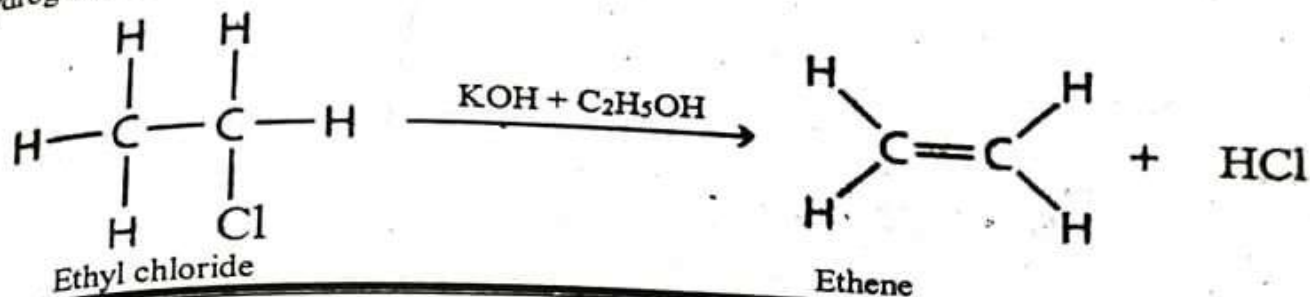


**Preparation of ethene from ethyl chloride:**

Ethyl alcohol is heated with an alcoholic solution of potassium hydroxide, a molecule of hydrogen chloride is removed to form ethene.

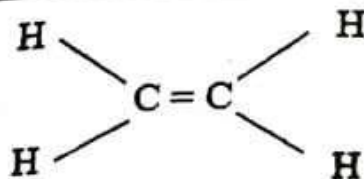


**(2) Federal Boards (Exercise Short/Section-B)**

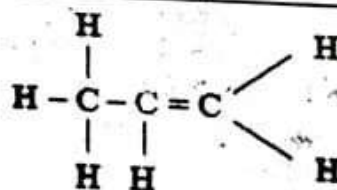
2. Give short answers.

(i) Give three examples of unsaturated hydrocarbons.

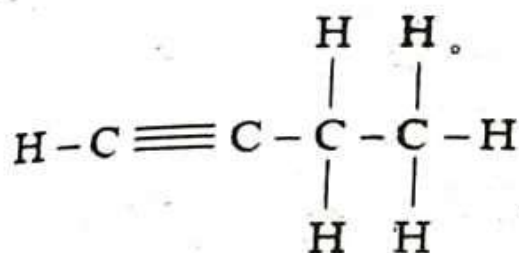
Ans:



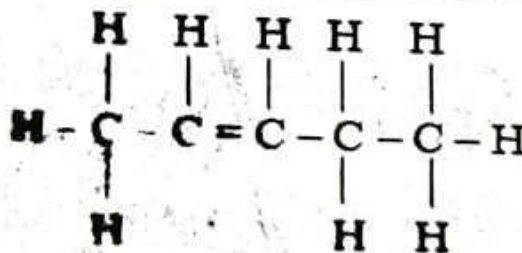
Ethene



Propene

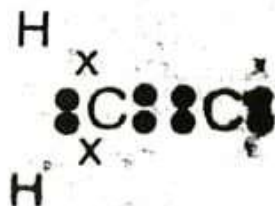


1-Butyne



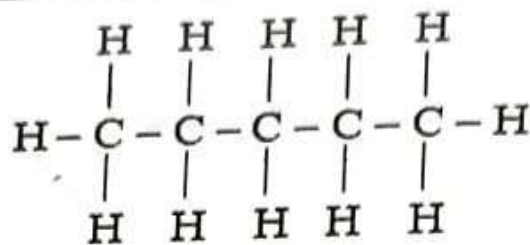
Pentene

(ii) Draw electron dot and cross structure for ethene.

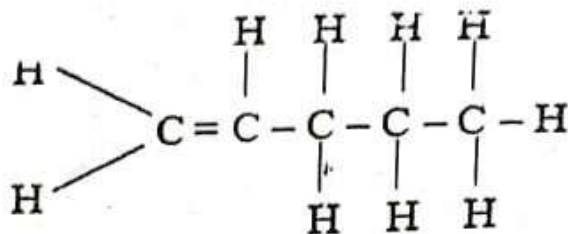


(iii) Draw structural formulas of an alkane, an alkene and an alkyne containing five carbon atoms.

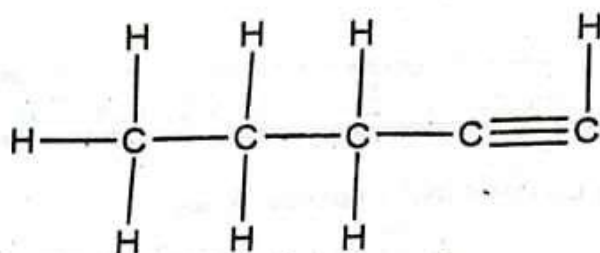
Ans: Alkane (Pentane)



Alkene (1-Pentene):

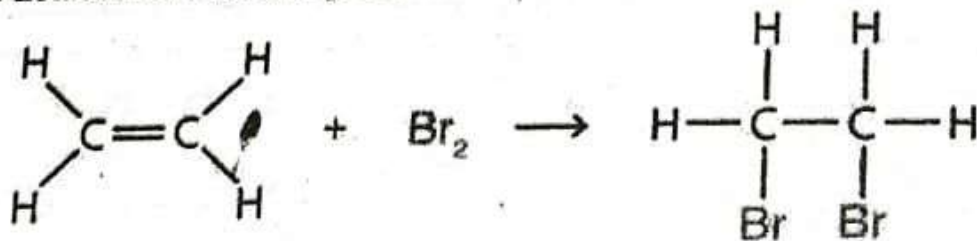


Alkyne (1-Pentyne)



(iv) How can you differentiate ethane from ethene.

Ans: When adding a small quantity of bromine water to separate containers with ethene and ethane, distinct outcomes emerge. Upon shaking the jar containing ethene, the bromine water undergoes decolorization. This transformation arises from the addition of bromine ( $\text{Br}_2$ ) across the ethene's double bond, forming dibromoethane. This reaction eliminates the reddish-brown hue from the bromine water, rendering it clear. Conversely, in the presence of ethane, a saturated compound, no notable reaction transpires. The bromine water retains its initial brown color.

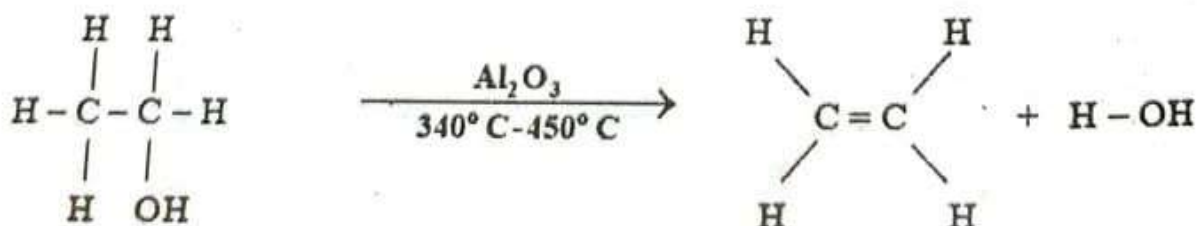


(v) What do you mean by dehydration reaction? Give one example.

Ans: Dehydration mean loss of water.

Examples:

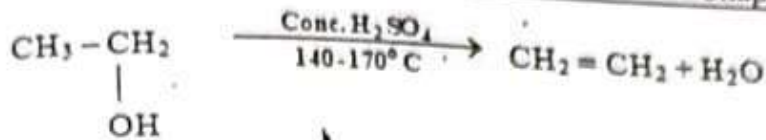
Alcohols dehydrate when their vapor are passed over heated alumina.



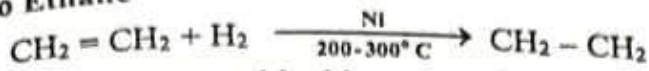
Ethanol

Ethene

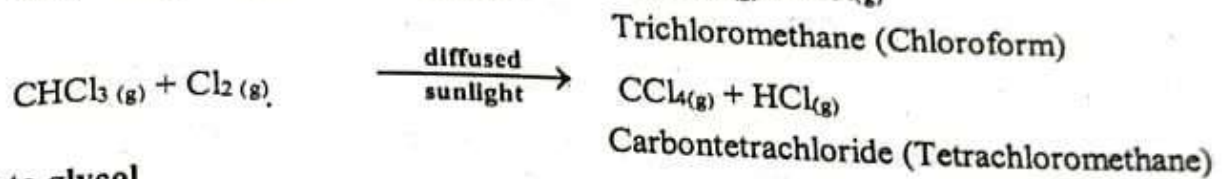
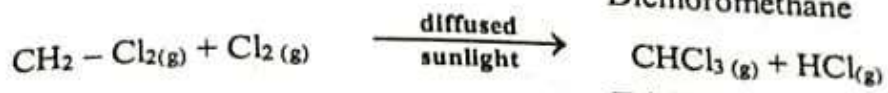
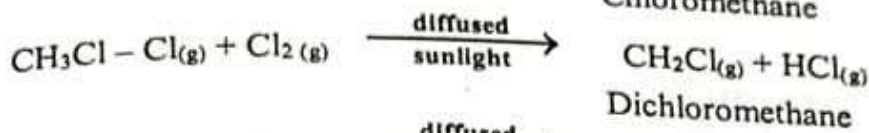
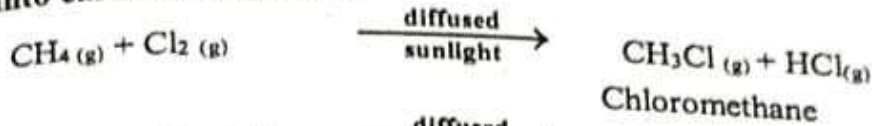
Concentrated Sulphuric acid is also used for dehydration.



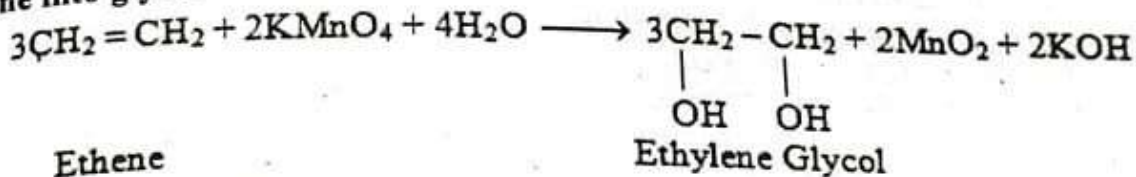
Q3: How can you convert  
(i) Ethene into Ethane



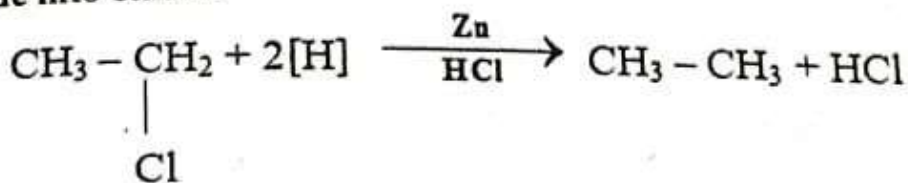
(ii) Methane into carbontetrachloride



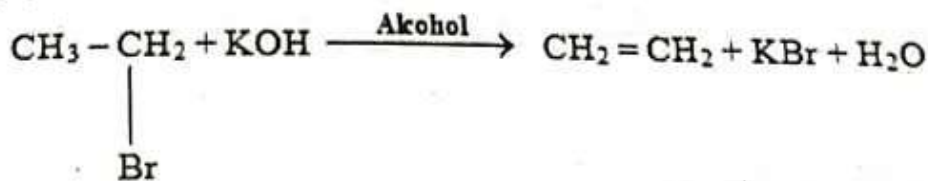
(iii) Ethene into glycol



(iv) Ethyl chloride into ethane



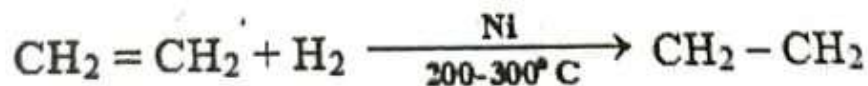
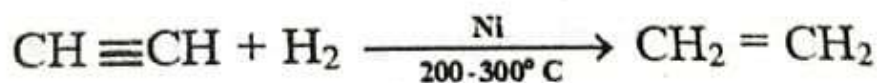
(v) Ethyl bromide into ethene



4. Write a chemical equation to show the preparation of an alkane from an alkene and an alkyne.

Solution: **Hydrogenation of Alkenes and Alkynes:**

Addition of hydrogen molecule across C-C multiple bonds is called hydrogenation. Hydrogenation takes place in presence of finely divided nickel at 200-300°C and high pressure. Hydrogenation can also be done in presence of Pt or Pd at room temperature.



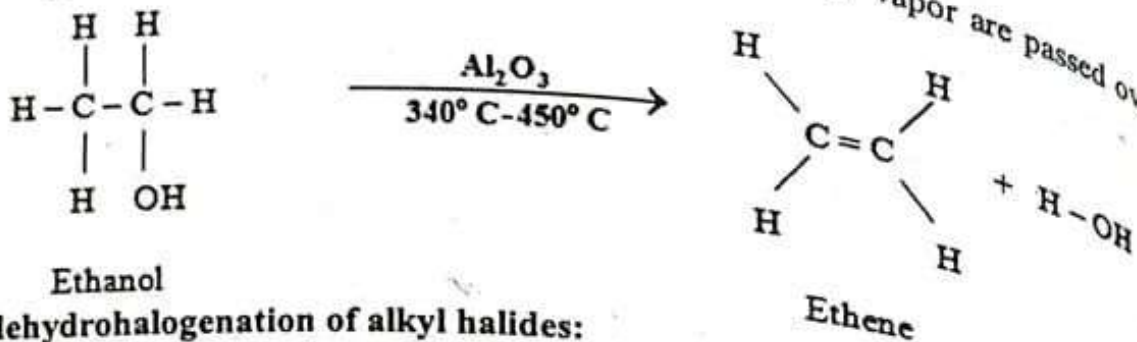


5. Write a chemical equation to show the preparation of alcohol and dehydrohalogenation of alkyl halides.

Ans: Preparation of Ethene:

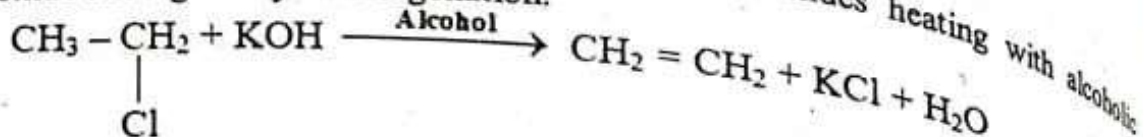
(i) By dehydration of Alcohols:

Dehydration means loss of water. Alcohols dehydrate when their vapor are passed over heated alumina.



(ii) By dehydrohalogenation of alkyl halides:

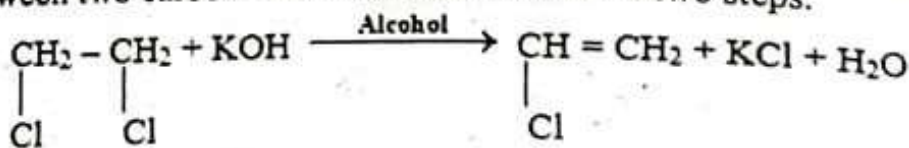
Dehydrohalogenation means loss of hydrogen halide. Alkyl halides heating with alcoholic potassium hydroxide undergo dehydrohalogenation.



6. Write a chemical equation to show the preparation of ethyne from a dehalogenation of 1,2-dihalide and a tetrahalide.

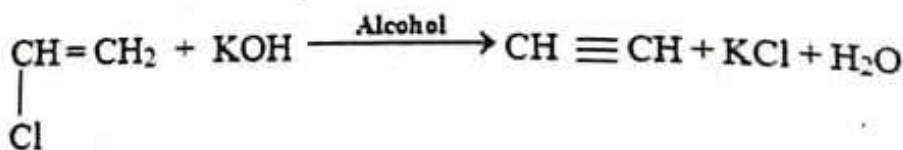
Ans: By dehydrohalogenation of 1,2-dihalide:

Vicinal dihalide on treatment with alcoholic potassium hydroxide eliminates two molecules of hydrogen halides from adjacent carbon atoms. Removal of two molecules forms a triple bond between two carbon atoms. Reaction occurs in two steps.

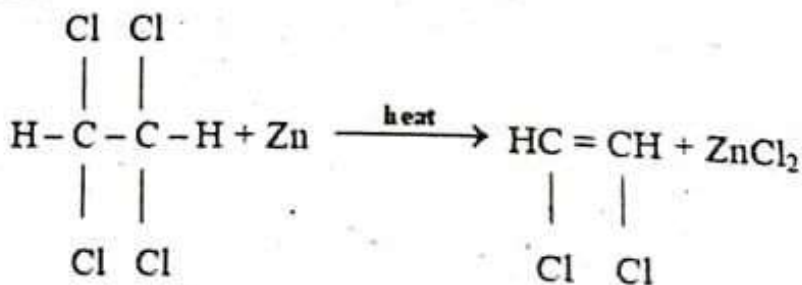


1,2-Dichloroethane  
(Vicinal dihalide)

Vinyl Chloride

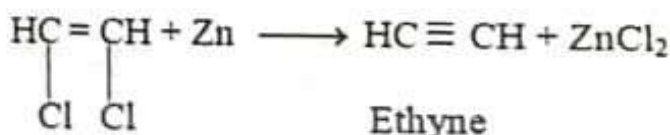


By dehalogenation of tetrahalides:



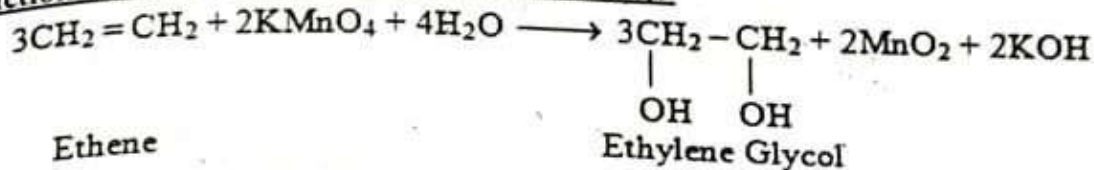
1,1,2,2-Tetrachloroethane

1,2-Dichloroethene

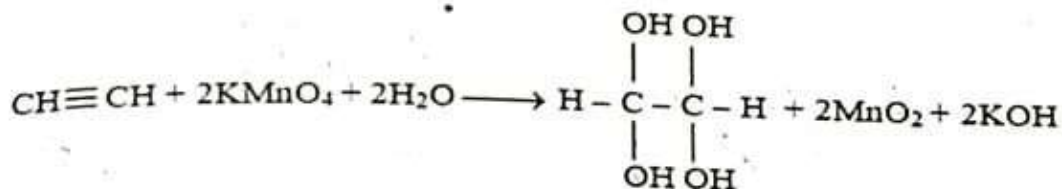


7. Write chemical equations showing reaction of  $\text{KMnO}_4$  with Ethene and Ethyne.

Ans: Reaction of  $\text{KMnO}_4$  with alkenes (Baeyer's test):



Reaction of  $\text{KMnO}_4$  with Ethyne:



8. List some industrial uses of Ethene and Ethyne.

Ans: Industrial uses of Ethene:

- Polyethylene Production: Ethene is a primary feedstock for the production of polyethylene, a widely used plastic.
- Polyvinyl Chloride (PVC) Production: Ethene is used in the production of polyvinyl chloride, another common plastic.
- Ethanol Production: Ethene is converted to ethanol, which is used as a fuel additive and solvent.
- Synthetic Rubber: Ethene is a key ingredient in the production of synthetic rubber.
- Various Chemicals: Ethene is used to produce various chemicals, including ethylene oxide, ethylene glycol, and more.
- Ripening Agent: Ethene is used to control the ripening of fruits during storage and transportation.
- Fuel: Ethene can be used as a fuel in some industrial processes.

Industrial use of Ethyne:

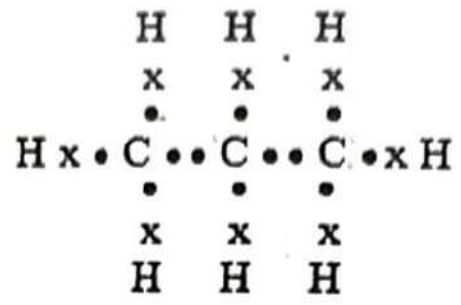
- Oxyacetylene Welding: Ethyne is used in oxyacetylene welding and cutting due to its high flame temperature.
- Chemical Synthesis: Ethyne is a precursor in the synthesis of various chemicals, including acetaldehyde and acetic acid.
- Production of Vinyl Chloride: Ethyne is used in the production of vinyl chloride, a precursor for polyvinyl chloride (PVC) plastic.
- Lighting: In the past, ethyne was used in gas lamps for illumination.
- Laboratory Use: Ethyne is used in laboratories for its role in chemical reactions and synthesis.

9. Explain why a systematic method of naming chemical compounds is necessary?

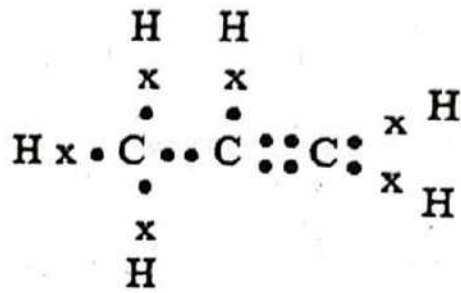
Ans: A systematic method of naming chemical compounds, known as IUPAC (International Union of Pure and Applied Chemistry) nomenclature, is crucial for several reasons. Firstly, it provides a standardized and unambiguous way to communicate the composition and structure of compounds, transcending language barriers and ensuring global understanding. Secondly, it aids in identifying the properties and behavior of compounds based on their names, facilitating efficient research and communication within the scientific community. Additionally, systematic naming eliminates the confusion arising from common names that can vary between regions and languages. Lastly, as chemistry advances, new compounds are continually discovered, and systematic naming ensures consistency, accuracy, and clarity in naming these novel substances.

10. Draw electron dot and cross structure for:

(a) Propane



(b) Propene



(c) Propyne

