

**Unit**  
12  
**Lesson**  
2

**AIM**  
• How are hydrocarbons named?

**AGENDA**  
• U12L2 Lesson video  
• Intro to naming/drawing hydrocarbon practice

**YOYO**  
• Watch the lesson video on YouTube (U12L2)

**HOMEWORK**  
• Nothing tonight  
• Follow calendar

1

**YOYO**

Which compound is a saturated hydrocarbon?

- $\text{CH}_2\text{CH}_2$
- $\text{CH}_3\text{CH}_3$
- $\text{CH}_3\text{CHO}$
- $\text{CH}_3\text{CH}_2\text{OH}$

**Table Q**  
**Homologous Series of Hydrocarbons**

Name	General Formula	Examples	
		Name	Structural Formula
alkanes	$\text{C}_n\text{H}_{2n+2}$	ethane	$\begin{array}{c} \text{H} & \text{H} \\   &   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   &   \\ \text{H} & \text{H} \end{array}$
alkenes	$\text{C}_n\text{H}_{2n}$	ethene	$\begin{array}{c} \text{H} & & \text{H} \\ & \backslash & / \\ & \text{C}=\text{C} \\ & / & \backslash \\ \text{H} & & \text{H} \end{array}$
alkynes	$\text{C}_n\text{H}_{2n-2}$	ethyne	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

Note: n = number of carbon atoms

2

**YOYO**

Which represents an unsaturated hydrocarbon?

- $\text{C}_2\text{H}_4$
- $\text{C}_3\text{H}_8$
- $\text{C}_4\text{H}_{10}$
- $\text{C}_5\text{H}_{12}$

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alkynes	$\text{C}_n\text{H}_{2n-2}$	ethyne	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

Note: n = number of carbon atoms

3

**YOYO**

Which general formula represents the compound  $\text{CH}_3\text{CH}_2\text{CCH}$

- $\text{C}_n\text{H}_n$
- $\text{C}_n\text{H}_{2n}$
- $\text{C}_n\text{H}_{2n-2}$
- $\text{C}_n\text{H}_{2n+2}$

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alkynes	$\text{C}_n\text{H}_{2n-2}$	ethyne	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

Note: n = number of carbon atoms

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## Straight Chain Alkanes

- Also referred to as n-alkanes (“normal” alkanes); example = n-hexane
- General Rule for Naming Straight Chain Alkanes → use prefix (Table P) to tell you how many carbon atoms you have then add the suffix “-ane”

Table Q  
Homologous Series of Hydrocarbons

Name	General Formula	Name	Structural Formula
alkanes	$C_nH_{2n+2}$	ethane	
alkenes	$C_nH_{2n}$	ethene	
alkynes	$C_nH_{2n-2}$	ethyne	

Note: n = number of carbon atoms

Table P  
Organic Prefixes

Prefix	Number of Carbon Atoms
meth-	1
eth-	2
prop-	3
but-	4
pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

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## Straight Chain Alkanes

- Name: Pentane
- Chemical Formula:
- Structural Formula:

Table P  
Organic Prefixes

Prefix	Number of Carbon Atoms
meth-	1
eth-	2
prop-	3
but-	4
pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

Table Q  
Homologous Series of Hydrocarbons

Name	General Formula	Name	Structural Formula
alkanes	$C_nH_{2n+2}$	ethane	
alkenes	$C_nH_{2n}$	ethene	
alkynes	$C_nH_{2n-2}$	ethyne	

Note: n = number of carbon atoms

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## Straight Chain Alkanes

- Name: Butane
- Chemical Formula:
- Structural Formula:

Table P  
Organic Prefixes

Prefix	Number of Carbon Atoms
meth-	1
eth-	2
prop-	3
but-	4
pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

Table Q  
Homologous Series of Hydrocarbons

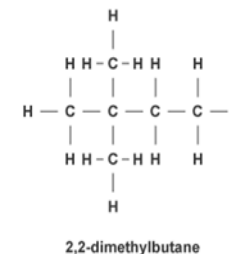
Name	General Formula	Name	Structural Formula
alkanes	$C_nH_{2n+2}$	ethane	
alkenes	$C_nH_{2n}$	ethene	
alkynes	$C_nH_{2n-2}$	ethyne	

Note: n = number of carbon atoms

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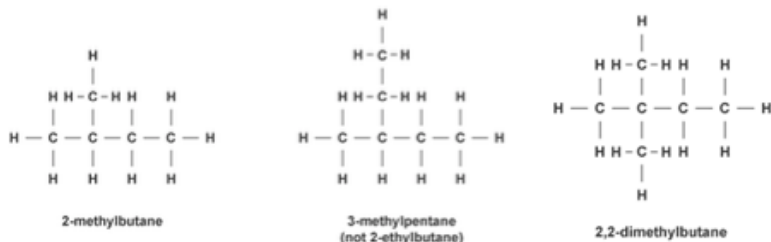
## Branched Alkanes

- Branched = not a straight continuous chain; organic molecule that has smaller branches coming off a longer continuous chain
- \*How can you tell if it's “branched”? You can't run your finger along all the carbons in one “sweep” (you hit dead-ends and have to turn around and retrace part/some of your path); because of this we must establish a “parent chain” or main backbone in order to name the molecule



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## Branched Alkanes



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## Methyl & Ethyl Groups

- Methyl and ethyl groups are common branches on organic compounds

Methyl Group	Ethyl Group

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## Naming Branched Alkanes

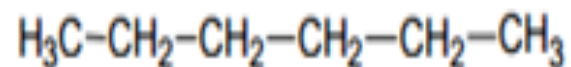
- Locate the **longest possible carbon chain** (parent chain) in molecule. Any carbons coming off this chain are the **branches**. **Number the carbons** in the parent chain so that the branch(es) fall at the **lowest possible number/sum**
- Name the **branches first** (separately, in alphabetical order as per their prefix) along with the **# of the C they are on**.
  - Prefix based on the # C's (table P) + suffix **-yl**
- Branches are named separately unless there are two of the same. If this is the case, lump them into the same branch name (w/ number locations) & add appropriate **prefix** (di, tri, tetra, etc.) depending on how many C's in branch.
- The **parent chain is stated last** in the name (the # carbons in parent chain should agree with the prefix in the last word of the chemical name).

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## Naming Branched Alkanes

Name:

Structural Formula:

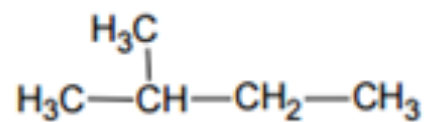


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## Naming Branched Alkanes

Name:

Structural Formula:

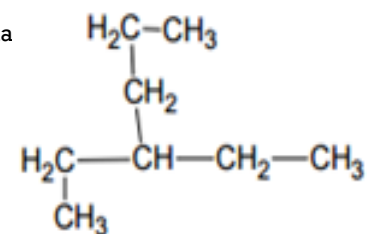


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## Naming Branched Alkanes

Name:

Structural Formula



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## Naming Branched Alkanes

Name: 4-ethyl heptane

Structural Formula:

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## Naming Branched Alkanes

Name: 2-methyl butane

Structural Formula:

16

## Naming Branched Alkanes

Name: 2-methyl pentane

Structural Formula:

17

## Straight Chain Alkenes

- Number the lowest # carbon where the double bond is located, then add the suffix "-ene" to the name (prefix should refer to the number of C's)

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Organic Prefixes

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meth-	1
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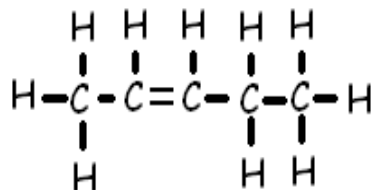
Note: n = number of carbon atoms

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## Straight Chain Alkenes

Name:

Structural Formula:

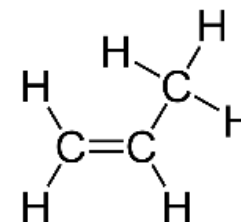


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## Straight Chain Alkenes

Name:

Structural Formula:



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## Straight Chain Alkenes

Name: 3-hexene

Structural Formula:

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## Straight Chain Alkenes

Name: 4-decene

Structural Formula:

22

## Straight Chain Alkynes

- State the lowest carbon # where the triple bond is located then add the suffix "-yne"

Table Q  
Homologous Series of Hydrocarbons

Name	General Formula	Examples	
		Name	Structural Formula
alkanes	$C_nH_{2n+2}$	ethane	$\begin{array}{c} \text{H} & \text{H} \\   &   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   &   \\ \text{H} & \text{H} \end{array}$
alkenes	$C_nH_{2n}$	ethene	$\begin{array}{c} \text{H} & & \text{H} \\ & \backslash & / \\ & \text{C}=\text{C} \\ & / & \backslash \\ \text{H} & & \text{H} \end{array}$
alkynes	$C_nH_{2n-2}$	ethyne	$\text{H}-\text{C}\equiv\text{C}-\text{H}$

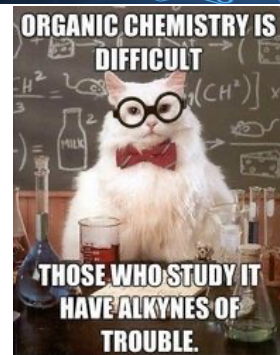
Note: n = number of carbon atoms

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Organic Prefixes

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pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

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## Straight Chain Alkynes

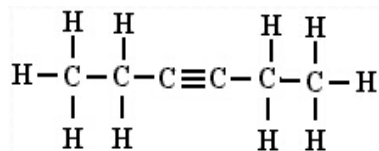


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## Straight Chain Alkynes

Name:

Structural Formula:

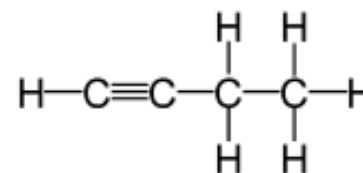


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## Straight Chain Alkynes

Name:

Structural Formula:



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## Straight Chain Alkynes

Name: 2-pentyne

Structural Formula:

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## Straight Chain Alkynes

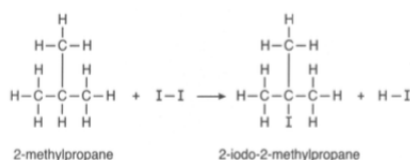
Name: 3-heptyne

Structural Formula:

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## Practice Regents Short Answer Questions

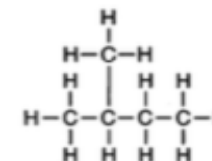
- Base your answer to the following question on the information below
- The hydrocarbon 2-methylpropane reacts with iodine as represented by the balanced equation below. At standard pressure, the boiling point of 2-methylpropane is lower than the boiling point of 2-iodo-2-methylpropane. **Explain, in terms of bonding, why the hydrocarbon 2-methylpropane is saturated.**



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## Practice Regents Short Answer Questions

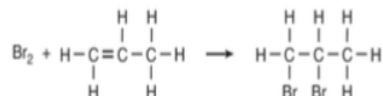
- Base your answer to the following question on the information below.
- The formula below represents a hydrocarbon.
- **Explain, in terms of carbon-carbon bonds, why this hydrocarbon is saturated.**



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## Practice Regents Short Answer Questions

- Base your answer to the following question on the information below.  
A reaction between bromine and a hydrocarbon is represented by the balanced equation below.
- **Write the name of the homologous series to which the hydrocarbon belongs.**



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## Practice Regents Short Answer Questions

- Base your answer to the following question on the information below.
- Gasoline is a mixture composed primarily of hydrocarbons such as isooctane, which is also known as 2,2,4-trimethylpentane. Gasoline is assigned a number called an octane rating. Gasoline with an octane rating of 87 performs the same as a mixture that consists of 87% isooctane and 13% heptane.
- An alternative fuel, E-85, can be used in some automobiles. This fuel is a mixture of 85% ethanol and 15% gasoline. **In the space below, draw a structural formula for a molecule of 2,2,4-trimethylpentane.**

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