Chapter 11

Hydrocarbons

11.1 Hydrocarbons

Multiple Choice Questions (MCQs)

1. **Organic chemistry is primarily concerned with:**
   Ⓐ the study of inorganic compounds
   Ⓑ the chemistry of carbon compounds
   Ⓒ the study of biochemistry Ⓓ the study of elemental chemistry

2. **_____ is not classified as an organic compound.**
   Ⓐ Proteins Ⓑ Enzymes Ⓒ Carbon dioxide Ⓓ Carbohydrates

3. **Most organic compounds contain carbon and often oxygen:**
   Ⓐ nitrogen Ⓑ sulphur Ⓒ phosphorus Ⓓ hydrogen

4. **_____Organic molecules are usually and complex in nature:**
   Ⓐ large Ⓑ small Ⓒ simple Ⓓ intricate

5. **The number of compounds formed by carbon is than those formed by all other elements combined:**
   Ⓐ less Ⓑ equal Ⓒ more Ⓓ incomparable

6. **Hydrocarbons consist only hydrogen and:**
   Ⓐ carbon Ⓑ oxygen Ⓒ nitrogen Ⓓ

7. **Common uses of hydrocarbons include:**
   Ⓐ fertilizers Ⓑ fuels Ⓒ metals Ⓓ solvents

8. **Hydrocarbons are classified into such as alkanes, alkenes, alkynes, and aromatic hydrocarbons:**
   Ⓐ metals Ⓑ nonmetals Ⓒ structural types Ⓓ natural types

9. **Only are discussed in this chapter among hydrocarbons:**
   Ⓐ aromatic hydrocarbons Ⓑ alkynes
   Ⓒ alkenes Ⓓ alkanes

10. **A characteristic feature of hydrocarbons is that they contain only:**
    Ⓐ carbon and hydrogen Ⓑ carbon and oxygen
    Ⓒ hydrogen and oxygen Ⓓ nitrogen and sulphur

Short Answered Questions

1. What are hydrocarbons?

Ans. Hydrocarbons are simple organic compounds made up only of carbon and hydrogen atoms. They form the basis of many fuels such as natural gas petrol and diesel. They are also used to make complex substances like plastics and pharmaceuticals.

2. Why are organic compounds significant?

Ans. Organic compounds include a wide range of substances from biomolecules like proteins and carbohydrates to industrially important materials like pharmaceuticals and synthetic fibers. Their diversity and complexity make them essential in biology and industry.

3. What distinguishes organic from inorganic compounds?

Ans. Organic compounds contain carbon and hydrogen and may include other elements like oxygen and nitrogen. They do not include some carbon-containing compounds like carbonates and oxides which are classified as inorganic.

4. How many organic compounds are known?

Ans. Several million organic compounds are known. These compounds are found naturally or are synthesized in laboratories. Their large number shows the versatility of carbon to form stable and varied molecular structures.

5. What makes carbon unique in forming compounds?

Ans. Carbon can form four covalent bonds with other atoms including itself. This allows it to create a variety of stable and complex molecular structures making it capable of forming more compounds than all other elements combined.

6. What are the uses of hydrocarbons?

Ans. Hydrocarbons are mainly used as fuels including natural gas LPG CNG petrol diesel and kerosene. They are also key for making chemical products like plastics synthetic fibers and medicines.

7. What are the main types of hydrocarbons?

Ans. Hydrocarbons are categorized into alkanes alkenes alkynes and aromatic hydrocarbons. Each type has unique properties and uses in various industries.

8. Why are alkanes significant?

Ans. Alkanes consist of carbon and hydrogen atoms linked by single bonds. They are stable and commonly used as fuels in various forms like gas and oil due to their less reactive nature compared to other hydrocarbons.

9. How are complex compounds derived from hydrocarbons?

Ans. Hydrocarbons serve as feedstock for making complex compounds. Through chemical reactions these simple molecules are turned into more complex ones with specific functional properties.

10. What role do hydrocarbons play in everyday life?

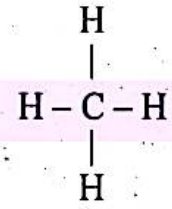
Ans. Hydrocarbons are crucial in daily life as the power vehicles heat homes and are the base for many everyday products like plastic containers and pharmaceuticals. Their energy content and versatility make them indispensable in modern society.

Exercise

☆ **What do you understand by the term structural formula of an organic compound?**

Ans. The formula which shows actual arrangement of atoms in an organic compound is called structural formula.

Example:



Methane

11.2 *Alkanes*

Multiple Choice Questions (MCQs)

11. Alkanes are saturated hydrocarbons because they contain only:

Ⓐ Double bonds Ⓑ Triple bonds Ⓒ Single bonds Ⓓ Ionic bonds

12. The molecular formula of propane is:

Ⓐ C_3H_6 Ⓑ C_3H_8 Ⓒ C_2H_6 Ⓓ C_4H_{10}

13. How many carbon atoms are present in hexane?

Ⓐ 4 Ⓑ 5 Ⓒ 6 Ⓓ 7

14. What is the IUPAC name for the compound $CH_3 - CH_2 - CH_2 - CH_3$?

Ⓐ Methane Ⓑ Ethane Ⓒ Propane Ⓓ Butane

15. **In IUPAC nomenclature, the prefix 'eth-' indicates the presence of:**
Ⓐ 1 carbon atom Ⓑ 2 carbon atoms Ⓒ 3 carbon atoms Ⓓ 4 carbon atoms

16. **Which alkane has the molecular formula C_4H_{10}?**
Ⓐ Methane Ⓑ Propane Ⓒ Butane Ⓓ Ethane

17. **Identify the simplest hydrocarbon:**
Ⓐ Methane Ⓑ Ethane Ⓒ Propane Ⓓ Butane

18. **The chemical formula C_nH_{2n+2} represents:**
Ⓐ Alkenes Ⓑ Alkynes Ⓒ Alcohols Ⓓ Alkanes

19. **Which term describes a hydrocarbon chain where all carbons are linked by single bonds?**
Ⓐ Saturated Ⓑ Unsaturated Ⓒ Cyclic Ⓓ Aromatic

20. **IUPAC nomenclature involves three parts: root, prefix, and:**
Ⓐ Base Ⓑ Suffix Ⓒ Addition Ⓓ Connector

21. **The prefix for a three-carbon alkane is:**
Ⓐ Meth- Ⓑ Eth- Ⓒ But- Ⓓ Prop-

22. **The root 'oct-' in IUPAC nomenclature indicates a chain of how many carbon atoms?**
Ⓐ 6 Ⓑ 7 Ⓒ 8 Ⓓ 9

23. **The IUPAC name for $CH_3-(CH_2)_4-CH_3$ is:**
Ⓐ Hexane Ⓑ Pentane Ⓒ Butane Ⓓ Heptane

24. **What type of bonding is found between carbon atoms in alkanes?**
Ⓐ Ionic Ⓑ Covalent Ⓒ Hydrogen Ⓓ Metallic

25. **Alkanes react with oxygen in a reaction type called:**
Ⓐ Addition Ⓑ Substitution Ⓒ Combustion Ⓓ Fermentation

26. **The term 'n-butane' refers to:**
Ⓐ A branched isomer. Ⓑ A cyclic molecule
Ⓒ An unsaturated molecule Ⓓ An unbranched molecule

27. **Methane can also be referred to as:**
Ⓐ The parent hydrocarbon Ⓑ iso-Methane
Ⓒ n-Methane Ⓓ Aromatic methane

28. **The alkane with the formula C_7H_{16} is named:**
Ⓐ Methane Ⓑ Heptane Ⓒ Propane Ⓓ Nonane

29. **Which alkane is used commonly as a fuel for barbecues?**
Ⓐ Methane Ⓑ Propane Ⓒ Butane Ⓓ Ethane

30. **Ethane consists of how many carbon atoms?**
Ⓐ 4 Ⓑ 3 Ⓒ 2 Ⓓ 1

Short Answered Questions

1. What are alkanes?

Ans. Alkanes are simple organic compounds consisting solely of carbon and hydrogen atoms linked by single bonds. They are also known as saturated hydrocarbons because every carbon atom in an alkane uses all its four valencies to bond with other carbon atoms or hydrogen atoms.

2. Why are alkanes called saturated hydrocarbons?

Ans. Alkanes are termed saturated hydrocarbons because all the carbon-carbon bonds in alkanes are single bonds, which means all the carbon atoms have reached their maximum capacity of forming single bonds with hydrogen or other carbon atoms.

3. What is the general formula for alkanes?

Ans. The general formula for alkanes is CnH2n+2 where n represents the number of carbon atoms in the molecule. This formula helps determine the number of hydrogen atoms in an alkane based on its carbon content.

4. Why is methane called the parent hydrocarbon?

Ans. Methane is known as the parent hydrocarbon because it is the simplest form of alkane, consisting of only one carbon atom bonded to four hydrogen atoms. It serves as a fundamental building block for more complex hydrocarbons.

5. How is IUPAC nomenclature used to name alkanes?

Ans. IUPAC nomenclature for naming alkanes involves identifying the longest continuous chain of carbon atoms and then naming it based on the number of carbons it contains. The chain is modified by prefixes and suffixes that describe any branching or functional groups.

6. What role does the root play in IUPAC nomenclature of alkanes?

Ans. In IUPAC nomenclature, the root of the name indicates the number of carbon atoms in the longest continuous chain of the alkane molecule. This root helps in forming the base of the compound's name.

7. What does the suffix indicate in the naming of alkanes?

Ans. The suffix in the naming of alkanes indicates the type of chemical compound. For alkanes, the suffix "-ane" is used to show that the compound is a saturated hydrocarbon with single bonds only.

8. How do you determine the prefix in alkane nomenclature?

Ans. The prefix in the nomenclature of alkanes describes the groups attached to the longest chain. It provides information about the number and type of branches or functional groups attached to the main chain.

9. What is the significance of the chain length in naming alkanes?

Ans. The length of the carbon chain in an alkane determines the root of its IUPAC name and affects the compound's physical and chemical properties. Longer chains typically mean higher boiling points and greater molecular weights.

10. How are complex alkanes named?

Ans. Complex alkanes are named by identifying the longest carbon chain as the base name and adding prefixes that describe any branches or substituents. The position of the branches is indicated by numbers, ensuring the lowest possible digits for the substituents along the chain.

Interesting Information!

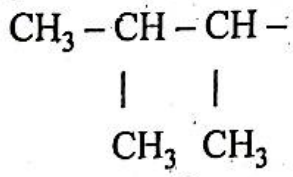
☆ **What distinguishes alkanes from other compounds in terms of reactivity?**

Ans. The distinguishing feature of alkanes making them distinct from other compounds is their lack of reactivity towards usual chemical reagents.

Exercise

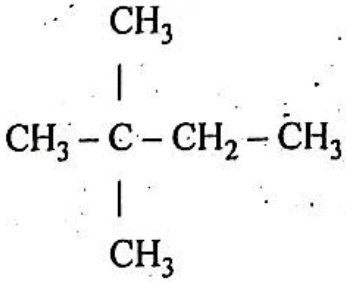
1. Name the following compounds according to IUPAC system of nomenclature.

(i)



IUPAC Name: 2,3-Dimethylpentane

(ii)



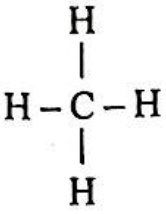
IUPAC Name: 2,2-Dimethylbutane

Exercise

☆ **How many methyl and methylene, groups are present in each of the above compounds?**

Ans. 1. Methane (CH_4)

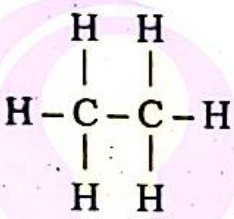
Open Structure:



- Methyl groups ($-CH_3$): 1
- Methylene groups ($-CH_2-$): 0

2. Ethane (C_2H_6)

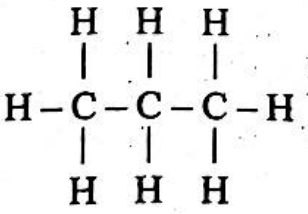
Open Structure:



- Methyl groups ($-CH_3$): 2
- Methylene groups ($-CH_2-$): 0

3. Propane (C_3H_8)

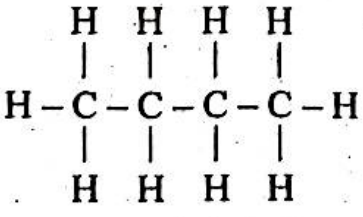
Open Structure:



- Methyl groups ($-CH_3$): 2 (one at each end)
- Methylene groups ($-CH_2-$): 1 (middle carbon atom)

4. Butane (C_4H_{10}):

Open Structure:



- Methyl groups ($-CH_3$): 2 (one at each end)
- Methylene groups ($-CH_2-$): 2 (two central carbon atoms)

11.3 Preparation of Alkanes

Multiple Choice Questions (MCQs)

31. **The process of breaking higher molecular mass hydrocarbons into smaller ones is called:**
Ⓐ Hydrolysis Ⓑ Cracking Ⓒ Hydrogenation Ⓓ Fermentation

32. **Naphtha is heated at around ____°C in the presence of a catalyst to produce smaller hydrocarbons.**
Ⓐ 100°C Ⓑ 250°C Ⓒ 500°C Ⓓ 750°C

33. **The catalyst used in the cracking process of naphtha to produce smaller hydrocarbons is called:**
Ⓐ Platinum Ⓑ Iron Ⓒ Nickel Ⓓ Zeolite

34. **Cracking naphtha produces_____containing 5 to 10 carbon atoms.**
Ⓐ Alkanes and Alkenes Ⓑ Alkanes and Alkynes
Ⓒ Alkenes and Aromatics Ⓓ Only Alkanes

35. **Alkanes can be prepared from alkenes and alkynes using hydrogen gas in the presence of _____ as a catalyst.**
Ⓐ Platinum Ⓑ Nickel Ⓒ Silver Ⓓ Copper

36. **The addition of hydrogen to alkenes or alkynes to form alkanes is also known as a reaction:**
Ⓐ Oxidation Ⓑ Substitution Ⓒ Reduction Ⓓ Addition

37. **Methane cannot be prepared by reducing:**
Ⓐ Alkyl halides Ⓑ Alkenes Ⓒ Alkynes Ⓓ Both B and C

38. **Alkyl halides can be reduced to alkanes using hydrogen generated from the reaction of zinc metal with:**
Ⓐ Sulfuric acid Ⓑ Nitric acid Ⓒ Hydrochloric acid Ⓓ Acetic acid

39. **The reaction between zinc and hydrochloric acid produces _____ along with hydrogen:**
Ⓐ Zinc chloride Ⓑ Zinc sulphate Ⓒ Zinc nitrate Ⓓ Zinc acetate

40. **In the reaction used to reduce alkyl halides, the intermediate hydrogen species is symbolized as:**
Ⓐ $[H^+]$ Ⓑ $[H_2]$ Ⓒ $[H^-]$ Ⓓ [2H]

41. **Reduction of ethene ($CH_2 = CH_2$) with hydrogen in the presence of nickel catalyst at 200°C produces:**
Ⓐ Methane Ⓑ Ethane Ⓒ Ethene Ⓓ Propane

42. **Chloromethane can be reduced to methane using zinc and :**

Ⓐ Hydrochloric acid Ⓑ Sulfuric acid

Ⓒ Nitric acid Ⓓ Phosphoric acid

43. **The hydrogenation of alkynes involves adding_____molecules of hydrogen.**

Ⓐ One Ⓑ Two Ⓒ Three Ⓓ Four

44. **The process that balances the availability of petroleum fractions with demand by transforming larger hydrocarbons into smaller ones is called:**

Ⓐ Fractionation Ⓑ Catalysis Ⓒ Cracking Ⓓ Reforming

45. **The industrial application of reducing alkenes to produce banaspati ghee involves a____ reaction.**

Ⓐ Hydrolysis Ⓑ Dehydration Ⓒ Fermentation Ⓓ Reduction

Short Answered Questions

1. **What is cracking in the context of hydrocarbon processing?**

Ans. Cracking is a process used in the petroleum industry to break down larger, less useful hydrocarbons into smaller, more valuable ones like alkanes and alkenes. This is achieved by heating large hydrocarbons in the presence of a catalyst such as zeolite, which facilitates the breaking of molecular bonds.

$$\underset{\text{(Mixture of hydrocarbons)}}{\text{Naphtha}} \xrightarrow[\text{Zeolite}]{\text{Heat}} \text{Alkanes and alkenes containing 5 to 10 carbon atoms}$$

2. **How does the cracking process contribute to meeting fuel demand?**

Ans. Cracking adjusts the balance between the availability and demand for petroleum products by converting less desired heavy hydrocarbons into highly demanded lighter ones. This process increases the overall supply of fuel, making it a critical step in refining petroleum.

3. **What is the reduction of alkenes and alkynes?**

Ans. The reduction of alkenes and alkynes involves adding hydrogen to these molecules to convert them into more saturated alkanes. This reaction typically uses a nickel catalyst and occurs at high temperatures, transforming unsaturated hydrocarbons into saturated ones.

$$\underset{\text{Ethene}}{CH_2=CH_2} + H_2 \xrightarrow[200°C]{Ni} \underset{\text{Ethane}}{CH_3-CH_3}$$

$$\underset{\text{Ethyne}}{CH\equiv CH} + 2H_2 \xrightarrow[200°C]{Ni} \underset{\text{Ethane}}{CH_3-CH_3}$$

4. How is methane different in the context of reduction reactions?

Ans. Methane, being the simplest alkane, cannot be prepared by reducing other hydrocarbons through hydrogenation because it is already fully saturated. Therefore, methods used to synthesize higher alkanes from alkenes and alkynes do not apply to methane.

5. What is the role of zinc in the reduction of alkyl halides?

Ans. Zinc is used in the reduction of alkyl halides to generate hydrogen gas, which then reacts with the alkyl halide to produce alkanes. This reaction typically involves the formation of zinc chloride as a byproduct, highlighting zinc's role as a reducing agent.

$$Zn + HCl \longrightarrow ZnCl2 + 2[H]$$

$$R-X \xrightarrow{[2H]} R-H + H-X$$

$$\underset{\text{Chloromethane}}{CH_3-Cl} + Zn/HCl \xrightarrow{[2H]} \underset{\text{Methane}}{CH_3-H} + H-Cl$$

6. What is a photochemical substitution reaction?

Ans. A photochemical substitution reaction involves the replacement of a hydrogen atom in an alkane with a halogen atom, facilitated by the presence of ultraviolet light. This type of reaction is particularly common with chlorine, producing alkyl halides as products.

$$\underset{\text{Methane}}{CH_4} + Cl_2 \xrightarrow{h\nu} \underset{\text{Chloromethane}}{CH_3-Cl} + H-Cl$$

7. How do alkanes react in combustion reactions?

Ans. Alkanes combust in the presence of oxygen to produce carbon dioxide and water, releasing a significant amount of heat. This reaction is exothermic and is the basis for the use of alkanes as fuels in various applications, from domestic heating to powering engines.

$$\underset{\text{Methane}}{CH_4\,(g)} + 2O_2\,(g) \longrightarrow CO_2\,(g) + 2H_2O\,(g) + \text{heat}$$

$$\underset{\text{Ethane}}{2CH_3-CH_3\,(g)} + 7O_2\,(g) \longrightarrow 4CO_2\,(g) + 6H_2O\,(g) + \text{heat}$$

8. Why are alkanes referred to as paraffins?

Ans. Alkanes are sometimes called paraffins, a term derived from the Latin words for "little affinity," reflecting their low reactivity due to the

non-polarity of their carbon-hydrogen bonds. This makes them relatively inert compared to other organic compounds.

9. What causes the low reactivity of alkanes?

Ans. The low reactivity of alkanes can be attributed to the non-polarity of their carbon-hydrogen bonds and the similar electronegativity values of carbon and hydrogen. These properties result in nearly equal sharing of electrons, making alkanes chemically stable.

10. What are the risks associated with natural gas leaks in homes?

Ans. Natural gas, primarily methane, can form explosive mixtures with air when leaked into enclosed spaces. Ignition of such mixtures can lead to explosions, posing significant safety risks in residential settings, highlighting the need for careful handling and monitoring of gas appliances.

11. Give reactions of halogenation of alkanes in dimlight?

Ans.

$$\underset{\text{Methane}}{CH_4} + Cl_2 \xrightarrow[\text{Dimlight}]{h\nu} \underset{\text{Chloromethane}}{CH_3 - Cl} + H - Cl$$

$$CH_3 - Cl + Cl_2 \xrightarrow[\text{Dimlight}]{h\nu} \underset{\text{Dichloromethane}}{CH_2Cl_2} + HCl$$

$$CH_2Cl_2 + Cl_2 \xrightarrow[\text{Dimlight}]{h\nu} \underset{\text{Trichloromethane or chloroform}}{CHCl_3} + HCl$$

$$CHCl_3 + Cl_2 \xrightarrow[\text{Dimlight}]{h\nu} \underset{\text{Tetrachloromethane or carbon tetrachloride}}{CCl_4} + HCl$$

11.4 Important Reactions

Multiple Choice Questions (MCQs)

46. Alkanes are sometimes referred to as _____ due to their low chemical reactivity.

Ⓐ Paraffins Ⓑ Alkenes Ⓒ Arenes Ⓓ Cycloalkanes

47. The term "little affinity" associated with alkanes refers to their:

Ⓐ High reactivity Ⓑ Low chemical affinity
Ⓒ Solubility in water Ⓓ Bonding with metals

48. Alkanes are chemically inert to most laboratory reagents due to the _____ of their bonds.

Ⓐ High polarity Ⓑ Metallic character
Ⓒ Ionic nature Ⓓ Non-polarity

49. **In halogenation, alkanes react with chlorine in the presence of _____ to give alkyl halides.**
Ⓐ Heat Ⓑ Water Ⓒ UV light Ⓓ Oxygen

50. **The reaction between methane and chlorine in the presence of UV light produces chloromethane and:**
Ⓐ Methanol Ⓑ Hydrochloric acid
Ⓒ Carbon dioxide Ⓓ Water

51. **Combustion of alkanes produces CO_2, H_2O, and:**
Ⓐ Heat Ⓑ Light Ⓒ Smoke Ⓓ Soot

52. **The primary cause of explosions in homes due to natural gas leakage is the formation of a flammable mixture of methane and:**
Ⓐ Carbon dioxide Ⓑ Water vapor
Ⓒ Hydrochloric acid Ⓓ Air

53. **Which type of reaction involves the replacement of hydrogen in alkanes with a halogen atom?**
Ⓐ Addition Ⓑ Elimination Ⓒ Substitution Ⓓ Oxidation

54. **The electronegativity values of carbon and hydrogen do not differ appreciably, making the bonding electrons between C – H and C – C bonds:**
Ⓐ Unequally shared Ⓑ Almost equally shared
Ⓒ Completely transferred Ⓓ Transferred

55. **During the combustion of methane, the number of moles of oxygen required is:**
Ⓐ 4 Ⓑ 3 Ⓒ 2 Ⓓ 1

56. **In a photochemical substitution reaction, the presence of _____ is crucial.**
Ⓐ UV light Ⓑ Oxygen Ⓒ Water Ⓓ Carbon dioxide

57. **The byproduct of methane combustion is primarily:**
Ⓐ Carbon monoxide Ⓑ Methanol
Ⓒ Ethane Ⓓ Carbon dioxide

58. **Natural gas primarily consists of:**
Ⓐ Ethane Ⓑ Methane Ⓒ Propane Ⓓ Butane

59. **Alkanes do not react with _____ due to their non-polar nature.**
Ⓐ Acids Ⓑ Bases
Ⓒ Oxidizing agents Ⓓ All of the above

60. **The difference in electronegativity between carbon and hydrogen in alkanes is relatively:**
Ⓐ High Ⓑ Moderate Ⓒ Low Ⓓ None

Short Answered Questions

1. What is cracking in the context of hydrocarbon processing?

Ans. Cracking is a process used in the petroleum industry to break down larger, less useful hydrocarbons into smaller, more valuable ones like alkanes and alkenes. This is achieved by heating large hydrocarbons in the presence of a catalyst such as zeolite, which facilitates the breaking of molecular bonds.

2. How does the cracking process contribute to meeting fuel demand?

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Interesting Information!

☆ **Why can a mixture of natural gas and air cause explosions at homes?**

Ans. A mixture of natural gas (methane) and air may explode when ignited. This is the main cause of explosion at homes where gas leakage occurs.

Exercise

1. In the reduction of alkyl halides with Zn / HCl, alkyl halide is being reduced. Which species in this reaction is being oxidized?

Ans. In the reduction of alkyl halides with Zn/HCl, zinc metal (Zn) is being oxidized. Zinc loses electrons to form Zn^{2+} ions, undergoing oxidation. These electrons are transferred to the alkyl halide, reducing it to an alkane. Thus, zinc acts as the reducing agent and is oxidized in the process.

2. During the combustion reaction of ethane, which bonds are being broken and which are being formed?

Ans. During the combustion reaction of ethane, the C – H and C – C bonds in ethane and the O = O double bonds in oxygen are broken. New bonds formed include the C = O double bonds in carbon dioxide and the O – H bonds in water. So, bonds broken: C – H, C – C, and O = O; bonds formed: C = O and O = H bonds.

3. What products other than CH_{3Cl} are formed when methane reacts with chlorine gas?

Ans. When methane reacts with chlorine gas, products other than chloromethane (CH_3Cl) include dichloromethane (CH_2Cl_2), chloroform ($CHCl_3$), and carbon tetrachloride (CCl_4). Additionally, hydrogen chloride (HCl) gas is formed as a byproduct. Multiple chlorination steps lead to these fully substituted products.

MCQs KEY

1	Ⓑ	2	Ⓒ	3	Ⓓ	4	Ⓐ	5	Ⓒ
6	Ⓐ	7	Ⓑ	8	Ⓒ	9	Ⓓ	10	Ⓐ
11	Ⓒ	12	Ⓑ	13	Ⓒ	14	Ⓓ	15	Ⓑ
16	Ⓒ	17	Ⓐ	18	Ⓓ	19	Ⓐ	20	Ⓑ
21	Ⓓ	22	Ⓒ	23	Ⓐ	24	Ⓑ	25	Ⓒ
26	Ⓓ	27	Ⓐ	28	Ⓒ	29	Ⓑ	30	Ⓒ
31	Ⓑ	32	Ⓒ	33	Ⓓ	34	Ⓐ	35	Ⓑ
36	Ⓒ	37	Ⓓ	38	Ⓒ	39	Ⓐ	40	Ⓓ
41	Ⓑ	42	Ⓐ	43	Ⓑ	44	Ⓒ	45	Ⓓ
46	Ⓐ	47	Ⓑ	48	Ⓓ	49	Ⓒ	50	Ⓑ
51	Ⓐ	52	Ⓓ	53	Ⓒ	54	Ⓑ	55	Ⓒ
56	Ⓐ	57	Ⓓ	58	Ⓑ	59	Ⓓ	60	Ⓒ

EXERCISE

1. Tick (✓) the correct answer.

(i) Which other atom is almost always present along with carbon atom in all organic compounds?

Ⓐ Oxygen Ⓑ Nitrogen Ⓒ Hydrogen Ⓓ Halogen

(ii) Which other metal can be used to reduce alkyl halides?

Ⓐ Al Ⓑ Mg Ⓒ Ni Ⓓ Co

(iii) If naphtha undergoes a combustion reaction what products do you expect to form?

Ⓐ Alkanes Ⓑ Alkenes

Ⓒ CO_2 and H_2O Ⓓ Both alkanes and alkenes