

Name: _____ Period: _____

Ms. Randall

Unit 12: Organic Chemistry Workbook

The **bold, underlined** words are **important vocabulary words** that you should be able to define and use properly in explanations. This is a study guide for what you will be tested on throughout the year. The objectives are divided into categories of “**Knowledge**” (what you have to *know*) and “**Application**” (what you have to be able to *do*).

I. ORGANIC CHEMISTRY		
	Knowledge	Application
1.	<ul style="list-style-type: none"> ○ <u>Organic compounds</u> contain carbon atoms which bond to one another in chains, rings, and networks to form a variety of structures. ○ Organic compounds are named using specific IUPAC rules and can be represented using <u>molecular formulas, structural formulas, or condensed structural formulas.</u> 	
2.	<ul style="list-style-type: none"> ○ <u>Hydrocarbons</u> are organic compounds that contain only carbon and hydrogen. *The C–H bonds are considered to be <i>nonpolar</i> covalent bonds.* ○ <u>Saturated hydrocarbons</u> contain only single C–C bonds. ○ <u>Unsaturated hydrocarbons</u> contain at least one double or triple carbon-carbon bond. 	<ul style="list-style-type: none"> ○ Draw structural formulas for <u>alkanes, alkenes, alkynes,</u> given their IUPAC names ○ Name a hydrocarbon (IUPAC rules), given its molecular formula, structural formula, or condensed structural formula ○ Identify whether a hydrocarbon is saturated or unsaturated, given its IUPAC name, structural formula, condensed structural formula, or <u>general formula</u> (see Table Q)
3.	<ul style="list-style-type: none"> ○ In a multiple covalent bond, more than one pair of electrons is shared between two atoms. In a structural formula, each line represents TWO shared electrons 	<ul style="list-style-type: none"> ○ Determine the TOTAL number of electrons shared in a covalent bond ○ Determine the number of electron PAIRS (lines) shared in a covalent bond
4.	<ul style="list-style-type: none"> ○ A <u>functional group</u> is a group of atoms attached to an organic compound that gives distinct physical and chemical properties to organic compounds having that group attached to it. ○ <u>Organic acids, alcohols, esters, aldehydes, ketones, ethers, halides, amines, amides, and amino acids</u> are types of organic compounds that differ in the type of functional group they have. ○ Compounds that have the same functional group have similar physical and chemical properties <i>Ex: all esters have pleasant odors, all organic acids donate H⁺ ions in solution, all alcohols have low boiling points, etc.</i> 	<ul style="list-style-type: none"> ○ Identify different kinds of functional groups ○ Classify an organic compound based on its structural formula, condensed structural formula, or IUPAC name ○ Draw a structural formula with the functional group(s) on a straight chain hydrocarbon backbone, given the correct IUPAC name for the compound ○ Name any of these organic compounds, given their structural or condensed structural formulas (see Table R)
5.	<ul style="list-style-type: none"> ○ <u>Isomers</u> are organic compounds that have the same molecular formula, but different structures and properties. 	<ul style="list-style-type: none"> ○ Determine if two compounds are isomers, given their molecular formulas, structural formulas, condensed structural formulas, or names
6.	<ul style="list-style-type: none"> ○ Types of organic reactions include: <u>polymerization, substitution, fermentation, addition, combustion, esterification,</u> and <u>saponification.</u> *P.S. FACES* 	<ul style="list-style-type: none"> ○ Identify types of organic reactions, given balanced chemical equations ○ Determine missing reactants or products in a balanced equation, given the type of reaction.

Goal setting: Based upon your learning style results and the information above list at least two techniques you plan to use to study during this unit.

- 1.
- 2.

What grade would you like to achieve on this unit based on your efforts? _____%

Lesson 1: Chapter Diary 16

Date: _____

Objective: To summarize concepts related to oxidation and reduction reactions

Directions: After reading the **Chapter 17 diary** answer the following question.

1. What does Organic Chemistry study?
2. What atom must be present in all organic molecules?
3. How many covalent bonds can carbon atom form?
4. When 2 carbon atoms form a double bond, how many pairs of electrons will be shared between them? _____
5. What is a hydrocarbon?
6. An organic compound is heated in the presence of oxygen. If a high enough temperature is reached, what chemical reaction will take place?
7. An alkane has 5 carbon atoms. How many hydrogen atoms will it have? _____
8. An alkene has 3 carbon atoms. How many hydrogen atoms will it have? _____
9. An alkyne has 4 carbon atoms. How many hydrogen atoms will it have? _____

List 10 facts from the reading

List any questions you may have from your reading:

Lesson 2 What is an Organic Compound?

Date: _____

Objective: To define organic compounds and their properties. To compare and contrast structure of the different kinds of hydrocarbons.

Check your understanding:

1. A student investigated four different substances in the solid phase. The table below is a record of the characteristics (marked with an X) exhibited by each substance.

Characteristic Tested	Substance A	Substance B	Substance C	Substance D
High Melting Point	X		X	
Low Melting Point		X		X
Soluble in Water	X			X
Insoluble in Water		X	X	
Decomposed under High Heat	X			
Stable under High Heat	X		X	X
Electrolyte	X			X
Nonelectrolyte		X	X	

Which substance has characteristics most like those of an organic compound?

- A) A B) B C) C D) D

2. Which of the following nonpolar molecules has the lowest boiling point?

- a) CH₄ b) C₂H₆ c) C₃H₈ d) C₄H₁₀

Explain: _____

3. Which of the following substances is organic?

- a) NaCl b) NH₃ c) CH₄ d) H₂O

Explain: _____

4. How many carbon atoms are in each compound?

- a. Methane ____
b. Ethane ____
c. Pentene ____
d. Propene ____
e. Hexane ____

Practice:

2. For each compound fill in each blank:

	Number of Carbon atoms	Series	Formula
a. Methane	<u>1</u>	<u>C_nH_{2n+2}</u>	<u>CH_4</u>
b. Butane	<u> </u>	<u> </u>	<u> </u>
c. Propyne	<u> </u>	<u> </u>	<u> </u>
d. Pentane	<u> </u>	<u> </u>	<u> </u>
e. Octane	<u> </u>	<u> </u>	<u> </u>
f. Heptene	<u> </u>	<u> </u>	<u> </u>
g. Propene	<u> </u>	<u> </u>	<u> </u>
h. Butyne	<u> </u>	<u> </u>	<u> </u>

3. Circle all the **Unsaturated** Hydrocarbons above

4. For each of the following use tables P and Q to determine the name.

a. CH_4	<u> </u>	f. C_9H_{18}	<u> </u>
b. $C_{10}H_{20}$	<u> </u>	g. C_2H_6	<u> </u>
c. C_3H_4	<u> </u>	h. C_4H_6	<u> </u>
d. C_8H_{18}	<u> </u>	i. C_7H_{16}	<u> </u>
e. C_5H_{12}	<u> </u>	j. C_6H_{12}	<u> </u>

5. Which of the following hydrocarbons has the highest normal boiling point?

- a) butene
- b) ethene
- c) pentene
- d) propene

6. Which property is generally characteristic of an organic compound?

- a) low melting point
- b) high melting point
- c) soluble in polar solvents
- d) insoluble in nonpolar solvents

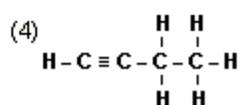
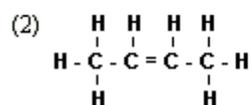
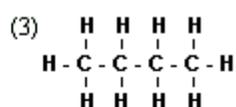
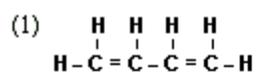
Objective: To compare molecular, structural and condensed formulas of hydrocarbons

Check your understanding:

1. Which is a saturated hydrocarbon?

- ethene
- ethyne
- propene
- propane

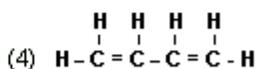
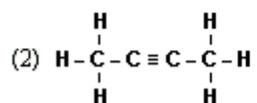
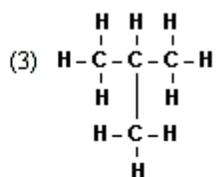
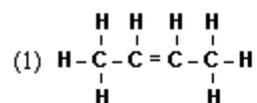
3. Which structural formula represents a molecule of butane?



4. Which formula represents an alkene?

- CH_4
- C_2H_2
- C_3H_6
- C_4H_{10}

5. Which hydrocarbon is a member of the alkane series?



Practice:

a. Draw the structural and condensed formula for the following compounds:

a. Butane

b. Pentane

c. Hexane

d. 2-pentyne

e. 2-pentene

f. 3-hexyne

g. 3-hexene

h. 5-octane

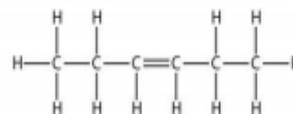
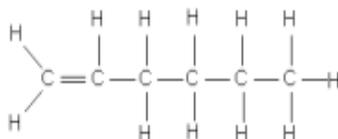
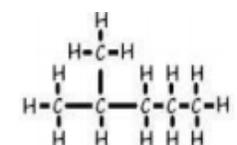
Practice:

1. Name the following branched alkanes

$\begin{array}{c} \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	
$\begin{array}{c} \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_2-\text{CH}_3 \end{array}$	
$\begin{array}{c} \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_2-\text{CH}_3 \end{array}$	
$\begin{array}{c} \text{CH}_2-\text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}-\text{CH}-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	
$\begin{array}{c} \text{CH}_2-\text{CH}_2-\text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}-\text{CH}_2-\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	
$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{CH}_2-\text{C}-\text{CH}_2-\text{CH}-\text{CH}_2-\text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$	
$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{C}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	
$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}-\text{CH}_2-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	
<p>***</p> $\begin{array}{c} \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2 \\ \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C}-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	

2. Draw an isomer of 2-heptyne below. Give the name of your isomer:

3. Name the following and identify the isomers.



3. Which of the hydrocarbons in the questions above were saturated?

4. . If a substance is an alkane, can it have an isomer that is an alkene or alkyne? Explain.

5. Draw an isomer of hexane

Objective: To compare and contrast functional groups. To name organic molecules based on their functional groups.

Check your understanding:

1. Circle the functional group AND classify each structural formula according to the family it belongs to.

<p>1.</p> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	<p>6.</p> $\begin{array}{c} \text{H} \quad \text{O} \quad \text{H} \\ \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{O} - \text{C} - \text{H} \\ \quad \quad \\ \text{H} \quad \quad \text{H} \end{array}$
<p>2.</p> $\begin{array}{c} \text{H} \quad \text{O} \quad \text{H} \\ \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ \quad \quad \\ \text{H} \quad \quad \text{H} \end{array}$	<p>7.</p> $\begin{array}{c} \text{H} \quad \text{OH} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{C} - \text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$
<p>3.</p> $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{C} - \text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	<p>8.</p> $\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
<p>4.</p> $\begin{array}{c} \text{H} \quad \text{O} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{OH} \\ \\ \text{H} \end{array}$	<p>9.</p> $\begin{array}{c} \text{H} \quad \text{O} \\ \quad \\ \text{H} - \text{C} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$
<p>5.</p> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H} - \text{C} - \text{O} - \text{C} - \text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	<p>10.</p> $\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \quad \text{H} \\ \quad \quad \quad \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{C} - \text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \quad \text{H} \end{array}$

Practice: For each of the following identify the functional group and then name the compound using table R.

$\begin{array}{c} \text{H} & \text{O} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{Br}-\text{C}-\text{C}-\text{Br} \\ & \\ \text{H} & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>	<p>_____</p> $\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C}-\text{C}-\text{Br} \\ & \\ \text{H} & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>
$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{O}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} & \text{O} \\ & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{OH} \\ & & & & \\ \text{H} & \text{H} & \text{H} & \text{H} & \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>
$\begin{array}{c} \text{H} & & \text{O} \\ & & \\ \text{H}-\text{C}-\text{C} \\ & \backslash \\ \text{H} & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\begin{array}{c} \text{H} & \text{O} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & & \text{H} & \text{H} \end{array}$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\text{CH}_3-\text{O}-\text{CH}_3$ <p>Functional Group: _____</p> <p>Name : _____</p>
CH_3-OH <p>Functional Group: _____</p> <p>Name : _____</p>	$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2$ <p>Functional Group: _____</p> <p>Name : _____</p>	$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_3$ <p>Functional Group: _____</p> <p>Name : _____</p>

2. For the following compounds, determine the family and draw the compound:

Name	Functional Group	Structural Formula	Condensed Formula
2-pentanol			
Ethanoic acid			
2-propanamine			
Hexanal			
Ethyl methanoate			

Lesson 6: Organic Reactions

Date: _____

Objective: To recognize and write the chemical sentence including the reactants and products for organic reactions.

Check your Understanding: Match the reaction to its name

- | | |
|-----------------------|---|
| ___ 1. Addition | a. $C_{13}H_{28} \rightarrow C_8H_{18} + C_2H_4 + C_3H_6$ |
| ___ 2. Substitution | b. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$ |
| ___ 3. Combustion | c. $(C_{17}H_{35}COO)_3C_3H_5 + 3 NaOH \rightarrow C_3H_5(OH)_3 + 3C_{17}H_{35}COONa$ |
| ___ 4. Cracking | d. $C_6H_{12}O_6 \rightarrow C_2H_5OH + CO_2$ |
| ___ 5. Polymerization | e. $n(CH_2CH_2) \rightarrow (CH_2CH_2)_n$ |
| ___ 6. Fermentation | f. $C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$ |
| ___ 7. Esterification | g. $C_3H_6COOH + C_2H_5OH \rightarrow C_3H_6COOC_2H_5 + H_2O$ |
| ___ 8. Saponification | h. $C_3H_6 + I_2 \rightarrow C_3H_6I_2$ |

Practice:

Name the reaction:

1. A saturated alkane reacts with fluorine _____
2. Small alkene chains connect to form larger alkane chains _____
3. Sugar is decomposed to form an alcohol _____
4. Large hydrocarbons are heated and break into smaller fragments _____
5. An unsaturated hydrocarbon reacts with bromine _____
6. An alcohol and an organic acid are reacted _____
7. A base is added to a fat molecule to form a soap _____
8. Hydrocarbons are burned in the presence of oxygen _____

Draw all organic reactants and products. Then name and give the formula for the missing substance in the reaction. Give the reaction type.



Additional Practice:

Complete the table below:

Draw the Structure	Functional Group	Number of Carbons	Name the compound	Chemical Formula
	Alkane	8		
			2-pentanol	
	Aldehyde	6		
				CH ₃ CH ₂ CH ₂ COOH
			3-heptene	
				HCCH
	Ester	Made from 1-hexanol and methanoic acid		
				H ₃ CCOCH ₂ CH ₃
			3,3-dichlorononane	

Organic compounds are now defined as compounds that contain the element _____. The nature of the _____ between each pair of carbon atoms in an organic compound will determine whether the compound is saturated or unsaturated. The bonds between the carbon atoms in a(n) _____ compound are single bonds, but in a(n) _____ compound, the bonds between neighboring carbon atoms are _____ or _____ bonds. The organic compounds containing only hydrogen and carbon are called _____. C_nH_{2n+2} is the general form for the _____ series of hydrocarbons. The names of this series are composed of a _____, which denotes the number of carbon atoms present, and the suffix _____. This series of hydrocarbons has only single bonds, and so, is said to be _____. C_nH_{2n} is the general form for the class of hydrocarbons referred to as the _____. Each member of this series has a pair of carbon atoms connected by a _____ bond, and so, is said to be _____. Again, _____ are used to denote the number of carbon atoms present in the molecule, and all members of this series end in the suffix _____.

Unit Study Guide

Law, Theories, BIG ideas

Laws:

Theories:

BIG ideas:

Equations, Calculations, Reference Tables

Equation: (When to use & units)

Calculations (When to use)

Reference Table (Hints & tricks)

Helpful tips, sayings, shortcuts

Things I always forget...

Unit Review: Acids, Bases, Salts

Place a checkmark next to each item that you can do! If a sample problem is given, complete it as evidence.

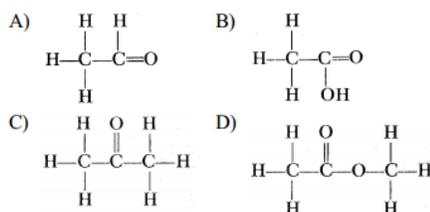
_____ 1. I can still do everything from Unit 1.	
_____ 2. I can still do everything from Unit 2.	
_____ 3. I can still do everything from Unit 3.	
_____ 4. I can still do everything from Unit 4.	
_____ 5. I can still do everything from Unit 5.	
_____ 6. I can still do everything from Unit 6.	
_____ 7. I can still do everything from Unit 7.	
_____ 8. I can still do everything from Unit 8.	
_____ 9. I can still do everything from Unit 9.	
_____ 10. I can still do everything from Unit 10.	
_____ 11. I can still do everything from Unit 11.	
_____ 12. I can define organic compound, saturated hydrocarbon, unsaturated hydrocarbon, and isomer.	Definitions: organic compound saturated hydrocarbon unsaturated hydrocarbon isomer

<p>_____ 13. I can expand a condensed structural formula to show the structural formula of an organic compound.</p>	<p>Draw the complete structural formula for $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$.</p> <p>Draw the complete structural formula for $\text{CH}_3\text{CHCHCH}_3$.</p>
<p>_____ 14. I can state the name and symbol of the element that is capable of forming rings, chains, and networks.</p>	<p>The element that is capable of forming rings, chains, and networks is _____ . Its symbol is _____ .</p>
<p>_____ 15. Given the formula, I can determine if a compound is a hydrocarbon or not.</p>	<p>Which formula represents a hydrocarbon? A) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ D) $\text{CH}_3\text{CH}_2\text{COOCH}_3$</p>
<p>_____ 16. Given the name, I can use Reference Table P to determine how many carbon atoms are in a compound.</p>	<p>Determine how many carbon atoms are in each of the following compounds:</p> <p>decane _____ ethene _____</p> <p>3-nonene _____ 1- pentyne _____</p>
<p>_____ 17. Given the name, I can use Reference Table Q to determine to which class of hydrocarbons a compound belongs.</p>	<p>Determine the homologous series of hydrocarbons to which each of the following belongs:</p> <p>decane _____ 2- decene _____</p> <p>3-nonene _____ 1- pentyne _____</p>
<p>_____ 18. Given the name, I can determine if the hydrocarbon is saturated or unsaturated.</p>	<p>Determine if each of the following is a saturated or unsaturated hydrocarbon.</p> <p>decane _____ ethene _____</p> <p>3-nonene _____ 1- pentyne _____</p>

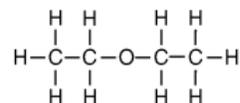
<p>_____ 19. Given the formula, I can determine to which homologous series a hydrocarbon belongs.</p>	<p>Determine the homologous series of hydrocarbons to which each of the following belongs:</p> $ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $ <p>belongs to the _____ series.</p> <hr style="border-top: 1px dashed black;"/> $ \begin{array}{cccc} \text{H} & & & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & \equiv & \text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & & & \text{H} \end{array} $ <p>belongs to the _____ series.</p> <hr style="border-top: 1px dashed black;"/> $ \begin{array}{cccc} \text{H} & \text{H} & \text{H} & & & \text{H} \\ & & & & & / \\ \text{H}-\text{C} & -\text{C} & -\text{C} & = & \text{C} & \\ & & & & & \backslash \\ \text{H} & \text{H} & & & & \text{H} \end{array} $ <p>belongs to the _____ series.</p>
<p>_____ 20. Given the formula, I can determine if a hydrocarbon is saturated or unsaturated.</p>	<p>Determine if each of the following is a saturated or unsaturated hydrocarbon.</p> <p>$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ _____</p> <p>$\text{CH}_3\text{CHCHCH}_3$ _____</p>
<p>_____ 21. Given the name, I can use Reference Table Q to determine how many hydrogen atoms the hydrocarbon contains.</p>	<p>Determine the number of hydrogen atoms in each of the following.</p> <p>decane _____ 1-</p> <p>butene _____</p> <p>3-nonene _____ 1-</p> <p>pentyne _____</p>
<p>_____ 22. Given a list of compounds, I can determine which ones are isomers.</p>	<p>Given a formula representing a compound:</p> $ \begin{array}{cccc} & \text{O} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C} & -\text{H} \\ & & & & \\ & & \text{H} & \text{H} & \text{H} \end{array} $ <p>Which formula represents an isomer of this compound?</p> <p>A) $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{O} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \end{array}$</p> <p>B) $\begin{array}{cccc} \text{H} & \text{O} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{H} \\ & & & \\ \text{H} & & \text{H} & \text{H} \end{array}$</p> <p>C) $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{O} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{C}-\text{OH} \\ & & & \\ \text{H} & \text{H} & \text{H} & \end{array}$</p> <p>D) $\begin{array}{cccc} \text{H} & \text{H} & \text{O} & \text{H} \\ & & & \\ \text{H}-\text{C} & -\text{C} & -\text{C} & -\text{O}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & & \text{H} \end{array}$</p>

_____ 23. Given a structural formula, I can use Reference Table R to identify to which class of organic compounds a substance belongs.

Which structural formula represents a ketone?



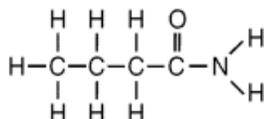
Given the structural formula:



The compound represented by this formula can be classified as an

- A) organic acid B) ether
C) ester D) aldehyde

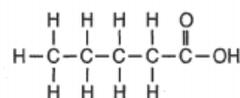
Given the formula:



This compound is classified as

- A) an aldehyde B) an amide
C) an amine D) a ketone

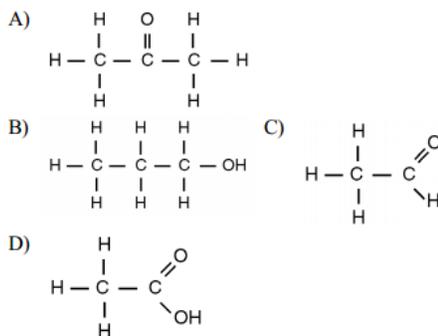
Given the formula for an organic compound:



This compound is classified as an

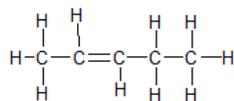
- A) aldehyde B) amine
C) ester D) organic acid

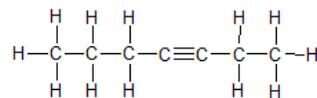
Which structural formula represents an alcohol?

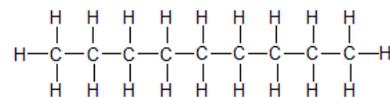


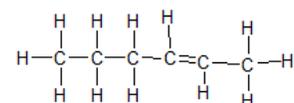
_____ 24. I can use Reference Tables P & Q and IUPAC nomenclature to name simple hydrocarbons.

Name the following hydrocarbons.









<p>_____ 25. I can use Reference Tables P & R and IUPAC nomenclature to name simple compounds in any of the classes of organic compounds.</p>	<p>Name the following organic compounds.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C} & \text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{O} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C} & \text{O}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{O} \end{array}$ <p>_____</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C} & =\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{O}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{ccccccc} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{N}-\text{H} \\ & & & & & & \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> $\begin{array}{ccc} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C} & \equiv & \text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C} & \text{O} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{O} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{ccccccc} \text{H} & \text{H} & \text{H} & \text{O} & \text{H} \\ & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{N}-\text{H} \\ & & & & \\ \text{H} & \text{H} & \text{H} & & \text{H} \end{array}$ <p>_____</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{Br} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{cccc} \text{H} & & \text{O} & \text{H} & \text{H} \\ & & & & \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & & \\ \text{H} & & & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> <div style="text-align: center;"> $\begin{array}{ccccccc} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{O}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$ <p>_____</p> </div> </div>
<p>_____ 26. I can list and describe the 7 types of organic reactions.</p>	<p>Fermentation This type of organic reaction results from a reaction of _____ to form _____ and _____. It typically requires a catalyst, in the form of an enzyme to occur.</p> <p>Substitution This type of organic reaction happens when _____ hydrocarbons replace one of the _____ for some other element (often a halide).</p>

Combustion

reaction a _____ reacts with _____ to form _____ and _____. It is an exothermic reaction.

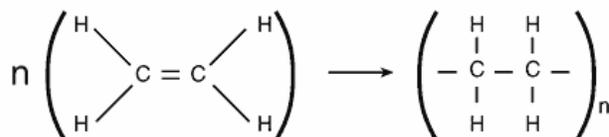
Addition In this type of organic reaction

an _____ becomes a _____ when the double bond breaks and two atoms of another element (often a halide) are added.

Polymerization In this type of organic

reaction many _____ are linked together to form a _____. A generalized form of this reaction looks like this.....

Note: n and n are very large numbers equal to about 2000.

**Esterification** In this type of organic

reaction an _____ reacts with a _____ to form an _____ and _____. The products of this reaction are typically fragrant.

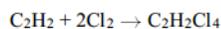
Saponification In this type of organic

reaction a _____ reacts with a _____ to form _____. You can really “clean up” if you remember this organic reaction.

26. I can list and describe the 7 types of organic reactions.

27. Given an equation, I can identify the type of organic reaction that is occurring.

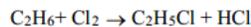
Given the balanced equation for an organic reaction:



This reaction is best classified as

- A) addition B) esterification
C) fermentation D) substitution

Given the equation:



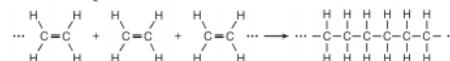
This reaction is best described as

- A) addition involving a saturated hydrocarbon
B) addition involving an unsaturated hydrocarbon
C) substitution involving a saturated hydrocarbon
D) substitution involving an unsaturated hydrocarbon

Which equation represents fermentation?

- A) $\text{C}_2\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_6\text{Cl} + \text{HCl}$
B) $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2 \text{C}_2\text{H}_5\text{OH} + 2 \text{CO}_2$
C) $\text{CH}_3\text{COOH} + \text{CH}_3\text{OH} \rightarrow \text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O}$
D) $n\text{C}_2\text{H}_4 \rightarrow (\text{C}_2\text{H}_4)_n$

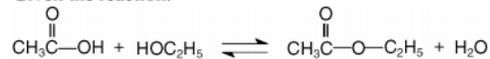
Given the equation:



Which type of reaction is represented by this equation?

- A) combustion B) esterification
C) polymerization D) substitution

Given the reaction:



This reaction is an example of

- A) fermentation B) saponification
C) hydrogenation D) esterification

Which reaction best represents the complete combustion of ethene?

- A) $\text{C}_2\text{H}_4 + \text{HCl} \rightarrow \text{C}_2\text{H}_5\text{Cl}$
B) $\text{C}_2\text{H}_4 + \text{Cl}_2 \rightarrow \text{C}_2\text{H}_4\text{Cl}_2$
C) $\text{C}_2\text{H}_4 + 3 \text{O}_2 \rightarrow 2 \text{CO}_2 + 2 \text{H}_2\text{O}$
D) $\text{C}_2\text{H}_4 + \text{H}_2\text{O} \rightarrow \text{C}_2\text{H}_5\text{OH}$