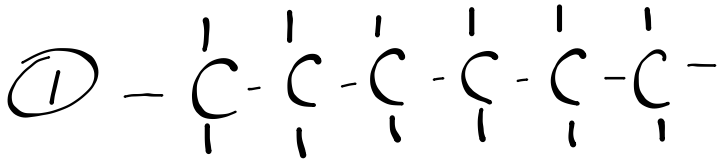
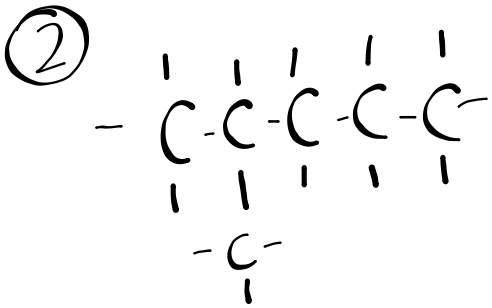
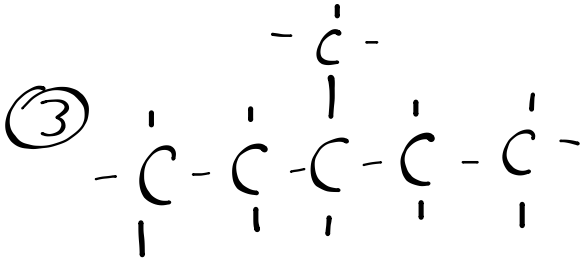
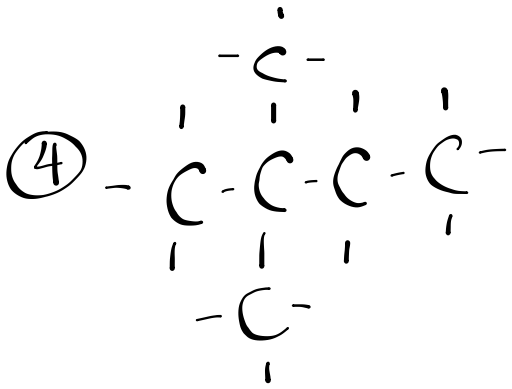
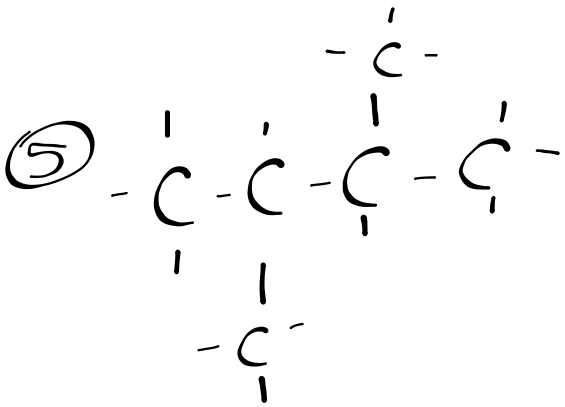
Isomers of C_6H_{14}





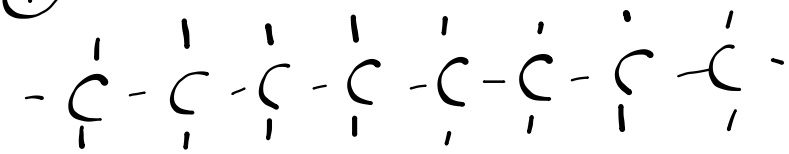






Isomers of C_8H_{18}

1)



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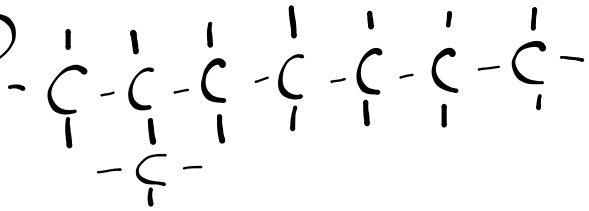

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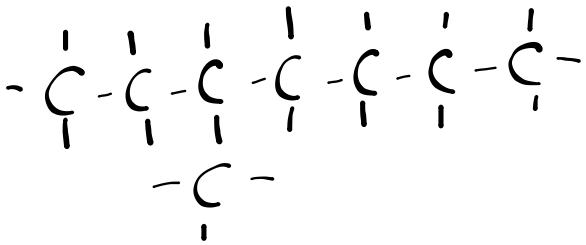

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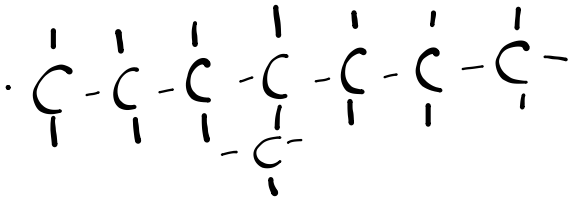
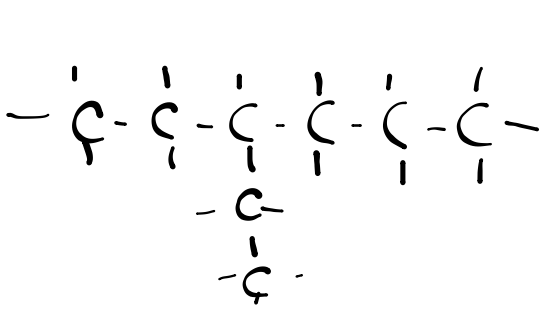
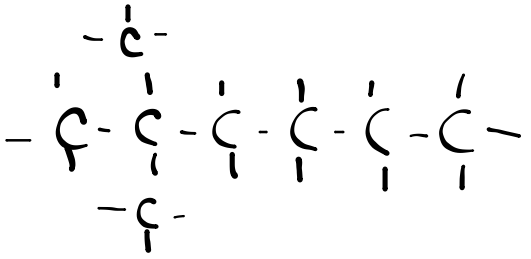
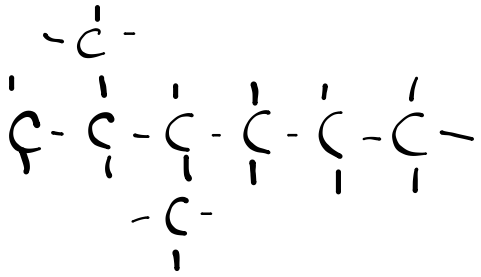
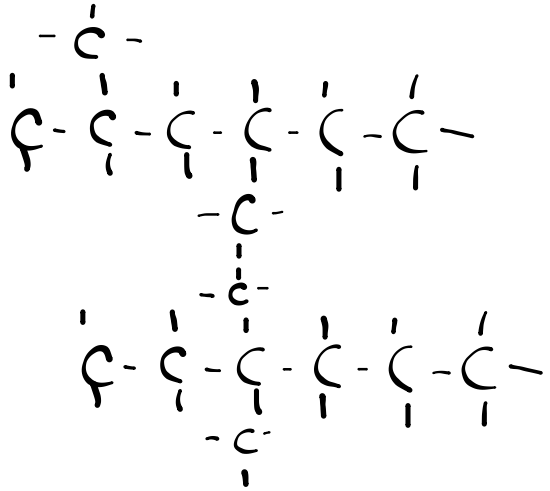
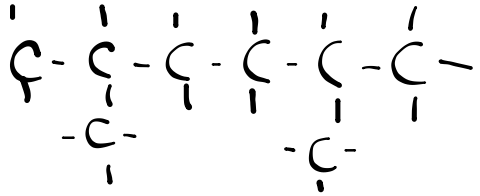


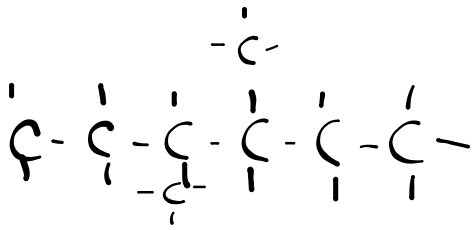


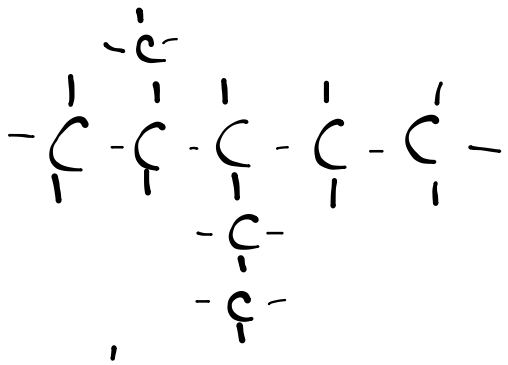


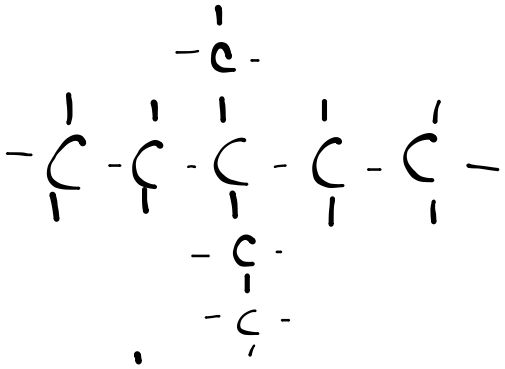


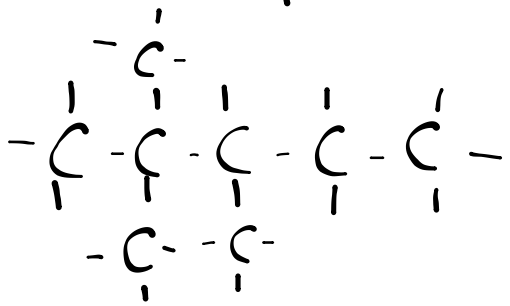


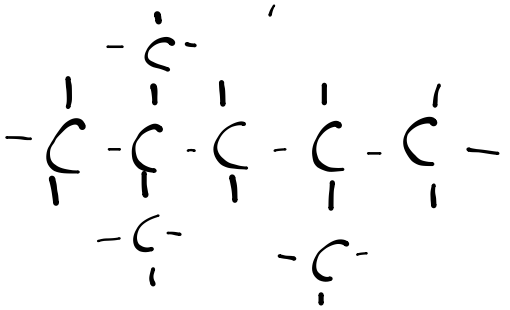


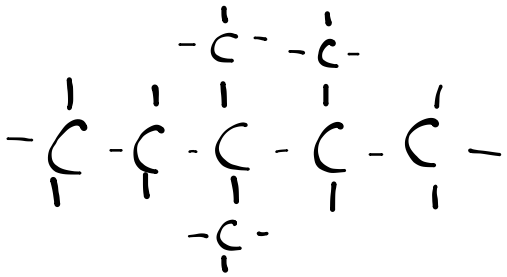


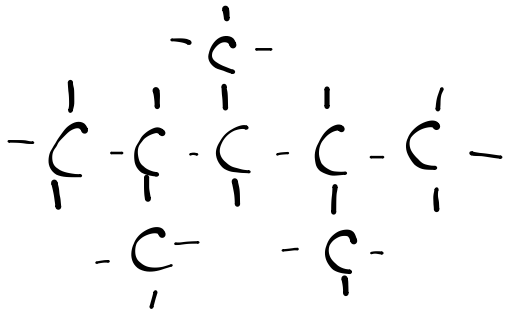


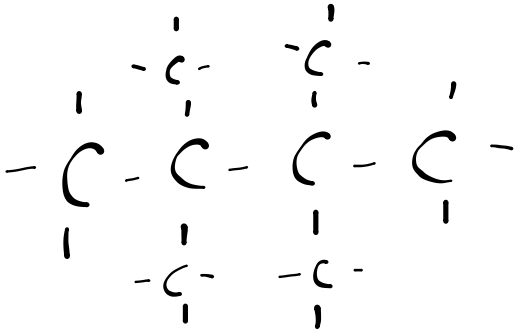












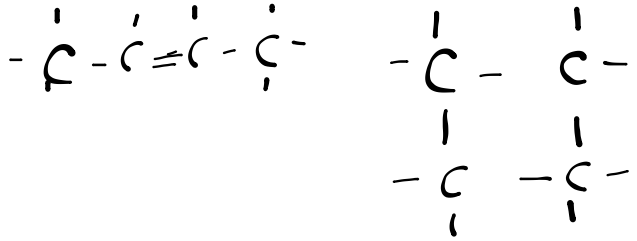
Organic Families

Organic families are classed according to functional groups. Functional groups are areas on a molecule that are reactive.

Hydrocarbons with general formula C_nH_{2n+2} contain all single bonds and are called **alkanes**.

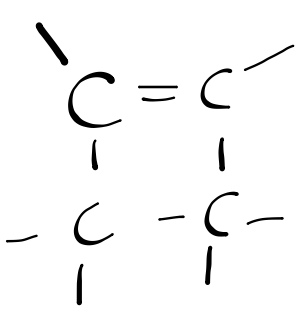
Ex.

Hydrocarbons with general formula C_nH_{2n} contain one double bond (**alkenes**) or are cyclic (**cycloalkanes**).



"closed ring"

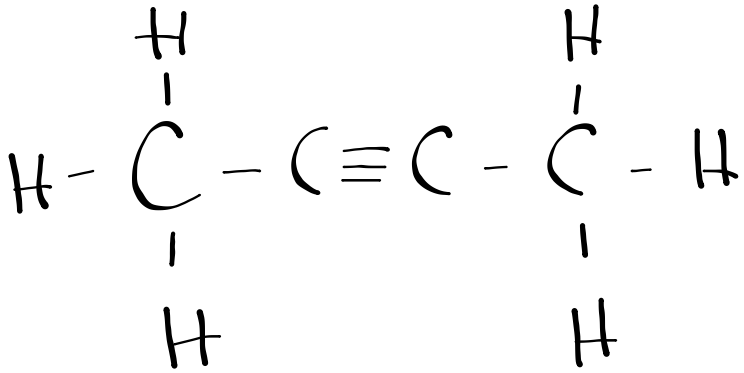
Hydrocarbons with a general formula C_nH_{2n-2} have a triple bond (**alkynes**) or are cyclic with a double bond (**cycloalkenes**).

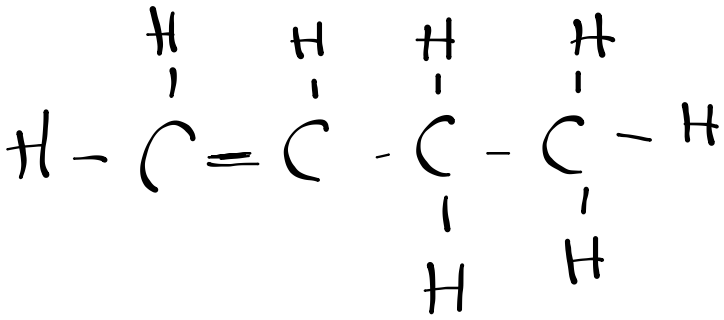


C_4H_6

C_nH_{2n-2}

C_nH_{2n+2-4}





C_nH_{2n}

C_4H_{10}

C_5H_{12}

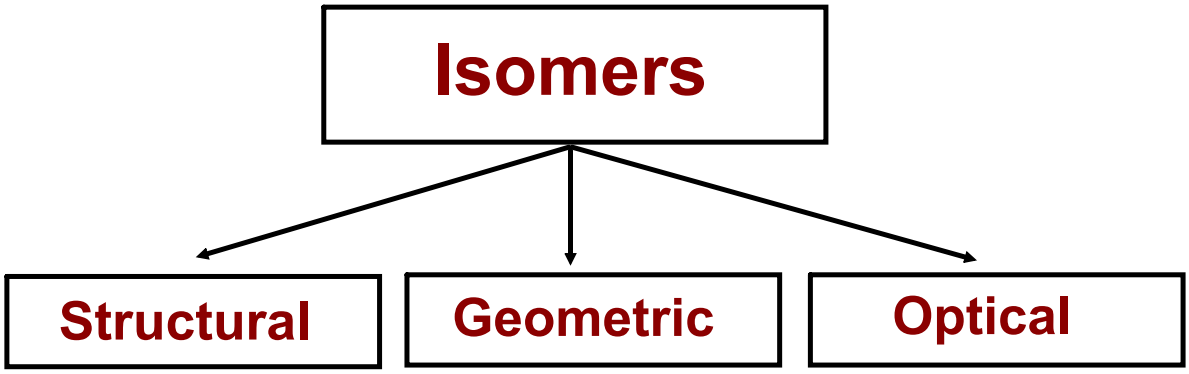
C_6H_{14}

C_8H_{18}

} C_nH_{2n+2}

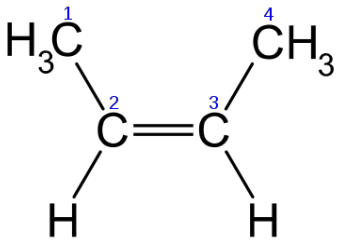
Match each of the following descriptions with the correct chemical formula.

$C_{12}H_{26}$	closed ring, two triple bonds
$C_{10}H_{20}$	all single bonds (alkane)
C_8H_{14}	cycloalkane
C_9H_{14}	triple bond and double bond
$C_{30}H_{52}$	two double bonds

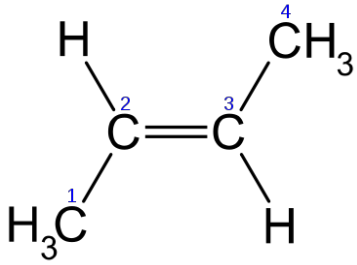


Stereoisomers - atoms are joined in the same order, but the positions of the atoms in space are different

Geometric isomers - atoms are joined in the same order, but the arrangement around a double bond is different



cis
"same"



trans
"different"

Investigation - Molecular Models

The purpose of this investigation is to examine the structure of some isomers of organic compounds and to practice drawing structural diagrams.

Problem:
What are the structures of the isomers of C_4H_{10}, $C_2H_3Cl_3$, C_2H_6O, and C_2H_7N?

Materials:
molecular model kit

Procedure:
1. Assemble two different isomeric models of C_4H_{10} and record three different structural diagrams for each model.
2. Assemble two different models for each of the other molecular formulas and record their complete and condensed structural diagrams.

Investigation 9.1

- Working in groups of 2 or 3
- Each person will pass in their own assignment
- Include Title, Date, Name, Group Members at top of page
- Copy 'Procedure' and 'Materials'
- For each isomer, include **expanded molecular formula, complete structural diagram, and line diagram**
- Keep work organized and neat (tables??)
(but remember...this is not art class!)
- To be passed in by tomorrow

Tips:
- Be sure to look at your molecule from all angles... you do not include the same isomer twice!
- Select the 'ball' for each element carefully (think "bonding capacity")

Chemistry 122 - Organic Naming

- each organic compound has a basic skeletal structure, called the *parent*, to which branches and functional groups have been added.
- in the naming of compounds, the branches and functional groups are specified by prefixes on the parent name.
- a **functional group** is a site of chemical reactivity in a molecule.
- carbon-carbon and carbon-hydrogen bonds (**sigma bonds**) are relatively unreactive. Ethane (CH_3CH_3) has no functional groups.
- when another type of atom is present in organic molecules, such as oxygen in ethanol (CH_3CH_2OH), the oxygen with its hydrogen is a site of chemical reactivity. A hydroxyl group (-OH) is a functiona group.
- the double bond, such as the one found in ethylene ($CH_2=CH_2$) is also a site of reactivity and therefore is a functional group.
- alkanes belong to a group of compounds called **aliphatic** (from the Greek - aleiphatos meaning fat). Aliphatic denotes noncyclic organic compounds since most fats have long chains.
- An alkane is a **saturated** (has its full compliment of H's) aliphatic hydrocarbon and is relatively non-reactive.

The names of straight chain alkanes are used as parent names for all aliphatic compounds, whether or not they contain branches of functional groups.

The names of the alkanes are composed of two parts. The first part tells the number of carbons in the parent chain. The second part, tell if the compound is saturated (-ane ending) or unsaturated (-ene or -yne ending)

Ex. pentane

Ring compound names are taken from the names of the continuous-chain parents with the prefix cyclo added. The number of carbons in the ring determines the parent name.

Ex. cyclohexane

Naming Branched Alkanes

1. find and name the longest continuous chain of carbon atoms
2. number the chain starting with the end closest to the branch

5 4 3 2 1

Ex. naming $CH_3CH_2CH_2CHCH_3$

CH_3

1. the longest continuous chain has 5 carbons; therefore the parent is pentane

2. one methyl alkyl group on the second carbon

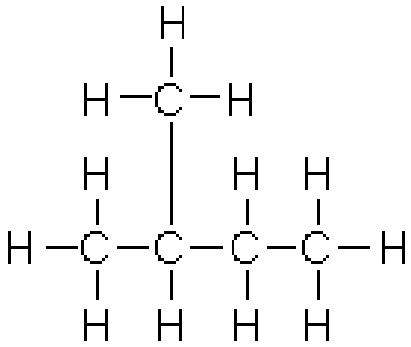
NAME: [redacted]

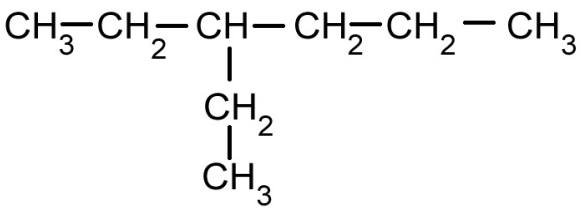
The names of the continuous chain branches commonly encountered is based upon the number of carbons contained and uses the same latin prefixes with -yl ending

Ex. - CH_3 methyl group

- $CH_3(CH_2)_8CH_3$ decyl group

Examples

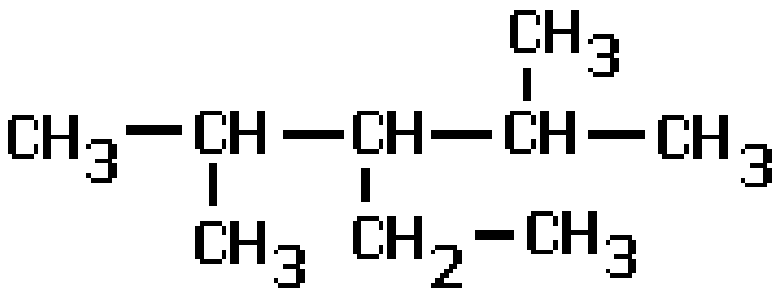




Multiple Branches

If there are multiple branches, the branches are listed in alphabetical order when writing the name of the alkane.

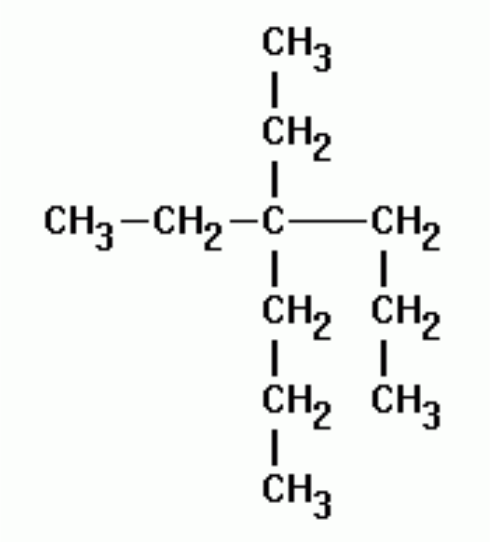
Ex.



1. Find parent chain.

2. Number the chain with the end closest to the branch.

3. Put branches in alphabetical order.



Homework

Organic Naming Worksheet

Practice problems #3, 4 p. 699

Textbook p. 695-700