N5: Systematic Organic Chemistry

Definitions

Term	Definition
Hydrocarbon	
Homologous Series	
Intermolecular forces	
Saturated	
Unsaturated	
Addition reaction	
Isomer	
General formula	

Number of carbons	Prefix
1	
2	
3	
4	
5	
6	
7	
8	

Family	Prefix/suffix on name	Functional group name	Functional group formula
Alkanes			
Alkenes			
Cycloalkanes			

Alkanes

Alkanes are a _____ of _____ hydrocarbons. They are commonly used as _____ and are insoluble. They have a general formula _____

E.g. Propane

?

Use the general formula to complete these alkane molecular formulae:

A) $C_4H_?$

B) $C_7H_?$

C) $C_?H_{12}$

D) $C_?H_{36}$

Alkenes

Alkenes are a _____ of _____ hydrocarbons. They are commonly used as _____, to make _____ and alcohol. They are insoluble. They have a general formula _____

E.g. propene

?

Use the general formula to complete these alkane molecular formulae:

A) $C_2H_?$

B) $C_{10}H_?$

C) $C_?H_{14}$

D) $C_?H_{48}$

Cycloalkanes

Cycloalkanes are a _____ of _____ hydrocarbons. They are commonly used as _____, and _____ , and are insoluble. They have a general formula _____

E.g. cylcopropane

?

Use the general formula to complete these alkane molecular formulae:

A) $C_3H_?$

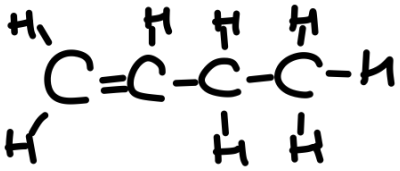
B) $C_{18}H_?$

C) $C_?H_{28}$

D) $C_?H_{38}$

Isomers

Isomers have the same molecular formula but different structural formula. They can be in the same or different homologous series.

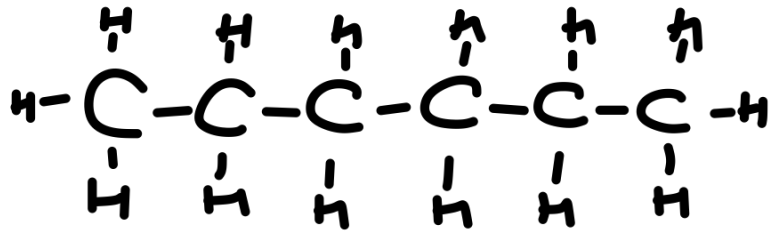


C_5H_{12}

?

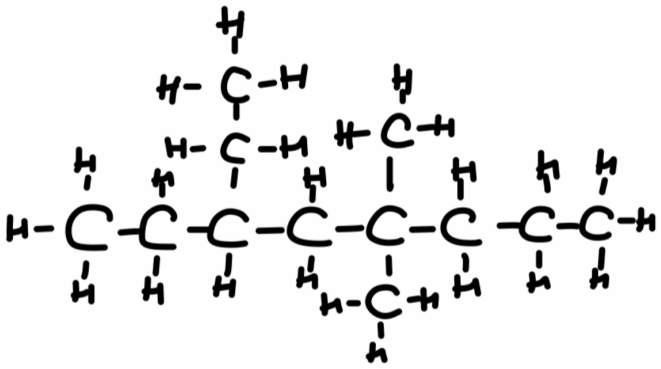
Draw all the possible isomers for:

A) C_5H_{10}

B) 

Naming Rules
Alkanes

1. **Identify and name the longest chain of carbons**
2. **Number the longest chain from the end closest to the branch**
3. **Name the branches. Where there are multiple of the same branch, use the prefixes -di, -tri, -tetra. Where there are different types of branch add them to the name alphabetically.**



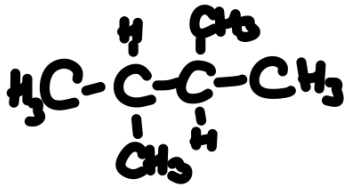
Drawing Rules
Alkanes

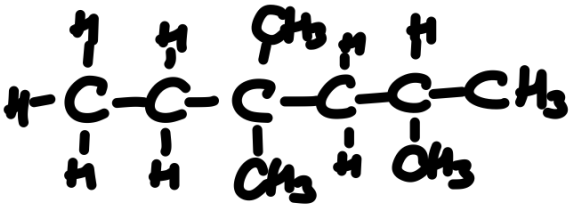
1. **Start from the end of the name, draw the longest chain of carbons**
2. **Number the chain and add the branches at the correct points**
3. **Add hydrogen atoms to bring each carbon to 4 bonds**

3-ethyl-2,2,4-trimethyloctane

?

Name/draw these molecules

A) 

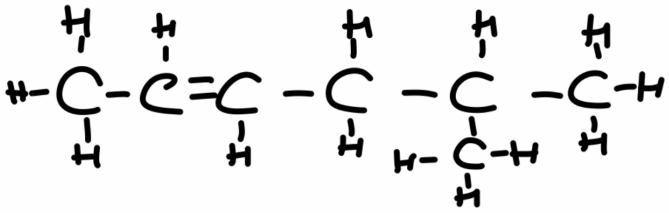
B) 

C) 2,2-dimethyl pentane

D) 2,3,5-trimethyl hexane

Naming Rules
Alkenes

1. **Identify and name the longest chain of carbons containing the double bond.**
2. **Number the longest chain from the end closest to the double bond. This number goes between the prefix and 'ene' ending.**
3. **Name the branches. Where there are multiple of the same branch, use the prefixes -di, -tri, -tetra. Where there are different types of branch add them to the name alphabetically.**



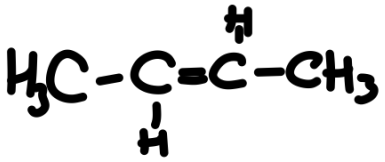
Drawing Rules
Alkenes

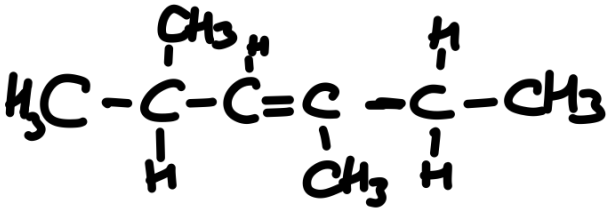
1. **Draw the longest chain of carbons**
2. **Number the chain and add in the double bond and branches at the correct points**
3. **Add hydrogen atoms to bring each carbon to 4 bonds, taking care at the double bond carbons**

2,3-dimethylbut-2-ene

?

Name/draw these molecules

A) 

B) 

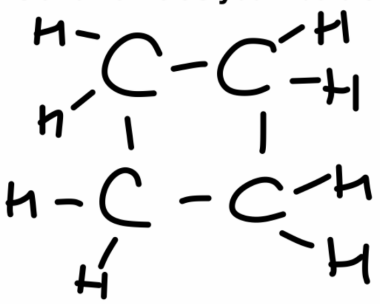
C) 3-methylpent-2-ene

D) 6-ethyloct-3-ene

Naming and Drawing
Cycloalkanes

Naming:

Count the carbons and name as you would an alkane with the prefix 'cyclo' in front.



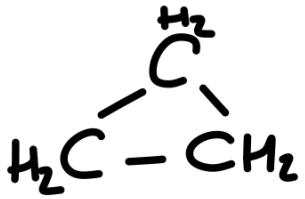
Drawing:

Draw the correct number of carbons in a ring, join them together. Each carbon will have two hydrogen atoms.

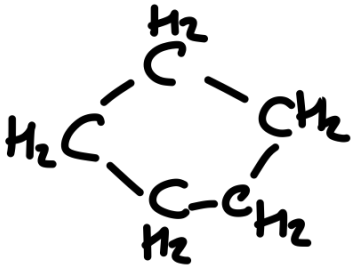
Cyclo hexane

?

Name/draw these molecules



B)



C) Cyclo butane

D) Cyclo heptane

Addition reactions

Alkenes undergo addition reactions because they are

_____

The test for unsaturation is the _____ test. Bromine is _____ due to the Br-Br bond. When this bond is broken the solution _____. This happens during addition reactions. Unsaturated compounds will decolourise bromine water _____, _____ compounds will not.

Addition of halogens in this way produces dihaloalkanes.

Alkenes can also undergo:

Hydrogenation, the addition of hydrogen, to produce alkanes.

Hydration, the addition of water, to produce alcohols. If the alkene is asymmetrical then two products are formed.

?

Draw the missing reagent in each reaction.