

Alkenes and Alkynes:

Alkenes:

Have a double bond between carbon atoms

Double bond must be in the long carbon chain

general formula C_xH_{2x}

have *cis* and *trans* isomers

Alkadienes:

Alkenes with 2 double bonds—usually has a single bond between them

To name:

Follow the same rules for alkanes except:

1. change the ending on the parent chain to *ene*
2. include where the double bond is located in compounds with more than 3 carbons—this number comes in front of the parent chain name.
3. When numbering the branches the double bond MUST have the smallest number and then the branches.
4. For cyclic compounds the double bond has to be between the first and second carbons and then name and number the branches.

Alkynes:

Have a triple bond between carbon atoms

Triple bond must be in the long carbon chain

General formula C_xH_{2x-2}

No cyclic forms

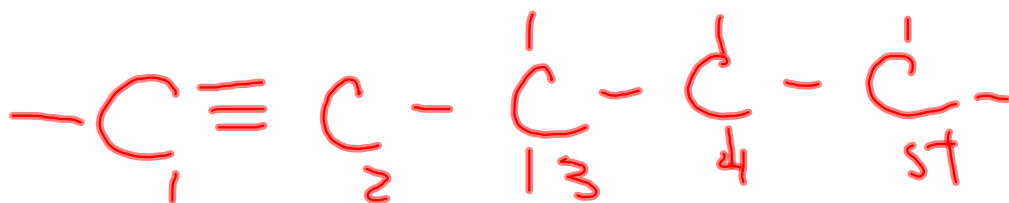
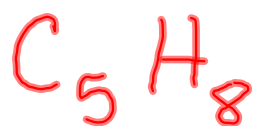
In general have very high reactivity

As a result they are not usually found in nature

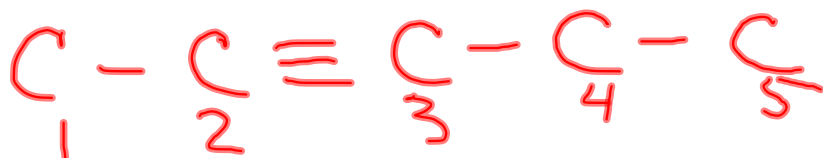
Are used as intermediates in many industrial processes

To name:

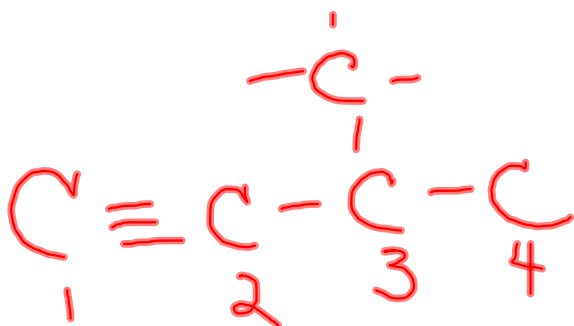
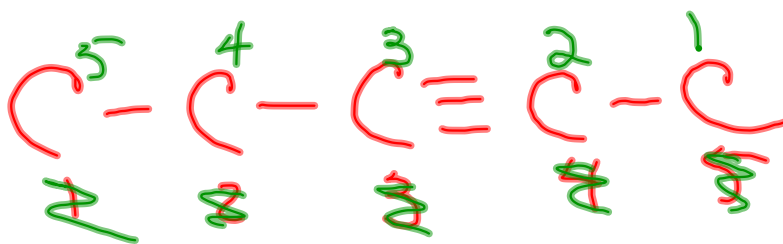
Follow the same procedure as alkenes except change the ending on the parent chain to *yne*.



1-pentyne

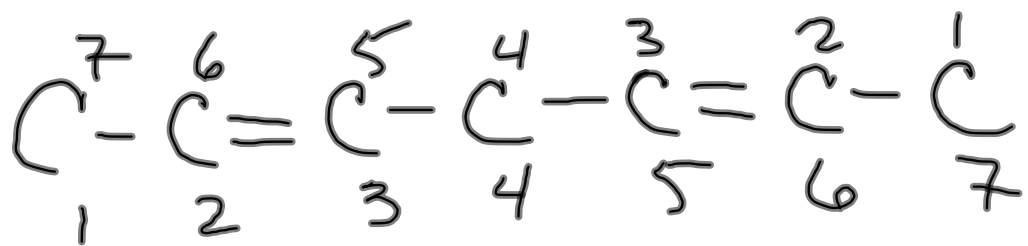


2-pentyne



3-methyl-1-butyne

alkadiene



2,5-heptadiene

Reactions involving alkenes and alkynes:

1. **addition**: reactant is added to the two atoms that form the multiple bond.
This breaks the multiple bond.

Halogenation reaction is a type of addition reaction where a **halogen** is added to break the multiple bond.

Hydrogenation reaction is a type of addition reaction where **hydrogen** is added to break the multiple bond.

Does not occur at ordinary conditions of temperature and pressure; this is because of the high bond enthalpy in the hydrogen molecule. A catalyst is needed in these reactions.

Process used to make margarine from oils.

Hydration reaction is a type of addition reaction where **water** is added to break the multiple bond. When this occurs the **-H** atom is added to the carbon with the most hydrogen and the **-OH** is added to the other carbon.

Addition of a **hydrogen halide** will break the multiple bond and the hydrogen bonds to the carbon with the most hydrogen and the halogen bonds to the other carbon.