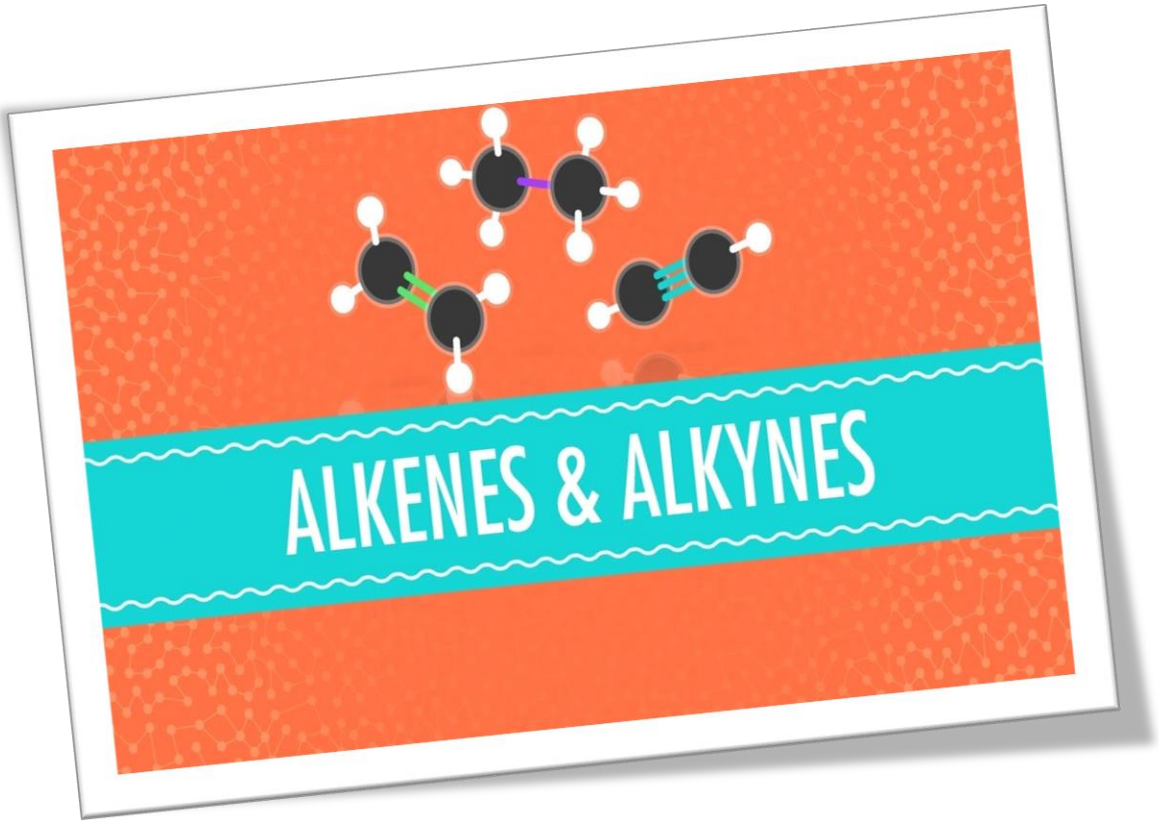
Al-Mustaqbal University College

Department of Radiology Techniques

First Stage

General Chemistry

Eighth Lecture

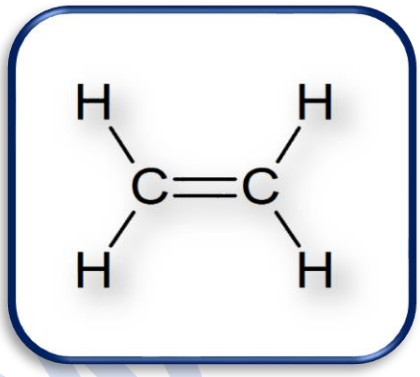


Asst. Lec.

Alaa Salman Al-Labban

ALKENES

ALKENES: are ***unsaturated*** chemical compound containing at least one ***carbon-carbon double bond***.



Alkenes also called **olefins.**

Alkenes have the general molecular formula C_nH_{2n}

To show the presence of the double bond, the **–ane** suffix from the alkane name is changed to **–ene**.

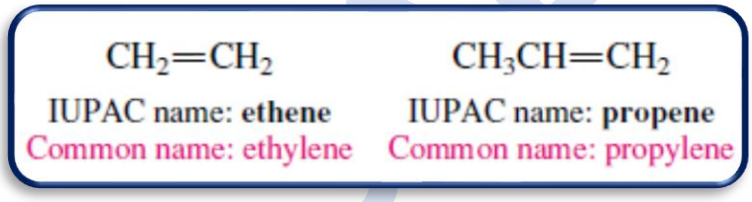
A carbon–carbon double bond is a functional group for alkenes.

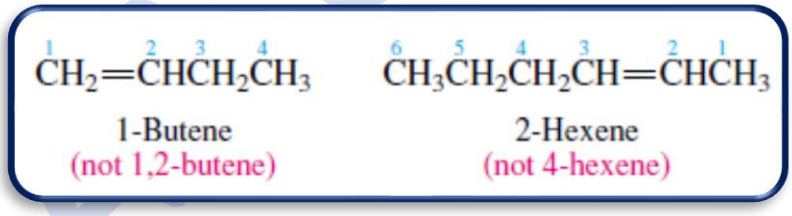
Properties of Alkenes

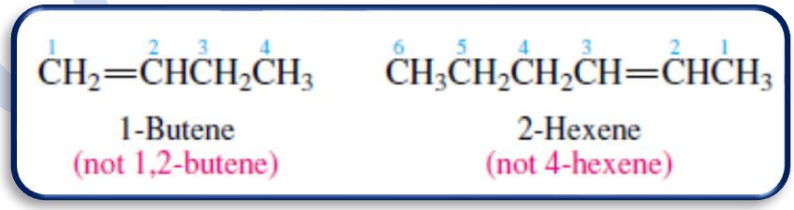
1. ***Physical state***: These double-bonded compounds are colorless and odorless in nature.
   The first three members of the alkene group are gaseous in nature; the next fourteen members are liquids and the remaining alkenes are solids.
2. ***Density:*** lighter than water.
3. ***Solubility:*** insoluble in water and soluble in nonpolar organic solvents.
4. ***Reactivity:*** *More* reactive than alkanes due to their double carbon-carbon bond.

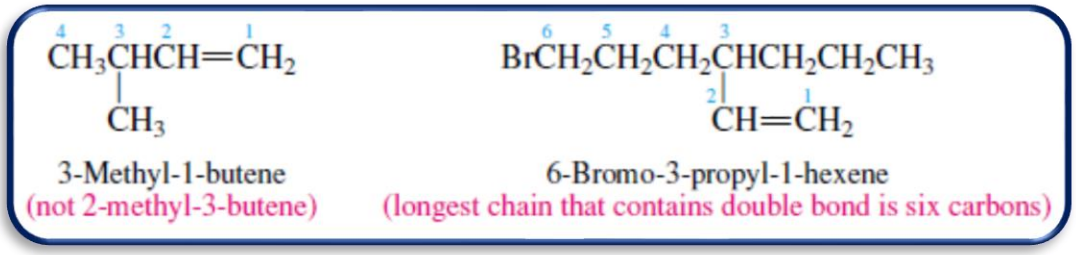
Nomenclature

1. Select the longest continuous carbon chain that contains a double bond.
2. Name this compound as you would an alkane, but change –ane to –ene for an alkene.
3. Number the carbon chain of the parent compound starting with the end nearer to the double bond. Use the smaller of the two numbers on the double-bonded carbon to indicate the position of the double bond. Place this number in front of the alkene name.



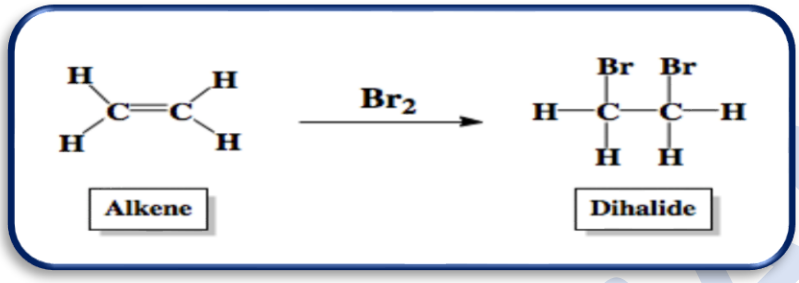






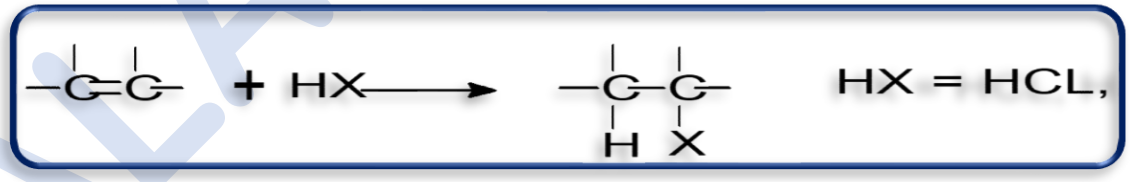
Reactions of Alkenes

1. Addition of Halogens (X_2)

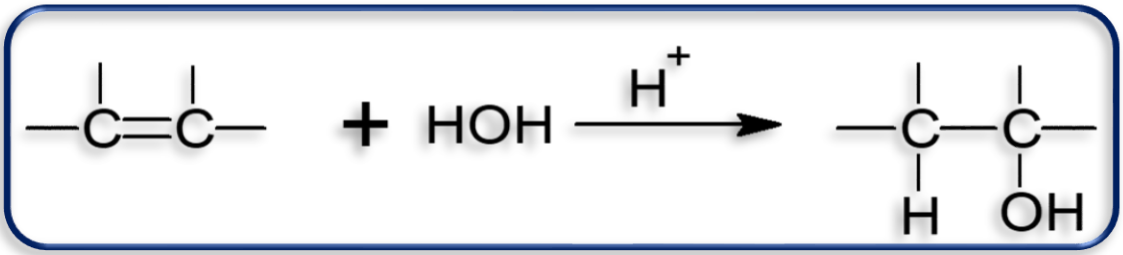


2. Addition of Hydrogen (catalytic hydrogenation)

3. Addition of hydrogen halides



4. Addition of water. HYDRATION



ALKYNES

ALKYNES: are ***unsaturated*** chemical compound containing at least one ***carbon-carbon triple bond***.

Alkenes have the general molecular formula C_nH_{2n-2}

To show the presence of the triple bond, the **–ane** suffix from the alkane name is changed to **–yne**.

Acetylene (HC ≡ CH) is the **simplest** alkyne.

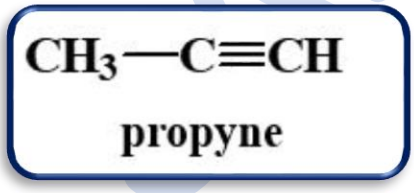
A carbon–carbon triple bond is a functional group for alkynes.

Properties of Alkynes

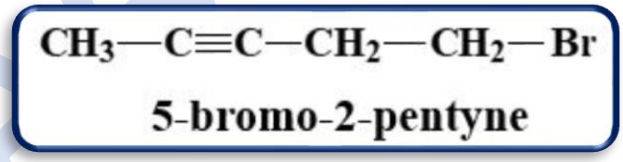
1. ***Physical state***: All alkynes are odorless and colorless with the exception of ethylene which has a slight distinctive odor.
   The first three alkynes are gases, and the next eight are liquids.
   All alkynes higher than these eleven are solids.
2. ***Solubility:*** Nonpolar, insoluble in water and Soluble in most organic solvents.
3. ***Boiling points:*** These triple bonded compounds have a boiling point slightly higher than alkanes and alkenes.
4. ***Density:*** Less density than water.

Nomenclature

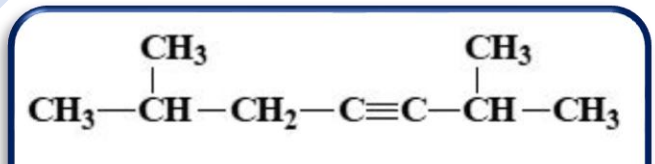
1. Select the longest continuous carbon chain that contains a triple bond.
2. Name this compound as you would an alkane, but change –ane to –yne for an alkyne.
3. Number the carbon chain of the parent compound starting with the end nearer to the triple bond. Use the smaller of the two numbers on the triple-bonded carbon to indicate the position of the triple bond. Place this number in front of the alkyne name.



propyne



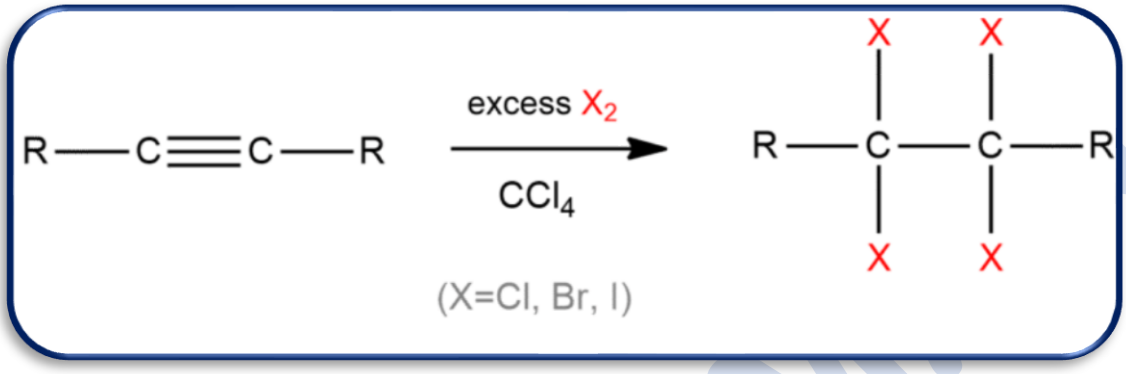
5-bromo-2-pentyne



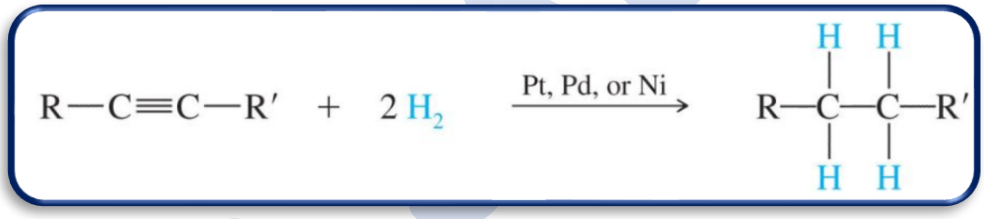
2,6-dimethyl-3-heptyne

Reactions of Alkynes

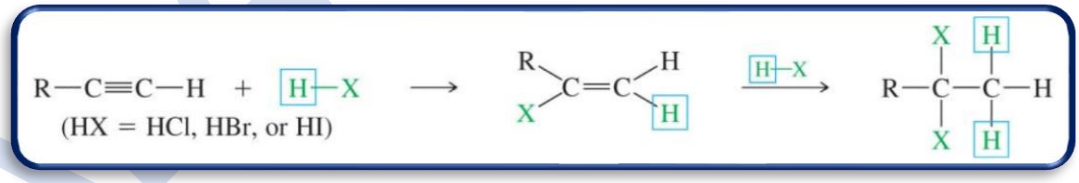
1. Halogenation of Alkynes:



2. Addition of Hydrogen:



3. Addition of hydrogen halides:



4. Oxidation of alkynes: