Name: KEY Official Class: _____ Date: _____

Teacher: _____ Period: _____ Class: _____

Naming & Drawing Hydrocarbons

YOYO: Answer the following questions.

Which compound is a saturated hydrocarbon?

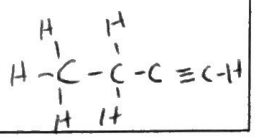
a. $CH_2CH_2C_2H_4$ single
b. CH_3CH_3 C_2H_6 bond
c. CH_3CHO (alkane)
d. CH_3CH_2OH (C_nH_{2n+2})

Which represents an unsaturated hydrocarbon?

a. C_2H_4 DB double or triple
b. C_3H_8 SB
c. C_4H_{10} SB $= C_nH_{2n}$
d. C_5H_{12} SB $\equiv C_nH_{2n-2}$

Which general formula represents the compound CH_3CH_2CCH

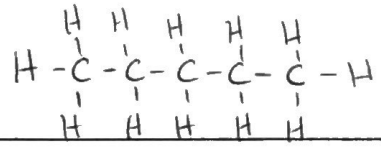
a. C_nH_n C_4H_6
b. C_nH_{2n}
c. C_nH_{2n-2}
d. C_nH_{2n+2}



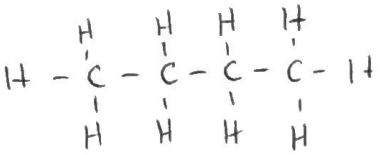
Straight Chain Alkanes

- 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"

Name: Pentane
Chemical Formula: C_5H_{12}
Structural Formula:

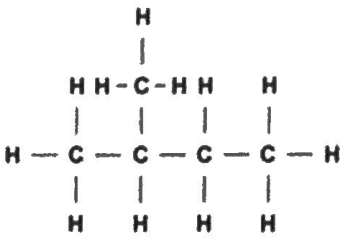


Name: Butane
Chemical Formula: C_4H_{10}
Structural Formula:

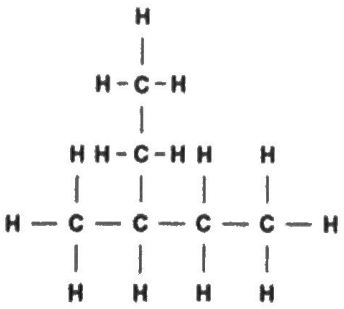


Branched Alkanes

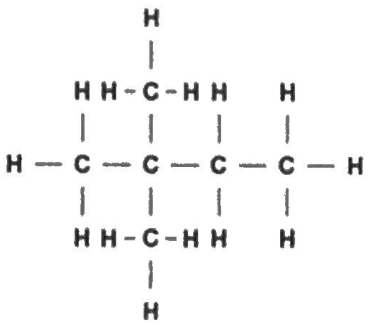
- Branched = not a straight continuous chain; organic molecule that has smaller branches coming off a longer continuous chain
- *How can you tell if it's "branched"? You can't run your finger along all the carbons in one "sweep" (you hit dead-ends and have to turn around and retrace part/some of your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



2-methylbutane



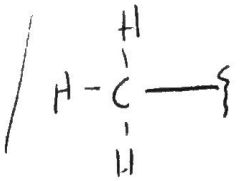
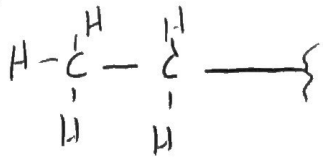
3-methylpentane
(not 2-ethylbutane)



2,2-dimethylbutane

Methyl and Ethyl Groups

- Methyl and ethyl groups are common branches on organic compounds

Methyl Group	Ethyl Group
CH_3- 	CH_3CH_2- 

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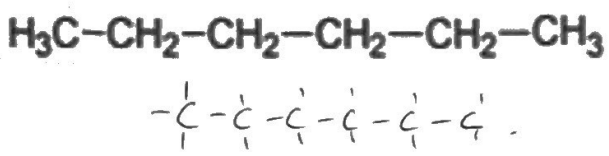
Naming Branched Alkanes

1. 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**
2. Name the **branches first** (separately, in alphabetical order as per their prefix) along with **the # of the C they are on.**
   a. **Prefix based on the # C's (table P) + suffix –yl**
3. 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.
4. 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).

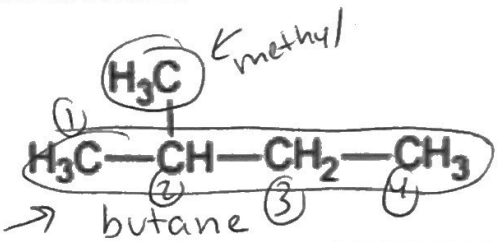
Name: hexane

Structural Formula:



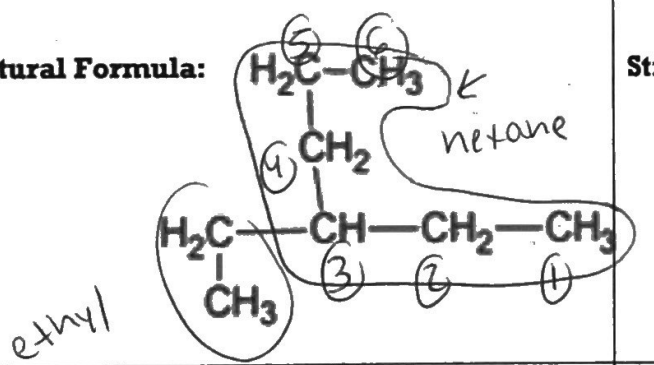
Name: 2-methyl butane

Structural Formula:



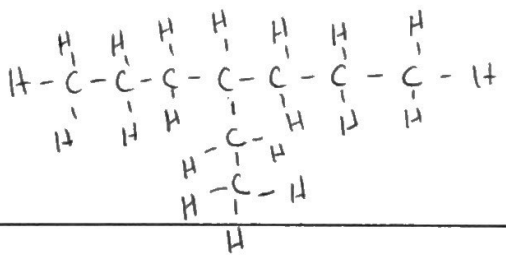
Name: 3-ethyl-hexane

Structural Formula:



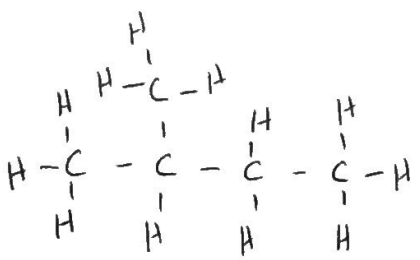
Name: 4-ethyl heptane

Structural Formula:



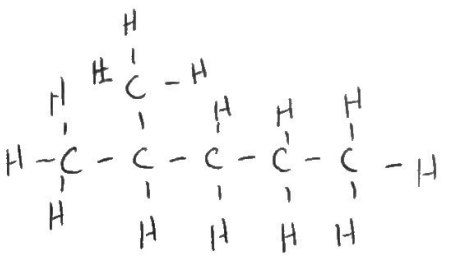
Name: 2-methyl butane

Structural Formula:



Name: 2-methyl pentane

Structural Formula:



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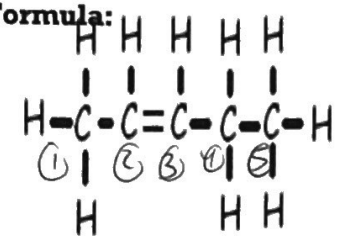
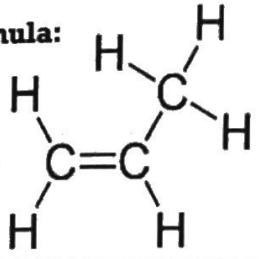
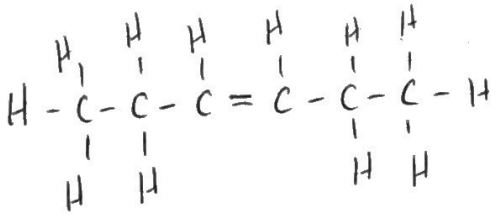
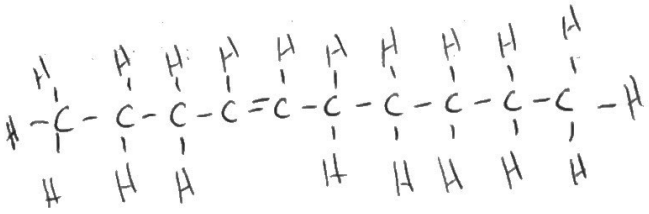
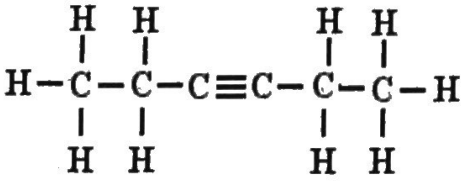
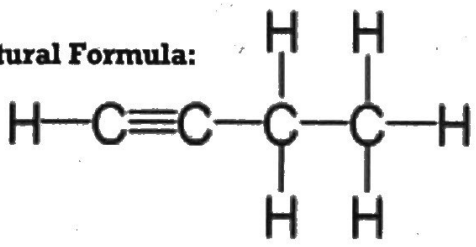
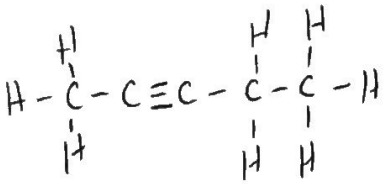
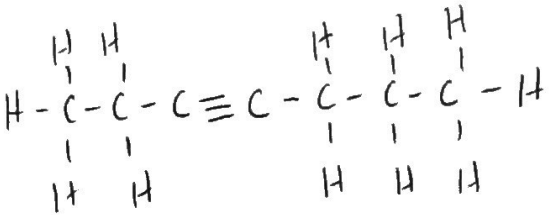
Straight Chain Alkenes

- 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)

Name: 2-pentene **Structural Formula:** 	**Name:** **Structural Formula:** 
Name: 3-hexene **Structural Formula:** 	**Name:** 4-decene **Structural Formula:** 

Straight Chain Alkynes

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

Name: 3 hexyne **Structural Formula:** 	**Name:** 1-butyne **Structural Formula:** 
Name: 2-pentyne **Structural Formula:** 	**Name:** 3-heptyne **Structural Formula:** 

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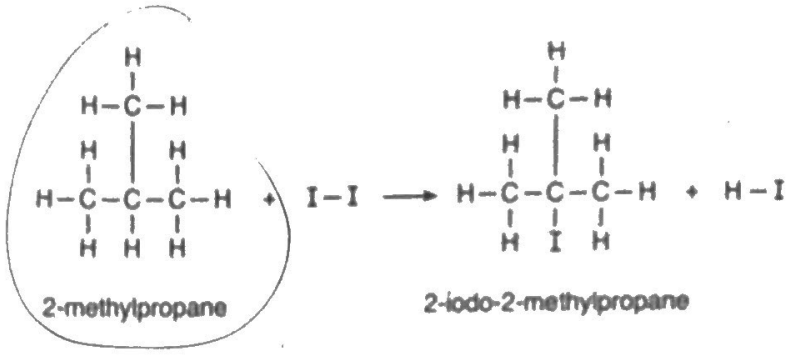
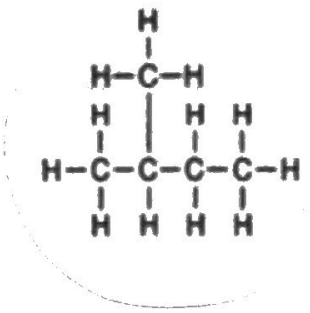
Practice Regents Short Answer Questions

1. 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.**



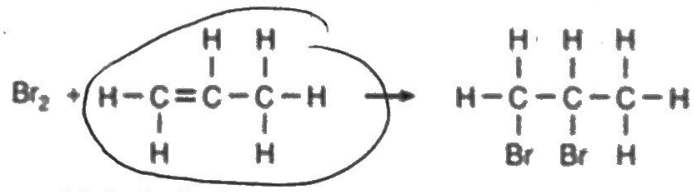
there are only single bonds present.

2. 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.



there are only single bonds ~~present~~ present.

3. 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.

alkene

↳ H & C only

4. 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.**