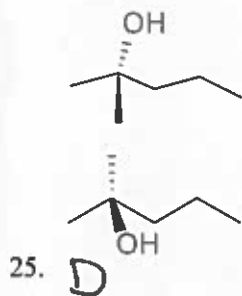
22. Which molecule has a chiral center? **AB**

23. Which molecule can be cis or trans? **C**

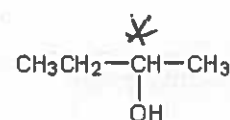
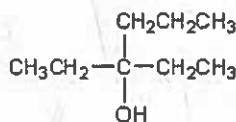
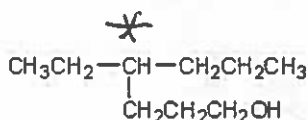
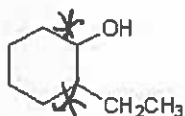
24. Which structure is an invalid structure? **B**

Use the following answers to identify the pairs of compounds in Questions 16-21.

- A) same    B) structural isomers    C) cis/trans isomers    D) enantiomers    E) not related

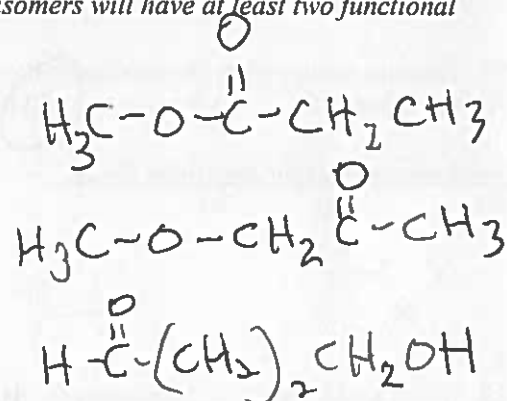
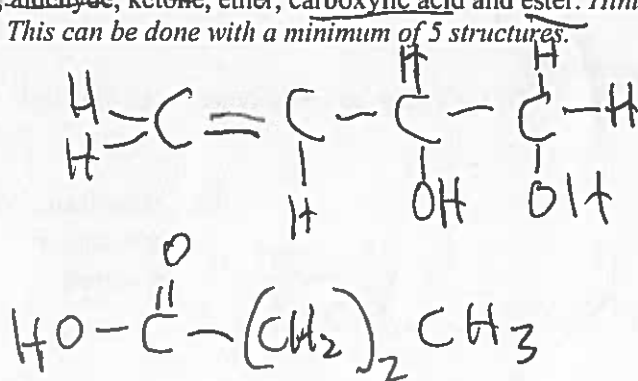


(8 pt) Mark stereocenters in each of the following compounds with a star.




**NONE**

(14 pt) Using the molecular formula  $C_4H_8O_2$ , draw structural isomers that have the following functional groups: alkene, alcohol, aldehyde, ketone, ether, carboxylic acid and ester. *Hint: Most of the isomers will have at least two functional groups. This can be done with a minimum of 5 structures.*

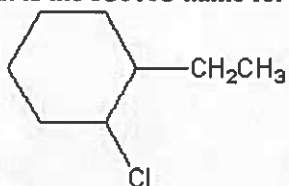


#### CHP 4.4 (Nomenclature of Organic Compounds)

17. What is the name of this molecule?  →

- A) 2,2-diethylpropane      B) 2-ethyl-2-methylbutane      **C) 3,3-dimethylpentane**

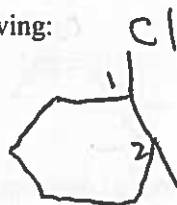
18. What is the IUPAC name for the following structure?



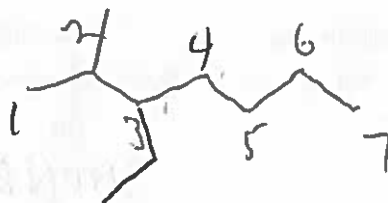
- A) Ethyl cyclohexane  
**B) 1-chloro-2-ethyl cyclohexane**  
 C) Chloro-ethyl cyclohexane  
 D) 2-chloro-2-ethyl cyclohexane

(8 pt) Draw the condensed or skeletal structures of the following:

*trans*-1-chloro-2-methylcyclohexane



2-methyl-3-ethylheptane



#### CHP 4.5 (Isomerism in Organic Compounds)

19. Compounds that have the same molecular formula but different arrangements of atoms are called

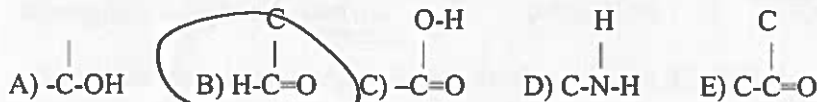
- A) isomers.**      B) isotopes.      C) indicators.      D) isozymes.      E) isometrics.

28 pt

CHP 4.3 (Families of Organic Compounds)

9. The structural part of an organic compound that determines its family and chemical reactivity is called a(n)  
 A) functional group. B) organic compound. C) identifying group. D) ionic bond. E) covalent bond.

10. Which of these functional groups is an aldehyde?



11. In the structure of acetaminophen shown above, what functional groups are present? *Mark all that apply*

A) alkene B) aromatic C) alcohol D) amine E) ketone

12. Your book states that fatty acids are like alkanes. Which statement below is the best explanation for that?

- A) Both contain C-C and C-H bonds.  
 B) Fatty acids have a  $\text{CO}_2\text{H}$  functional group and alkanes do not.  
 C) Both are linear molecules.  
 D) Both are polar compounds.  
 E) Both are non-polar compounds.

13. What functional groups do you find in natural occurring fatty acids? *Mark all that apply.*

A) alcohol B) carboxylic acid C) cis C=C D) trans C=C E) aldehyde

Use these answers for questions 14-16.

A) Stearic acid B) EPA C) Linoleic acid D) All of them. E) None

14. Meat contains mostly fatty acids of this type. **A**

15. Plants contain this type of fatty acid. **C**

16. The source of this fatty acid is fish. **B**

(8 pt) Write a paragraph comparing saturated and unsaturated fatty acids. Include two similarities and two differences.

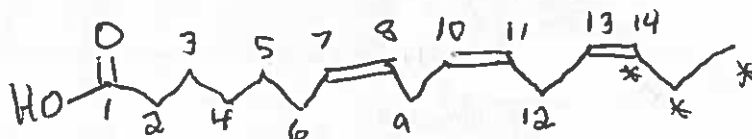
Similarities:

- ① Both contain carboxylic acid
- ② Both are non-polar
- ③ Both have even number of carbon atoms

Differences:

- ① Saturated are in animals and unsaturated in plants
- ② Unsaturated have  $\text{C}=\text{C}$  and saturated only single carbon-carbon bonds.

(8 pt) Some plants contain an unsaturated fatty acid the notation [16:3;7,10,13]. Draw the structure of this fatty acid. What is the omega ( $\omega$ ) classification of this fatty acid?



$\omega - 3$

Answer Questions 1-30 on your scantron. Each question is worth (2 pt ea). Some question require marking more than one answer.

CHP 4 (Introduction to Organic Chemistry)

1. Mark all of the following that are formulas of organic compounds.

- A)  $\text{Na}_2\text{SO}_4$     B)  $\text{I}_2$     C)  $\text{NaHCO}_3$     D)  $\text{KH}_2\text{PO}_4$     D) none are organic compounds

2. Which of the following is the MOST important and UNIQUE property of carbon that makes it the perfect element for making the countless compounds needed or life?

- A) It is a Group IV element.  
B) It forms covalent bonds.  
C) It forms covalent bonds with itself to make linear, branched and cyclic structures.  
D) It forms covalent bonds with other elements like H, O, N, S, F  
E) It is tetravalent.

3. Identify each of the following that is a characteristic of organic (O) compounds. Mark all that apply

- A) High melting point    B) Flammable    C) Contain ionic bonds    D) Non-polar    E) Water soluble  
(Burn)

4. Which of the following is a preferred bonding pattern for the element shown?

- A) -H-    B) -F-    C) -C-    D) -O-    E)     AB) All are correct bonding patterns.

CHP 4.1 (Alkanes)

5. A compound that is composed of only carbon and hydrogen is known as a(n):

- A) homolog    B) isomer    C) carbohydrate    D) hydrocarbon

6. The compound  $\text{CH}_3(\text{CH}_2)_5\text{CH}_3$  is called:

- A) hexane    B) pentane    C) heptane    D) octane

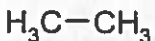
7. The name of the following alkyl group is:

- $\text{CH}_3\text{CH}_2-$   
A) Methyl    B) Isopropyl    C) Propyl    D) Ethyl

CHP 4.2 (Representing the Structures of Organic Compounds)

8. Which of the following molecular formulas is not correct?

- A)  $\text{C}_2\text{H}_6$     B)  $\text{C}_3\text{H}_8$     C)  $\text{C}_5\text{H}_{12}$     D)  $\text{C}_6\text{H}_{14}$



- E)  $\text{C}_8\text{H}_{16}$



(9 pt) Add the hydrogens that are missing to the following structure.

