Class: 10th

Subject: Chemistry

Chapter 12: Hydrocarbons

Important MCQs:

1. Which elements are present in hydrocarbons?

(a) Carbon and oxygen

(b) Hydrogen and nitrogen

(c) Carbon and hydrogen ✅

(d) Carbon and chlorine

2. Which of the following is a saturated hydrocarbon?

(a) Ethene

(b) Methane ✅

(c) Ethyne

(d) Propyne

3. What is the general formula of alkanes?

(a) CnH_2n

(b) CnH_2n+2 ✅

(c) CnH_2n-2

(d) CnHn

4. Which type of bond is present in alkenes?

(a) Single bond

(b) Triple bond

(c) Double bond ✅

(d) Ionic bond

5. Which of the following is an example of an alkyne?

(a) Ethene

(b) Methane

(c) Ethyne ✅

(d) Propane

6. Why are hydrocarbons almost non-polar in nature?

(a) Due to ionic bonds

(b) Due to high electronegativity

(c) Due to similar electronegativities of carbon and hydrogen ✅

(d) Due to the presence of oxygen

7. Hydrocarbons are insoluble in:

(a) Alcohol

(b) Ether

(c) Water ✅

(d) Benzene

8. What type of hydrocarbon is benzene?

(a) Alkyne

(b) Aromatic ✅

(c) Alkene

(d) Alkane

9. Which of the following is an example of a branched-chain hydrocarbon?

(a) Methane

(b) Isobutane ✅

(c) Ethene

(d) Cyclohexane

10. Fossil fuels mainly consist of:

(a) Alcohols

(b) Hydrocarbons ✅

(c) Proteins

(d) Acids

11. What type of bonds are present between carbon atoms in alkanes?

(a) Double bonds

(b) Triple bonds

(c) Single bonds ✅

(d) Ionic bonds

12. Why are alkanes called paraffins?

(a) Because they are polar

(b) Because they are aromatic

(c) Because they have high reactivity

(d) Because they have very low reactivity ✅

13. Which of the following is the first member of the alkane series?

(a) Ethane

(b) Propane

(c) Butane

(d) Methane ✅

14. What is the main source of methane in natural gas?

(a) Crude oil

(b) Coal gas

(c) Bacterial decay of vegetable matter ✅

(d) Petrol

15. Methane makes up approximately how much of natural gas?

(a) 45%

(b) 65%

(c) 85% ✅

(d) 100%

16. Alkanes can be prepared by hydrogenation of:

(a) Alkanes

(b) Halogens

(c) Alkenes and alkynes ✅

(d) Alcohols

17. In hydrogenation, which catalyst is used at 250–300°C?

(a) Platinum

(b) Nickel ✅

(c) Copper

(d) Sodium

18. Alkanes are insoluble in water because:

(a) They are ionic

(b) They are reactive

(c) They are nonpolar ✅

(d) They have large size

19. With the increase in molecular size, the melting

and boiling points of alkanes:

(a) Decrease

(b) Remain constant

(c) Increase irregularly

(d) Increase gradually ✅

20. Which type of chemical reaction is shown by alkanes with halogens?

(a) Addition reaction

(b) Elimination reaction

(c) Substitution reaction ✅

(d) Redox reaction

21. Halogenation of alkanes occurs in:

(a) Dark only

(b) Diffused sunlight ✅

(c) Boiling water

(d) Direct flame

22. What is formed in the complete combustion of methane?

(a) CO and water

(b) C and water

(c) CO_2 and water ✅

(d) CO and carbon

23. In the absence of enough oxygen, combustion of alkanes produces:

(a) CO_2

(b) CO ✅

(c) HCl

(d) CH_4

24. Which of the following is a use of carbon tetrachloride?

(a) Food coloring

(b) Plasticizer

(c) Dry cleaning solvent ✅

(d) Rocket fuel

25. What is the molecular formula of the simplest alkene (ethene)?

(a) C_2H_6

(b) C_2H_2

(c) C_2H_4 ✅

(d) CH_4

26. Why are alkenes also called olefins?

(a) Because they are polar compounds

(b) Because they smell like oil

(c) Because they form oily products with halogens ✅

(d) Because they are found in oils

27. Which of the following statements about alkenes is true?

(a) They are saturated compounds

(b) They are more reactive than alkanes ✅

(c) They occur freely in nature

(d) They are solid at room temperature

28. Which method is used to prepare ethene from ethanol?

(a) Hydrogenation

(b) Dehydration ✅

(c) Halogenation

(d) Hydrolysis

29. Which reagent is used in dehydration of alcohols to prepare alkenes?

(a) HNO_3

(b) Conc. H_2SO_4 ✅

(c) NaOH

(d) KOH (aq)

30. What is the characteristic type of reaction of alkenes?

(a) Substitution reaction

(b) Neutralization reaction

(c) Addition reaction ✅

(d) Displacement reaction

31. Which reaction is used to convert ethene into ethane?

(a) Halogenation

(b) Oxidation

(c) Hydrogenation ✅

(d) Hydrolysis

32. What is the effect of ethene on bromine water?

(a) It turns red

(b) It decolorizes it ✅

(c) It turns green

(d) No effect

33. Which of the following shows the correct order of reactivity of hydrogen halides with alkenes?

(a) HCl > HBr > HI

(b) HBr > HI > HCl

(c) HCl > HI > HBr

(d) HI > HBr > HCl ✅

34 What is the molecular formula of acetylene, the simplest alkyne?

(a) C_2H_4

(b) CH_4

(c) C_2H_2 ✅

(d) C_2H_6

35. Why are alkynes also called acetylenes?

(a) Because they contain acetic acid

(b) Because they have alcohol groups

(c) Because the first member is acetylene ✅

(d) Because they are aromatic compounds

36. Which method is used to prepare ethyne from vicinal dihalides?

(a) Dehydration

(b) Dehydrohalogenation ✅

(c) Hydrogenation

(d) Substitution

37. Which reagent is used in dehydrohalogenation of vicinal dihalides to produce alkynes?

(a) Dilute H_2SO_4

(b) NaOH (aq)

(c) Alcoholic KOH ✅

(d) Zinc dust

38. What is produced when tetrahalides are heated with zinc dust?

(a) Methane

(b) Ethene

(c) Ethyne ✅

(d) Benzene

39. Which of the following is a physical property of acetylene?

(a) Highly soluble in water

(b) Colourless gas with faint garlic odour ✅

(c) Heavier than air

(d) Solid at room temperature

40. What kind of flame do alkynes produce upon burning?

(a) Smokeless flame

(b) No flame

(c) Smokier flame than alkanes and alkenes ✅

(d) Yellowish blue flame

41. What is the main type of reaction shown by alkynes?

(a) Substitution

(b) Addition ✅

(c) Neutralization

(d) Hydrolysis

42. What is observed when bromine water is added to acetylene?

(a) Red color forms

(b) Red-brown color disappears ✅

(c) White precipitate forms

(d) No change

43. Which acid is formed by the oxidation of ethyne with alkaline $KMnO_4$?

(a) Acetic acid

(b) Citric acid

(c) Oxalic acid ✅

(d) Formic acid

Exercise Short Questions:

1. Differentiate between saturated and unsaturated hydrocarbons.

Answer:

Saturated hydrocarbons contain only single bonds between carbon atoms. They are called alkanes and follow the general formula C_nH_{2n+2}.

Unsaturated hydrocarbons contain one or more double or triple bonds between carbon atoms. They are further divided into:

- Alkenes (with double bonds – C=C)
- Alkynes (with triple bonds – C≡C)

2. A compound consisting of four carbon atoms has a triple bond in it. How many hydrogen atoms are present in it?

Answer:

The general formula for alkynes is CnH2n−2.

If number of carbon atoms (n) = 4, then:

H = 2(4) − 2 = 6 hydrogen atoms

🧪 So, the compound is C_4H_6.

3. Why are the alkanes called 'paraffins'?

Answer:

Alkanes are called paraffins (Latin: parum affinis = little affinity) because:

- They are less reactive
- Their carbon-carbon and carbon-hydrogen bonds are strong
- They do not readily react with acids, bases, or oxidizing agents under normal conditions.

4. What do you know about hydrogenation of alkenes?

Answer:

Hydrogenation is a chemical reaction in which hydrogen gas (H_2) is added to alkenes in the

presence of a nickel or platinum catalyst, converting them into alkanes.

🧪 **Example:**

$CH_2=CH_2 + H_2 \Rightarrow CH_3-CH_3$ (Ethene to Ethane)

This reaction is used in vegetable oil hardening and organic synthesis.

5. How are alkyl halides reduced?

Answer:

Alkyl halides are reduced by:

- Zinc (Zn) and dilute HCl,
- Or other reducing agents like $LiAlH_4$,

to form alkanes by removal of halogen and addition of hydrogen.

🧪 **Example**:

$C_2H_5Cl + 2[H] \Rightarrow C_2H_6 + HCl$

6. Why are the alkanes used as fuel?

Answer:

Alkanes are used as fuels because:

- They burn readily in air,
- They release a large amount of heat energy,
- They undergo complete combustion, producing CO_2 and H_2O.

🧪 **Example**: $CH_4 + 2O_2 \Rightarrow CO_2 + 2H_2O$ + Energy

7. How can you prepare ethene from alcohol and ethyl bromide?

Answer:

From Alcohol:

- Ethanol is heated with concentrated H_2SO_4 ⇒ Dehydration reaction

$C_2H_5OH \Rightarrow CH_2=CH_2 + H_2O$ (Ethene)

From Ethyl Bromide:

- Heated with alcoholic KOH ⇒ Dehydrohalogenation

C_2H_5Br + alc. $KOH \Rightarrow CH_2=CH_2 + HBr$

8. Identify propane from propene with a chemical test.

Answer:

🔍 **Bromine water test is used:**

- Propene (alkene) decolorizes red-brown bromine water due to addition reaction.
- Propane (alkane) does not react, so no color change.

🧪 **Observation:**

Propene ⇒ Colourless

Propane ⇒ No change

9. Why are the alkenes called 'olefins'?

Answer:

Alkenes are called olefins (from Latin: oleum = oil + facere = to make) because:

🔹 The first member (ethene) forms an oily compound when reacted with chlorine.

🔹 So, alkenes were historically known as oil-formers ⇒ "olefins"

10. Why alkane can't be oxidized with $KMnO_4$ solution?

Answer:

Alkanes are saturated and stable compounds.

- They have only single bonds which are not easily broken,
- So they do not react with oxidizing agents like $KMnO_4$ under normal conditions.

➡ Hence, no oxidation reaction occurs.

11. What are the addition reactions? Explain with an example.

Answer:

Addition reactions occur when unsaturated hydrocarbons (like alkenes and alkynes) add atoms or groups across the double or triple bond.

🧪 **Example (Ethene + Bromine):**

$CH_2=CH_2 + Br_2 \Rightarrow CH_2Br-CH_2Br$

👉 The double bond breaks and Br atoms are added, forming a dibromo compound.

12. Justify that alkanes give substitution reactions.

Answer:

Alkanes are saturated hydrocarbons, and they

undergo substitution reactions, where hydrogen atoms are replaced by halogens (like Cl or Br) in the presence of sunlight or UV light.

🧪 **Example (Methane + Chlorine):**

$CH_4 + Cl_2 \Rightarrow CH_3Cl + HCl$

☀️ Reaction requires sunlight

13. Both alkenes and alkynes are unsaturated hydrocarbons. State the one most significant difference between them.

Answer:

The most significant difference:

- Alkenes contain one double bond (C=C),
- Alkynes contain one triple bond (C≡C)

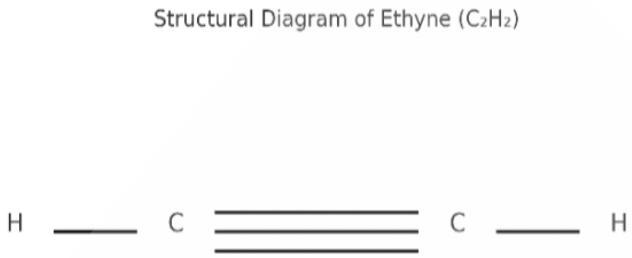
👉 This difference affects their reactivity and chemical properties.

14. Write the molecular, dot and cross, and structural formula of ethyne.

Answer:

- Molecular Formula: C_2H_2

- **Dot and Cross Diagram:**



Each carbon shares three electrons (triple bond) between them and one electron with hydrogen.

H–C≡C–H

(dots/crosses show shared electrons)

- Structural Formula:

H–C≡C–H

(one triple bond between carbon atoms)

15. Why are hydrocarbons soluble in organic solvents?

Answer:

Hydrocarbons are non-polar molecules, and organic solvents are also mostly non-polar.

➡ According to the rule “like dissolves like,”

- Non-polar hydrocarbons dissolve in non-polar

organic solvents (e.g., benzene, ether).

🔍 Therefore, hydrocarbons are soluble in organic solvents.

16. Give the physical properties of alkanes.

Answer:

- Alkanes are non-polar compounds.
- They are insoluble in water but soluble in organic solvents.
- Low molecular mass alkanes are gases (e.g., methane, ethane).
- Medium molecular mass alkanes are liquids (e.g., pentane, hexane).
- High molecular mass alkanes are waxy solids.
- They are colorless, odorless, and less dense than water.
- They have low boiling and melting points, which increase with molecular size.

17. How can you identify ethane from ethene?

Answer:

You can identify ethene from ethane using bromine water test:

🧪 **Test:**

Add bromine water to both compounds.

Result:

- Ethene (unsaturated) decolorizes bromine water.
- Ethane (saturated) does not react, so the brown color remains.

18. Why does the colour of bromine water discharge on addition of ethene in it?

Answer:

Ethene is an unsaturated hydrocarbon that undergoes addition reaction with bromine.

🧪 $CH_2=CH_2 + Br_2 \Rightarrow CH_2Br-CH_2Br$

👉 The double bond breaks, and bromine atoms add to ethene, forming a colorless compound, so the brown color disappears.

19. State one important use of each:

(i) Ethene:

Used in ripening of fruits and in the manufacture of polythene (plastic).

(ii) Acetylene:

Used in oxy-acetylene welding due to its high-temperature flame.

(iii) Chloroform:

Used as a solvent and was previously used as an anesthetic.

(iv) Carbon tetrachloride:

Used as a dry-cleaning solvent and in fire extinguishers.

Exercise Long Questions:

🌟 **Q1: What type of reactions are given by alkanes? Explain with reference to halogenation of alkanes.**

❖ Introduction:

Alkanes are saturated hydrocarbons, containing single covalent bonds only (C–C and C–H). Due to their stability, they are less reactive but undergo a special type of reaction called substitution reaction.

🔹 Type of Reaction — Substitution Reaction:

In substitution reactions, one or more hydrogen atoms in an alkane molecule are replaced by halogen atoms (Cl, Br, etc.), usually in the presence of sunlight or UV light.

🔹 **Example:** Halogenation of Methane

🧪 Reaction:

$CH_4 + Cl_2 \longrightarrow CH_3Cl + HCl$

(Occurs in presence of sunlight)

➤ Explanation:

- One hydrogen atom of methane is replaced by a chlorine atom.
- The product formed is methyl chloride (CH_3Cl) and hydrogen chloride (HCl).

🔹 **Further Substitution Steps:**

If excess chlorine is present, further substitution may occur:

$CH_3Cl + Cl_2 \longrightarrow CH_2Cl_2 + HCl$

$CH_2Cl_2 + Cl_2 \longrightarrow CHCl_3 + HCl$

$CHCl_3 + Cl_2 \longrightarrow CCl_4 + HCl$

👉 Final product can be carbon tetrachloride (CCl_4).

🔹 **Conditions Required:**

- Presence of sunlight or UV light
- Excess halogen to continue substitution
- Occurs in steps (stepwise reaction)

🌟 **Q2: Alkanes are a source of heat. Explain it.**

❖ **Introduction:**

Alkanes are excellent fuels because they are hydrocarbons that burn readily in the presence of oxygen to produce heat, light, CO_2, and water.

🔹 **Combustion of Alkanes (Exothermic Reaction):**

When alkanes react with oxygen, they undergo

complete combustion, releasing **a large amount of energy.**

🧪 **Example (Methane):**

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O + \text{heat}$

📌 This reaction releases heat energy, which makes alkanes useful as fuels.

🔹 Why Alkanes Are Good Fuels:

- They burn with a clean flame (especially lower alkanes).
- They release large amounts of heat energy per gram.
- They are abundant and cheap, especially in the form of natural gas and LPG.
- They are used in cooking, heating, and industries.

🔹 Common Alkanes Used as Fuel:

Alkane	Fuel Type	Use
Methane	Natural Gas	Domestic fuel (gas stove)

Propane/Butane	LPG (cylinders)	Heating/Cooking
Octane	Petrol (gasoline)	Car engines

(i) Ethane from Ethene

🧪 **Reaction:**

$C_2H_4 + H_2 \longrightarrow C_2H_6$

(Heat and Ni catalyst)

Explanation:

- Ethene (C_2H_4) is an unsaturated hydrocarbon (alkene).
- On hydrogenation (reaction with hydrogen gas in the presence of nickel catalyst and heat), the double bond breaks and ethane (C_2H_6) is formed.

(ii) Acetylene from Tetrahalide

🧪 **Reaction:**

$C_2H_2Br_4 + 2Zn \longrightarrow C_2H_2 + 2ZnBr_2$

(With Alcoholic Zn)

➤ **Explanation:**

- 1,1,2,2-Tetrabromoethane ($C_2H_2Br_4$) when heated with alcoholic zinc, it undergoes dehalogenation.

- The four bromine atoms are removed as $ZnBr_2$, and acetylene (C_2H_2) is formed.
- This is a method to prepare alkynes from tetrahalides.

(iii) Carbon Tetrachloride from Methane

🧪 **Reaction (Stepwise Chlorination):**

$CH_4 + 4Cl_2 \longrightarrow CCl_4 + 4HCl$

(UV light or sunlight)

➤ **Explanation:**

- Methane reacts with chlorine gas in presence of UV light or sunlight.
- In a substitution reaction, all 4 hydrogen atoms of methane are replaced by chlorine atoms step-by-step.

- Final product is carbon tetrachloride (CCl_4).

(iv) Ethylene Glycol from Ethene

🧪 **Reaction (Hydroxylation):**

$C_2H_4 + [O] + H_2O \longrightarrow HO{-}CH_2{-}CH_2{-}OH$

(Potassium permanganate solution)

➤ **Explanation:**

- Ethene reacts with cold, dilute $KMnO_4$ solution (alkaline) to form ethylene glycol (1,2-ethanediol).
- It is an oxidation reaction, where both double bonded carbons receive an –OH group.
- $KMnO_4$ acts as a mild oxidizing agent.

(v) 1,2-Dibromoethane from Ethene

🧪 **Reaction:**

$C_2H_4 + Br_2 \longrightarrow Br{-}CH_2{-}CH_2{-}Br$

➤ **Explanation:**

- Ethene reacts with bromine (Br_2) in an addition reaction.

- The double bond breaks and one Br atom adds to each carbon, forming 1,2-dibromoethane.
- This reaction is used as a test for unsaturation (bromine water becomes colourless).

(vi) Glyoxal from Acetylene

🧪 **Reaction:**

$HC{\equiv}CH + [O] \longrightarrow OHC{-}CHO$

(Cold dilute $KMnO_4$ or mild oxidation)

➤ **Explanation:**

- Acetylene (ethyne) reacts with cold, dilute alkaline $KMnO_4$ and undergoes mild oxidation.
- The triple bond opens and forms glyoxal (ethane-1,2-dial), a compound containing two –CHO (aldehyde) groups.
- It's an important oxidation product of alkynes.

🌟 **Q4: Explain the oxidation of acetylene.**

❖ **Introduction:**

Acetylene (C_2H_2) is the first member of the alkyne series. It is an unsaturated hydrocarbon containing

a triple bond between two carbon atoms. Due to the presence of this reactive triple bond, acetylene undergoes many addition and oxidation reactions easily.

🔹 Oxidation Reaction of Acetylene:

Acetylene reacts with alkaline potassium permanganate ($KMnO_4$) to undergo oxidation. This reaction occurs in two steps:

🔹 Step 1: Formation of Tetrahydroxy Ethane (Intermediate Product)

- In the first step, four hydroxyl (−OH) groups add across the triple bond of acetylene.
- This leads to the formation of tetrahydroxy ethane.

Chemical Equation:

$HC{\equiv}CH + 2KMnO_4 + 2H_2O \longrightarrow OH{-}CH{=}CH{-}OH + 2MnO_2 + 2KOH$

(Tetrahydroxy ethane - Intermediate Product)

🔹 Step 2: Conversion to Glyoxal and then to Oxalic Acid

- The intermediate product eliminates two water molecules, forming glyoxal (OHC–CHO).
- Further oxidation of glyoxal produces oxalic acid (HOOC–COOH).

Chemical Equations:

- $OH–CH=CH–OH \rightarrow OHC–CHO + 2H_2O$ (Glyoxal)
- $OHC–CHO + [O] \rightarrow HOOC–COOH$ (Oxalic Acid)

🔸 **Key Points:**

- Oxidation occurs due to the presence of weak π-bonds in the triple bond.
- Potassium permanganate acts as a strong oxidizing agent.
- The final product is oxalic acid, which is a dicarboxylic acid.

🌟 **Q5: Write balanced chemical equations for the following reactions. Also, name the products that are formed.**

🔹 (i) A mixture of ethyne and hydrogen is passed over heated nickel

📗 Balanced Chemical Equation:

$C_2H_2 + 2H_2 \Rightarrow C_2H_6$

📙 **Product Formed:**

Ethane (C_2H_6)

📘 **Explanation:**

- This is a hydrogenation reaction.
- Ethyne (C_2H_2) is an unsaturated hydrocarbon (contains triple bond).
- When passed over heated nickel catalyst in the presence of hydrogen, the triple bond breaks.
- Two hydrogen molecules add to form ethane, a saturated hydrocarbon.

🧪 **Type of Reaction: Addition reaction**

🔹 (ii) Ethyne is treated with chlorine

📗 **Balanced Chemical Equation:**

$C_2H_2 + Cl_2 \Rightarrow CHCl=CHCl$

📙 Product Formed:

1,2-Dichloroethene

📘 **Explanation:**

This is also an addition reaction.

- Chlorine adds across the triple bond of ethyne, converting it into a halogenated compound.
- The reddish-brown color of chlorine disappears due to the reaction.

🧪 **Type of Reaction: Halogen addition**

🔹 **(iii) Ethyne is burnt in air**

📗 Balanced Chemical Equation:

$2C_2H_2 + 5O_2 \Rightarrow 4CO_2 + 2H_2O$

📙 **Products Formed:**

Carbon dioxide (CO_2) and Water (H_2O)

➤ **Explanation:**

- This is a complete combustion reaction.
- Ethyne burns in oxygen producing carbon dioxide, water, and releases heat and light.

- The flame is luminous and sooty because of high carbon content.

🧪 **Type of Reaction: Combustion**

🔹 **(iv) Ethyne is passed through bromine water**

📗 **Balanced Chemical Equation:**

$C_2H_2 + Br_2 \Rightarrow CHBr=CHBr$

📙 **Product Formed:**

1,2-Dibromoethene

➤ **Explanation:**

- Bromine adds across the triple bond of ethyne.
- This is an addition reaction and a test for unsaturation.
- The reddish-brown color of bromine water gets discharged — a positive test for unsaturated compounds.

Long Question 6: Explain Brifly

🔹 **(i) Why butane undergoes substitution reactions?**

❖ **Answer:**

- Butane is a saturated hydrocarbon (alkane) which contains only single bonds between carbon atoms.
- Due to the lack of double or triple bonds, alkanes cannot undergo addition reactions.
- Instead, they react by substitution — where one hydrogen atom is replaced by another atom or group, commonly by a halogen.

🧪 **Example Reaction:**

$C_4H_{10} + Cl_2 \Rightarrow C_4H_9Cl + HCl$

(Butane + Chlorine ⇒ Butyl chloride + Hydrogen chloride)

🔹 **(ii) There are millions of organic compounds.**

❖ **Answer:**

The number of organic compounds is in the millions because of carbon's unique bonding nature:

🔹 **Reasons:**

Catenation: Carbon atoms can bond with each other to form long chains, branched chains, and

rings.

Tetravalency: Carbon forms four covalent bonds, allowing a wide variety of combinations.

Bonding with other elements: Carbon easily bonds with H, O, N, halogens, etc.

Isomerism: Many organic compounds have same molecular formula but different structures (isomers), further increasing the variety.

🔹 **(iii) Acetylene undergoes addition reactions in two stages.**

❖ **Answer:**

- Acetylene (C_2H_2) is an alkyne having a triple bond between carbon atoms.
- In addition reactions, the triple bond is partially broken in the first stage, forming a double bond.
- In the second stage, the remaining double bond is broken, forming a single bond.

🧪 **Example Reaction (with Br_2):**

Stage 1: $C_2H_2 + Br_2 \Rightarrow CHBr=CHBr$

(1,2-Dibromoethene)

Stage 2: $CHBr=CHBr + Br_2 \Rightarrow CHBr_2–CHBr_2$ (1,1,2,2-Tetrabromoethane)

🔹 (iv) Alkynes are more reactive than alkanes.

❖ **Answer:**

- Alkynes contain triple bonds, whereas alkanes have only single bonds.
- Triple bonds have high electron density and are less stable, making them more reactive.
- Alkynes easily undergo addition reactions with halogens, hydrogen, etc.
- In contrast, alkanes require heat or light to react and usually undergo slow substitution reactions.

🧪 **Example Comparison:**

Alkyne: $C_2H_2 + Br_2 \Rightarrow CHBr=CHBr$ (Fast)

Alkane: $C_2H_6 + Cl_2 \Rightarrow C_2H_5Cl + HCl$ (Slow, needs UV light)

Note:

This chapter is designed to provide a solid foundation of knowledge, with the goal of deepening understanding and encouraging further exploration of the subject. The content has been carefully selected to support effective learning and inspire students to engage with the topic more deeply.

Author: Muhammad Asghar

Purpose: To contribute to education by offering insightful, valuable content that enhances learning and understanding.

Copyright & Usage Policy