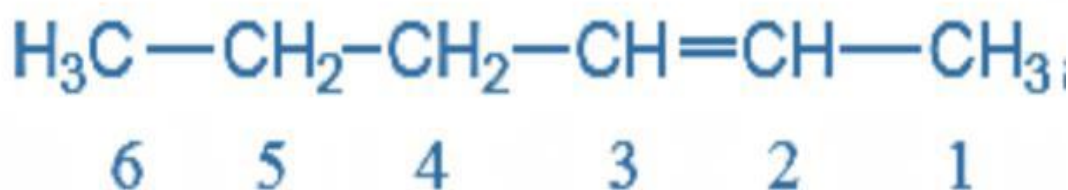


Alkene

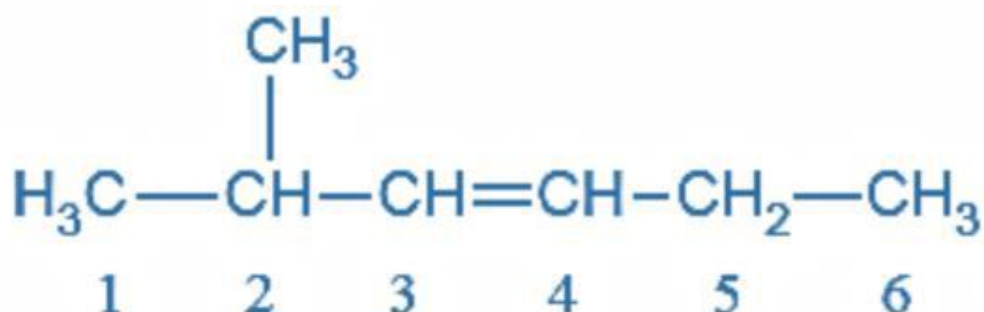
IUPAC Names

We form IUPAC names of alkenes by changing the **-ane-** suffix of the parent alkane to **-ene-** CH₂=CH₂ is named **Ethene**, and CH₃CH=CH₂ is named **propene**. In higher alkenes, where isomers exist that differ in the location of the double bond, we use a numbering system. We number the longest carbon chain that contains the double bond in the direction that gives the carbon atoms of the double bond the lower set of numbers. We then use the number of the first carbon of the double bond to show its location



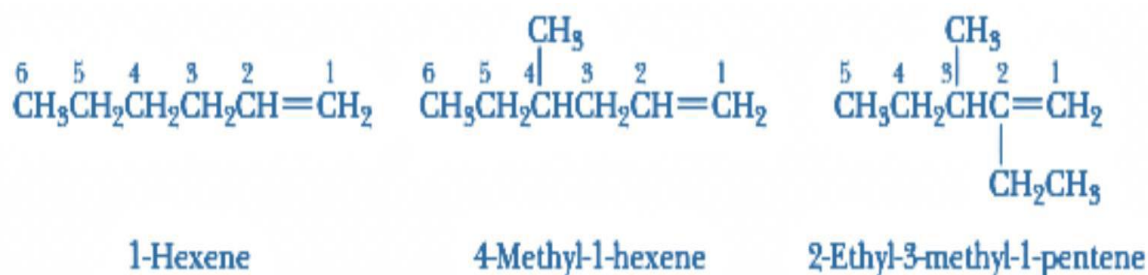
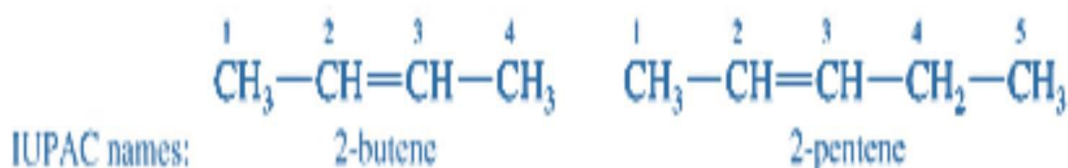
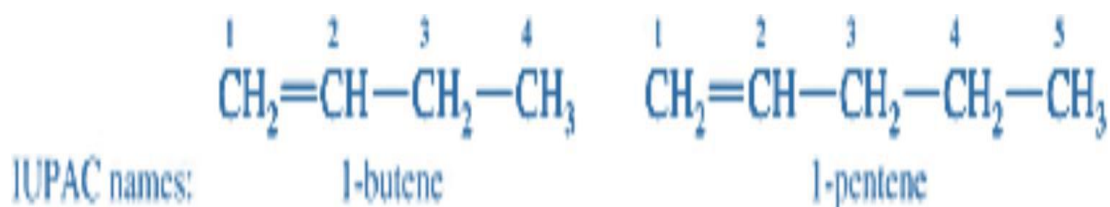
2-Hexene

If the double bond is equidistant from each end, number so the first substituent has the lowest number.



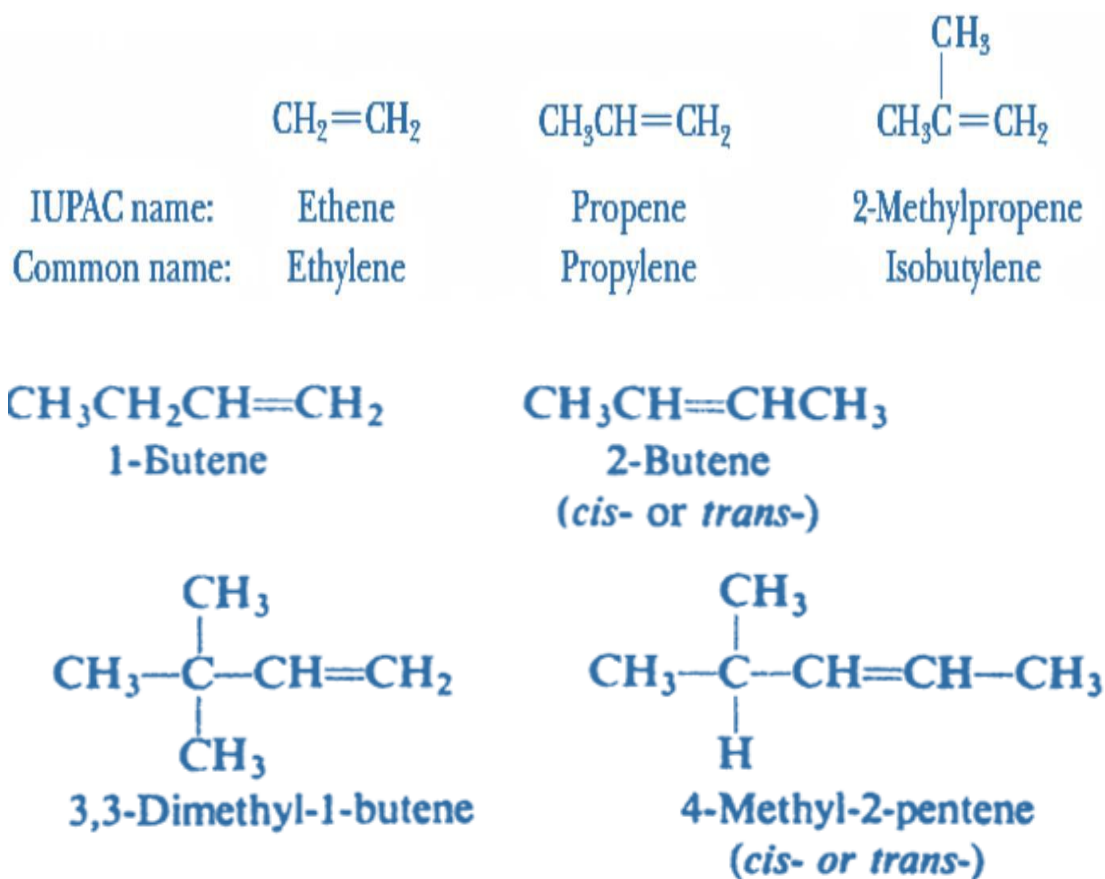
2-Methyl-3-hexene

We name branched or substituted alkenes in a manner similar to the way we name alkanes. We number the carbon atoms, locate the double bond, locate and name substituent groups, and name the main (parent) chain.

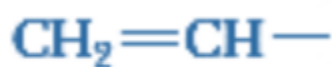


B. Common Names

some alkenes, particularly those with low molecular weight, are known almost exclusively by their common names, as illustrated by the common names of these alkenes:

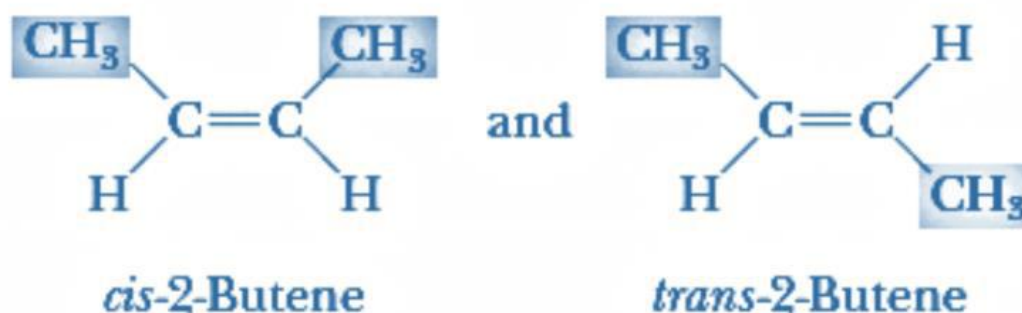


Furthermore, the common names methylene (a CH_2 group), vinyl, and allyl are often used to show the presence of the following alkenyl groups.



C. The Cis - Trans System (Geometrical isomer)(stereochemistry)

The most common method for specifying the configuration of a di substituted alkene uses the prefixes cis and trans. In this system, the orientation of the atoms of the parent chain determines whether the alkene is cis or trans. Following are structural formulas for the cis and trans isomers of 4-methyl-2-pentene:



In the cis example, carbon atoms of the main chain (carbons 1 and 4) are on the same side of the double bond. In the trans example, the same carbon atoms of the main chain are on opposite sides of the double bond.

Rotation around the double bond is restricted because the bond would have to be broken to allow rotation. Thus, the double bond is rigid geometric isomers are formed

Q: Is there geometric isomers in 1,2-dichloroethene?Why?

D. Naming Cyclo Alkenes



Cyclopropene



Cyclobutene



Cyclopentene



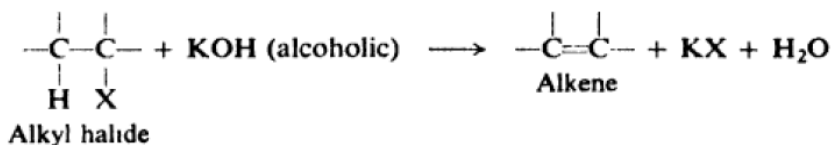
Cyclohexene

PREPARATION OF ALKENES

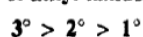
5.12 Dehydrohalogenation of alkyl halides

Alkyl halides are converted into alkenes by **dehydrohalogenation**: *elimination of the elements of hydrogen halide*. Dehydrohalogenation involves removal of the halogen atom together with a hydrogen atom from a carbon adjacent to the one

Dehydrohalogenation: elimination of HX



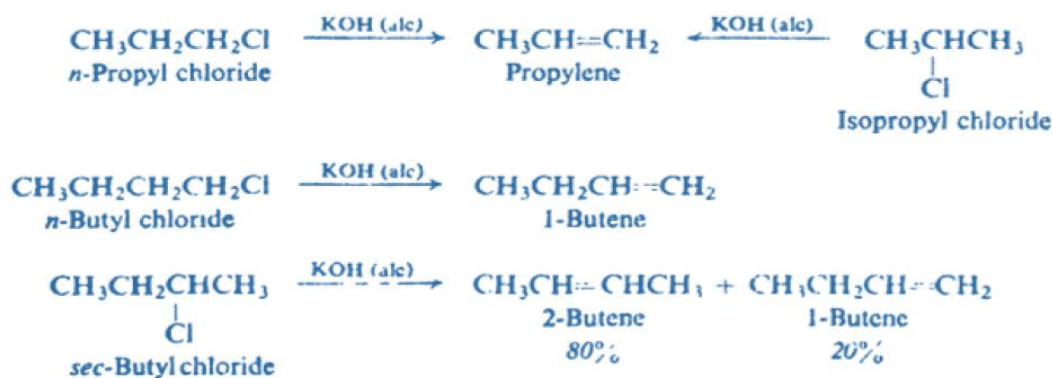
Ease of dehydrohalogenation
of alkyl halides



Dehydrohalogenation: loss of HX from an alkyl halide to form an alkene

11

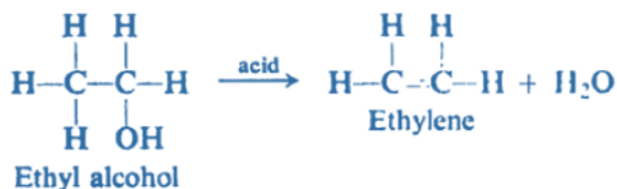
Examples:



2. Dehydration of alcohols. Discussed in Sec. 5.19–5.23.

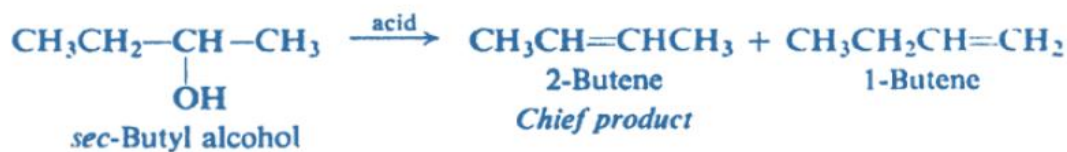


Examples:

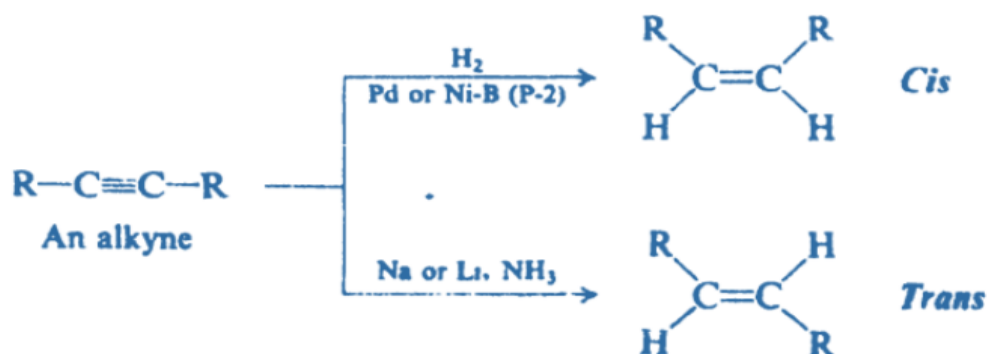


The dehydration (removal of water) of alcohols is a good synthetic route to alkenes. Normally acids like sulfuric or phosphoric acids are used.

Examples:

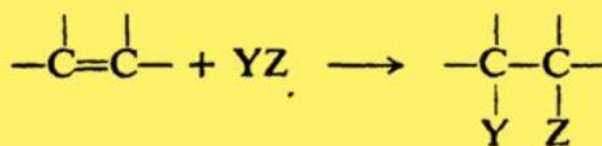


4. Reduction of alkynes. Discussed in Sec. 8.9.



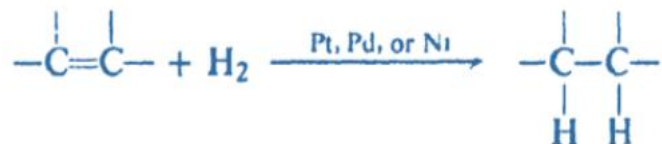
REACTIONS OF ALKENES

Addition Reactions

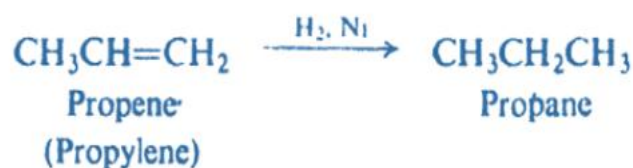


A reaction in which two molecules combine to yield a single molecule of product is called an *addition reaction*.

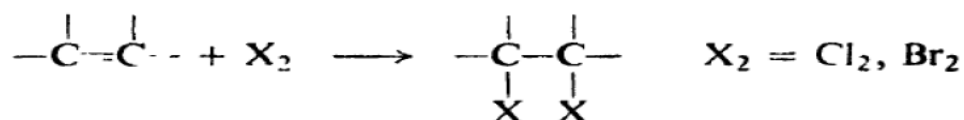
1. Addition of hydrogen. Catalytic hydrogenation. Discussed in Sec. 6.3.



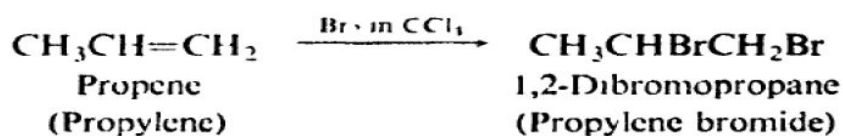
Example:



2. Addition of halogens. Discussed in Secs. 6.5, 6.13, and 7.11–7.12.

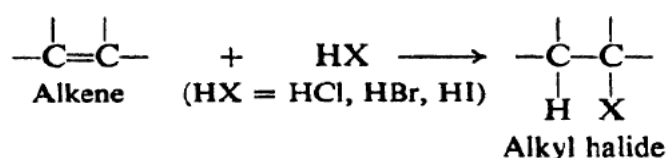


Example:

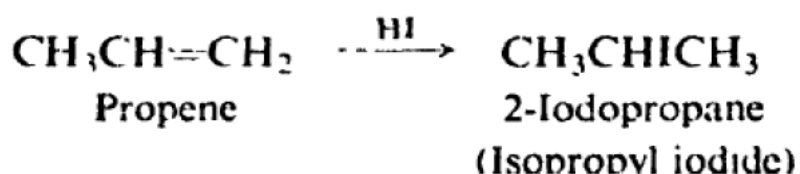


6.6 Addition of hydrogen halides. Markovnikov's rule

An alkene is converted by hydrogen chloride, hydrogen bromide, or hydrogen iodide into the corresponding alkyl halide.

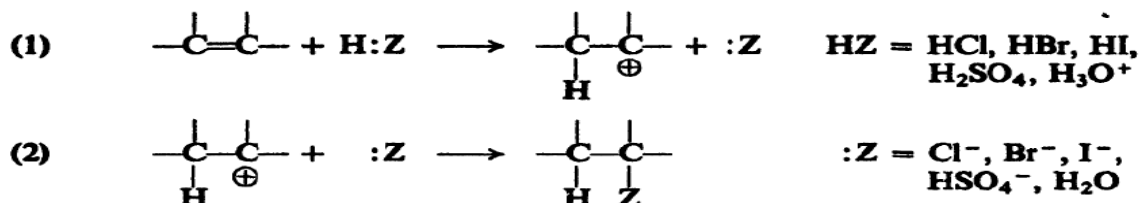


Examples:



Mechanism of addition reaction(Markonikove)

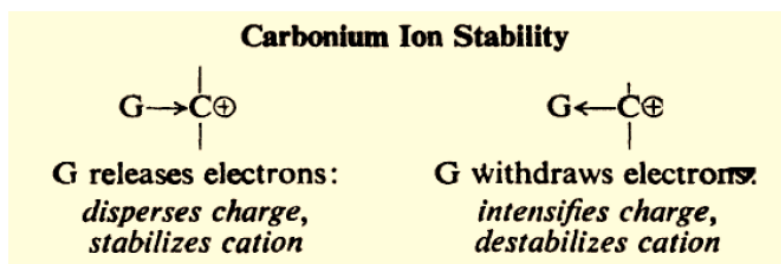
Addition of the acidic reagent, HZ, is believed to proceed by two steps:



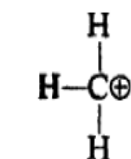
Step (1) involves transfer of hydrogen ion from :Z to the alkene to form a carbonium ion; this is a transfer of a proton from one base to another.

Carbonium ions

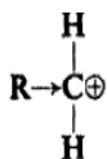
The Carbonium ion,(Carbonation) a group of atoms that contains a carbon atom bearing only six electrons. Carbonium ions are classified as primary, secondary, or tertiary after the carbon bearing the positive charge. They are named by use of the word cation. For example



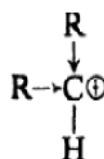
The facts are, then, that the greater the number of alkyl groups, the more stable the carbonium ion.



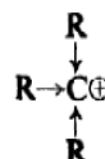
Methyl cation



Primary cation

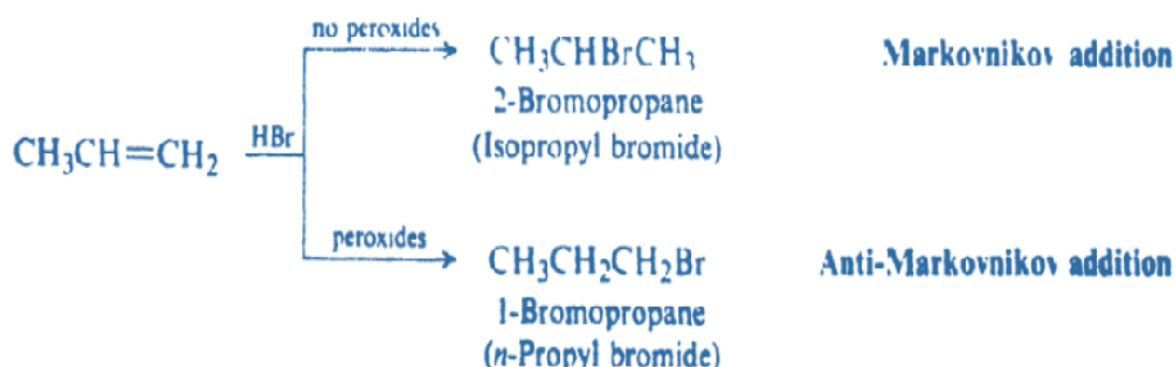


Secondary cation



Tertiary cation

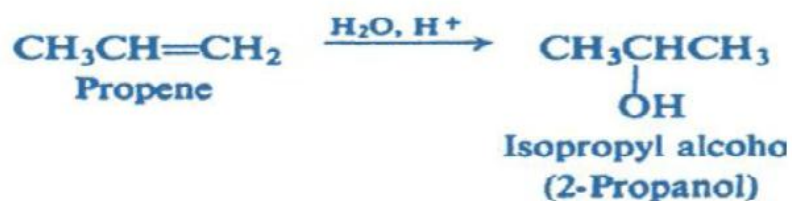
Electron release: Disperses charge, stabilizes ion



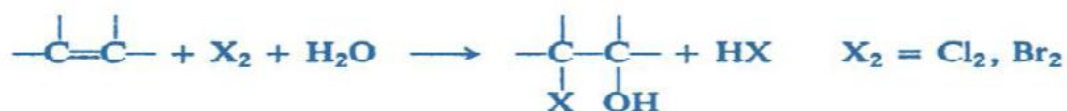
5. Addition of water. Hydration. Discussed in Sec. 6.9.



Example:



6. Halohydrin formation. Discussed in Sec. 6.14.



Example:

