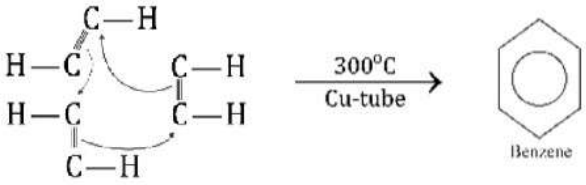
CHEMISTRY CHAPTER 8(XII)

(Aliphatic Hydrocarbons)

SHORT QUESTIONS:

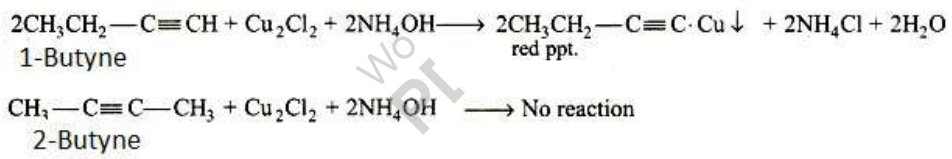
1. How would you establish that benzene is a polymer of acetylene?

Ans: When acetylene is passed through a copper tube at 300°C, it polymerizes to benzene.



2. How do you distinguish between1-Butyne and 2-Butyne?

Ans: 1-Butyne is a terminal alkyne and thus acidic in nature. It therefore reacts with cuprous chloride Cu_2Cl_2 in presence of NH_4OH to produce a red precipitate. In 2-Butyne triple bond is not terminal hence triple bonded carbon atoms do not have a hydrogen atom attached and therefore lack acidic character. It gives no reaction with cuprous chloride Cu_2Cl_2 in presence of NH_4OH.



3. Mention four uses of ethene.

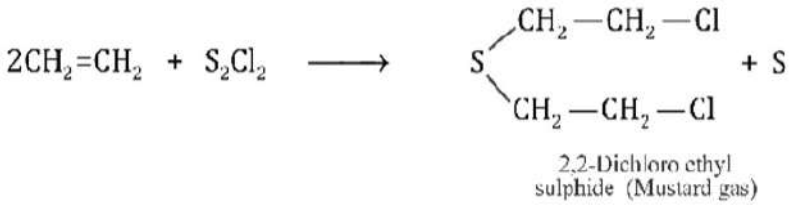
Ans:

1. for the manufacture of polythene, a plastic material used for making toys, cables, bags, boxes, etc.

2. for artificial ripening of the fruits.

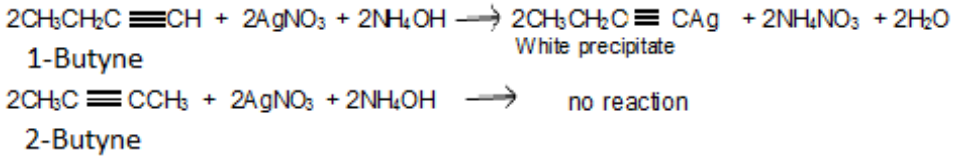
3. as a general anaesthetic.

4. for preparing 'Mustard gas' a chemical used in World War I. The name comes from its mustard like odour. It is not a gas, but a high boiling liquid that is dispersed as a mist of tiny droplets. It is a powerful vesicant i.e., causes blisters.



4. How Ammonical solution of AgNO3 can be used to distinguish between 1-Butyne and 2-Butyne.

Ans: 1-Butyne is a terminal alkyne and thus acidic in nature. It therefore reacts with ammonical silver nitrate $AgNO_3$ in presence of NH_4OH to produce a white precipitate. In 2-Butyne triple bond is not terminal hence triple bonded carbon atoms do not have a hydrogen atom attached and therefore lack acidic character. It gives no reaction with ammonical silver nitrate.

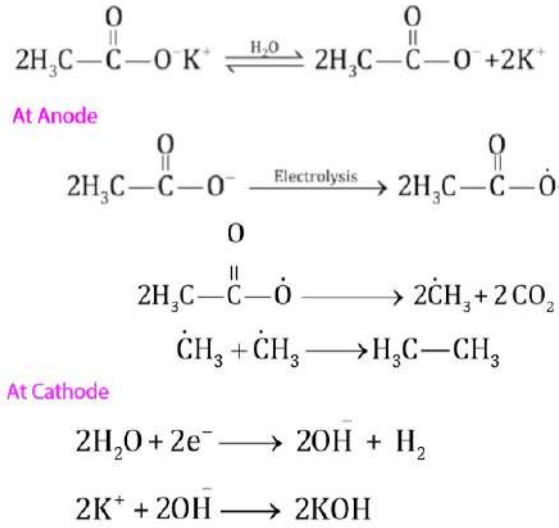


5. State Markownikov's rule. Give example.

Ans: The rule states that; in the addition of an unsymmetrical reagent to an unsymmetrical alkene, the negative part of the adding reagent goes to that carbon, constituting the double bond, which has least number of hydrogen atoms.

6. Write mechanism for Kolbe's electrolytic method for preparation of an alkane.

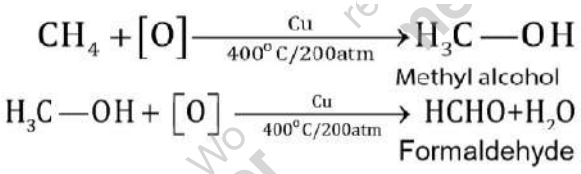
Ans:



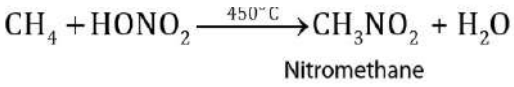
7. Convert methane into i. Formaldehyde ii. Nitromethane

Ans:

Methane into Formaldehyde



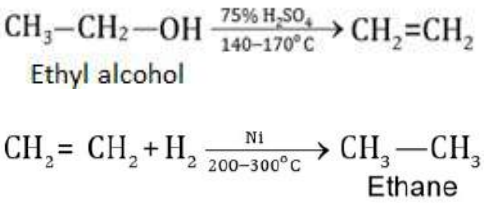
Methane into Nitromethane



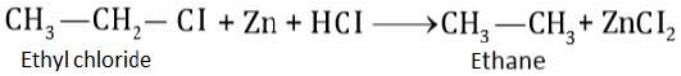
8. Prepare Ethane from i. Ethyl alcohol ii. Ethyl chloride

Ans:

Ethane from Ethyl alcohol

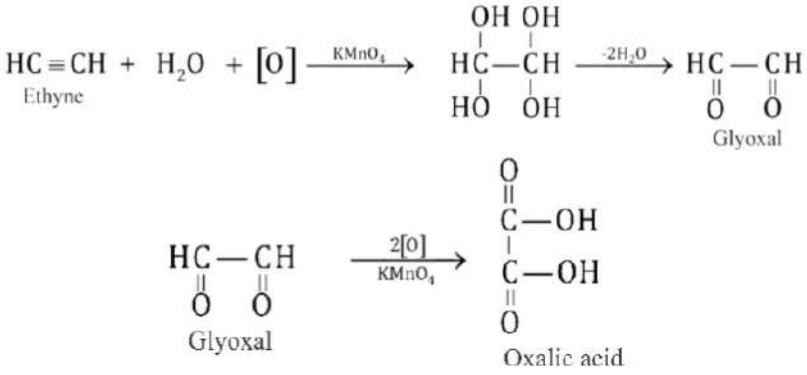


Ethane from Ethyl chloride



9. Write the chemical equation when alkaline $KMnO_4$ reacts with ethyne.

Ans:



10.Alkanes are less reactive than alkenes. Comment.

Ans:

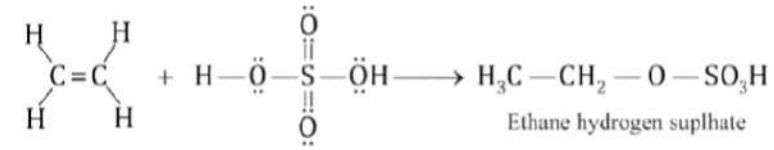
The unreactivity of alkanes under normal conditions may be explained on the basis of the non-polarity of the bonds forming them. The eletronegativity values of carbon (2.5) and hydrogen (2.1) do not differ appreciably and the bonding electrons between C-H and C-C are equally shared making them almost nonpolar. In view of this, the ionic reagents such as acids, alkalies, oxidizing agents, etc find no reaction site in the alkane molecules to which they could be attached.

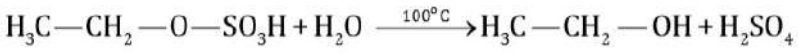
Inertness of s-bond

The unreactivity of alkanes can also be explained on the basis of inertness of a s-bond. In a s -bond the electrons are very tightly held between the nuclei which makes it a very stable bond. A lot of energy is required to break it. Moreover the electrons present in a σ-bond can neither attack on any electrophile nor a nucleophile can attack on them. Both these facts make alkanes less reactive.

11. Ethene can be converted to ethyl alcohol. Write equation.

Ans:





12.Give four uses of Methane.

Ans:

(i) as a fuel and as an illuminating gas.

(ii) for the preparation of methylchloride, dichloromethane, chloroform and carbon tetrachloride.

(iii) for the industrial preparation of methyl alcohol, formaldehyde and hydrogen cyanide.

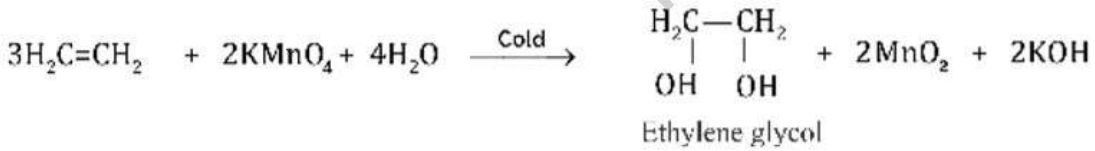
(iv) for the preparation of carbon black used in paints, printing inks and automobile tyres.

(v) is used to manufacture urea fertilizer.

13.What is Baeyer's test? What is its use?

Ans:

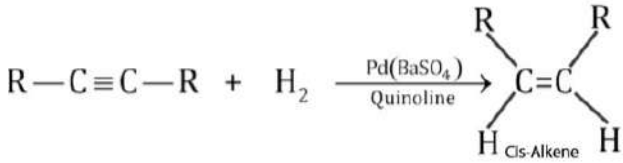
When alkenes are treated with mild oxidizing reagents like dilute (1%) alkaline $KMnO_4$ solution (Baeyer's Reagent) at low temperature, hydroxylation of duoubie bond occurs resulting in the formation of dihydroxy compounds known as vicinal glycols. The pink colour of $KMnO_4$ solution is discharged during the reaction. This test is used to check the presence of unsaturation in the molecules. For example,



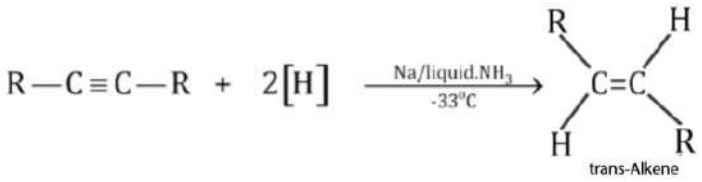
14. How cis and trans alkenes are produced? Give reactions.

Ans:

Controlled hydrogenation of alkynes with hydrogen gas in an equimolar ratio over heated catalysts, gives alkenes. The catalyst is finely divided palladium supported on $BaSO_4$ and poisoned by treatment with quinoline (Lindlar's catalyst).



A trans alkene can be obtained by treating an alkyne with Na in liquid NH3 at -33°C.

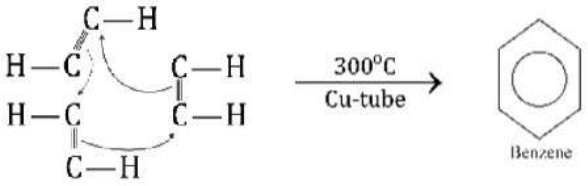


15. How will you synthesize following compounds from ethyne (acetylene). i. Benzene ii. Chloroprene
OR Convert (i) acetylene to benzene (ii) vinyl acetylene to chloroprene

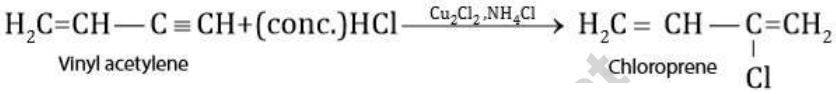
Ans:

(i) acetylene to benzene

When acetylene is passed through a copper tube at 300°C, it polymerizes to benzene.

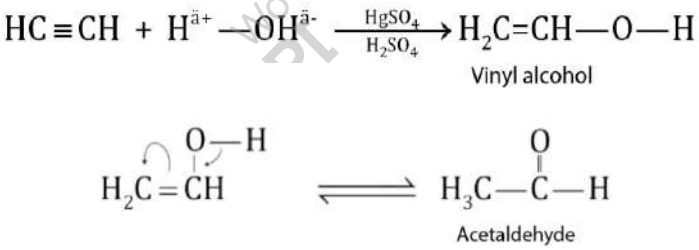


(ii) vinyl acetylene to chloroprene



16.Convert ethyne into acetaldehyde.

Ans:



17. Sigma bond is inert. Justify it.

Ans:

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18.Why alkanes are less reactive organic compounds?

Ans:

The unreactivity of alkanes under normal conditions may be explained on the basis of the non-polarity of the bonds forming them. The eletronegativity values of carbon (2.5) and hydrogen (2.1) do not differ

appreciably and the bonding electrons between C-H and C-C are equally shared making them almost nonpolar. In view of this, the ionic reagents such as acids, alkalies, oxidizing agents, etc find no reaction site in the alkane molecules to which they could be attached.

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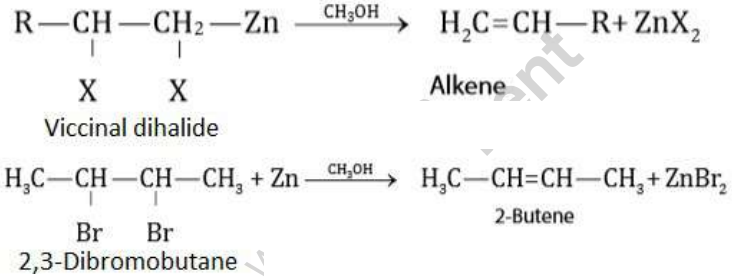
19. What happens when vicinal dihalide is treated with Zinc dust?

Ans:

Vicinal dihalides have two halogens on adjacent carbon atoms. Dehalogenation occurs when dihalide is treated with Zinc dust in an anhydrous solvent like methanol or acetic acid.



20. Why alkanes are called Paraffins and alkenes as Olefins?

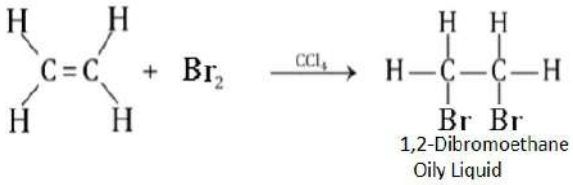
Ans:

The alkanes or paraffins (Latin: parum = little, affins = affinity) under ordinary condition are inert towards acids, alkalis, oxidizing and reducing agents. However, under suitable conditions, alkanes do undergo two types of reactions.

1. Substitution Reactions

2. Thermal and Catalytic Reactions

They are also known as Olefins (derived from Latin word olefiant meaning oil forming) because lower members form oily products on treatment with chlorine or bromine.



LONG QUESTIONS:

1. Give one method of preparation of each of Ethane, Ethene and Ethyne.

2. Discuss acidic nature of alkynes with at least two examples.

3. Convert (i) acetic acid into methane (ii) 1-Propanol to 1-Chloro-2-propanol.

4. How can you convert i. 2,3-Dibromo butane into 2-Butene ii. Acetone into propane iii. Acetylene into vinyl acetylene iv. Acetylene into Disilver acetylide

5. How can you convert v. Propyne into acetone vi. Ethyne into oxalic acid

6. Discuss acidic behaviour of alkynes. What are the main uses of alkynides?

7. How will you distinguish between Ethane, Ethene and Ethyne? Give comparison of reactivity of alkane, alkene and alkyne.

8. Prepare Ethane from Kolbe's electrolysis?

9. How is ethene prepared by Kolbe's electrolytic method? Write its mechanism.

10.Write a note on Halogenation of alkanes.

11.Write chemical reactions of Ethene with the following. i. HCl ii. Br2 iii. O3 iv. HOX

12. Why are some hydrocarbons called saturated and others unsaturated? Write down their characteristic reactions.

13.What are the rules for naming alkynes? Give suitable examples.