Chapter: 9

Q.1 Textbook activity question **46**

1 Objects in everyday use such as foodstuff, fibers, paper, medicines, wood, fuels, are made of various compounds. Which consituent elements are common in these compounds?

Ans Objects that we use in everyday life such as foodstuff, fibers, medicines, wood, fuels, are etc., generally contain common elements such as carbon, hydrogen and oxygen.

2 General formula of the homologous series of alkanes is C_nH_{2n+2}. Write down the molecular formula of the 8^{th} and 12^{th} member using this.

Ans i. The general formula of the homologous series of alkanes is C_nH_{2n+2}.
ii. The molecular formula of 8^{th} member of the homologous series of alkanes = $C_8H_{(2\times8+2)} = C_8H_{18}$
iii. The molecular formula of 12^{th} member of the homologous series of alkanes = $C_{12}H_{(2\times12+2)} = C_{12}H_{26}$

3 From the given structural formula of polyvinyl acetate, that is used in paints and glues, deduce the name and structural formula of the corresponding monomer.

Ans The name and the structural formula of the monomer in polyvinyl acetate:

$$CH_3 - \overset{\overset{O}{||}}{C} - O - CH = CH_2$$

Vinyl acetate

4 What are the types of compounds ?

Ans i. Metal + Nonmetal —> ionic compound (usually)
ii. Metal + Polyatomic ion —> ionic compound (usually)
iii. Nonmetal + Nonmetal —> covalent compound (usually)
iv. Hydrogen + Nonmetal —> covalent compound (usually)

5 Molecular formula of chlorine is Cl_2. Draw electron-dot and line structure of a chlorine molecule.

Ans The required electron-dot and line structure are:

$$:\ddot{Cl}:\ddot{Cl}: \longrightarrow :\ddot{Cl}-\ddot{Cl}: \longrightarrow Cl-Cl$$

6 What are the chemical names of the nutrients that we get from the food stuff, namely, cereals, pulses and meat?

Ans Carbohydrates, fats and proteins

7 Draw all the possible structural formulae having molecular formula C_6H_{14}. Give names to all the isomers. Which difficulties were faced by you while naming? As the time progressed, the carbon compounds became very large in number and their common names caused confusion. A need was felt to have a logical system acceptable to all for naming the carbon compounds.

Ans Molecular formula → C_6H_{14} → hexane → it has 5 structural isomer.
i) Hexane ⇒ CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_3
ii) 2 Methyl Pentane → $CH_3 - CH_2 - CH_2 - \underset{\underset{CH_3}{|}}{CH} - CH_3$

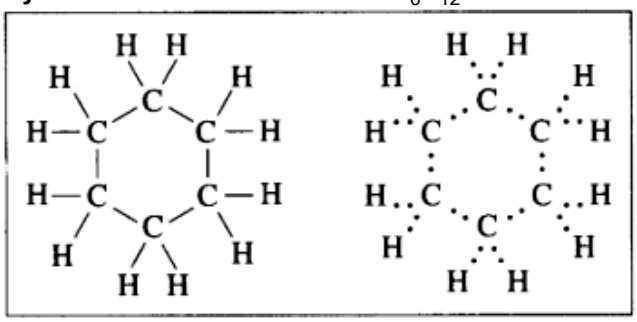
iii) 3 Methyl Pentane → $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_3$

iv) 2, 3 Dimethyl Butane → $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_3$

v) 2, 2 Dimethyl Butane → $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{C}} - CH\,2 - CH_3$

8 Draw electron-dot structure of cyclohexane.

Ans **Cyclohexane:** Molecular formula: C_6H_{12}



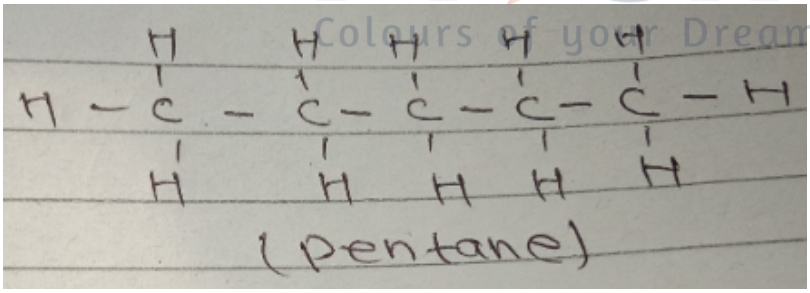
Cyclohexane

9 How many bonds have to be there in between the two carbon atoms in ethyne so as to satisfy their tetravalency?

Ans There are three covalent bonds between two carbon atoms in ethyne so as to satisfy the valency of both the carbon atoms.

10 Draw three structural formulae having molecular formula C_5H_{12}.

Ans



11 The homologous series of alkenes. Inspect the molecular formulae of the members of this series. Do you find any relationship, in the number of carbon atoms and the number of hydrogen atoms in the molecular formulae?

Ans In the molecular formula of any member of the homologous series of alkenes, the number of hydrogen atoms is twice the number of carbon atoms.

12 What are the two important types of chemical bonds?

Ans Two important types of chemical bonds are ionic bond and covalent bond.

13 Which indicator paper out of blue litmus paper and pH paper is useful to distinguish between ethanoic acid and hydrochloric acid?

Ans pH paper is useful to distinguish between ethanoic acid and hydrochloric acid.

14 If the number of carbon atoms in the molecular formulae of alkenes is denoted by ‘n’, what will be the number of hydrogen atoms?

Ans If the number of carbon atoms in the molecular formulae of alkenes is denoted by 'n', then the number of hydrogen atoms in the molecular formulae will be '2n'.

15 What is the number of chemical bonds that an atom of an element forms called?

Ans The number of chemical bonds that an atom of an element can from is called its valecny.

16 Explain by writing a reaction, what will happen when pieces of sodium metal are put in n- propyl alcohol.

Ans When pieces of sodium metal are put in n-propyl alcohol, hydrogen gas is produced and the other product formed is sodium n-propoxide.

The reaction is

$2CH_3CH_2CH_2OH + 2Na \rightarrow 2CH_3CH_2CH_2O - Na^+ + H_2\downarrow$

n-Propyl alcohol | Sodium | Sodium n-propoxide | Hydrogen

17 Explain with reaction why does the lime water turn milky in the above activity.

Ans The CO_2 gas reacts with lime water to produce a white precipitate of calcium carbonate. Therefore, lime water turns milky. The reaction can be represented as :

$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s)\downarrow + H_2O(l)$

Calcium hydroxide (lime water) | Carbon dioxide | Calcium carbonate | Water

18 How many methylene units are extra in the formula of the fourth member than the third member of the homolous series of alcohols?

Ans There is only one methylene unit extra in the formula of the fourth member and the third member of the homologous series of alcohols.

19 With which bond C atom in CO_2 is bonded to each of the O atoms?

Ans Carbon atom is bonded to each of the oxygen atoms in CO_2 by two covalent bonds (that is, a double bond).

20 Which one of ethanoic acid and hydrochloric acid is stronger?

Ans Hydrochloric acid is stronger than ethanoic acid (CH_3COOH). Since, hydrocholoric (HCl) and dissociates completely in water, and produces more H^+ ions. Ethanoic acid does not dissociates completely and produces low number of H^+ ions.

21 Atomic number of chlorine is 17. What is the number of electron in the valence shell of chlorine?

Ans Atomic number of chlorine is 17. Its electronic configuration is 2, 8, 7. Therefore, the number of electrons in the valence shell of chlorine is 7.

22 By how many -CH_2 - (methylene) units do the formulae of the first two members of homologous series of alkanes, methane (CH_4) and ethane (C_2H_6) differ? Similarly, by how many - CH_2 - units do the neighbouring members ethane (C_2H_6) and propane (C_3H_8) differ from each other?

Ans The first two members of homologous series of alkanes, methane (CH_4) and ethane (C_2H_6) differ by one $-CH_2-$ unit in their formulae. Similarly, ethane (C_2H_6) and propane (C_3H_8) differ by one $-CH_2-$ unit from each other.

23 When fat is heated with sodium hydroxide solution, soap and glycerin are formed. Which functional groups might be present in fat and glycerin? What do you think?

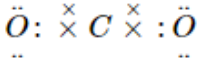
Ans The functional group carboxylic acid (-COOH) is present in fat whereas the functioned group hydroxyl group (-OH) is present in glycerin.

24 Is the biogas combustion reaction endothermic or exhothermic?

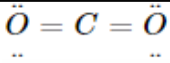
Ans The biogas combustion is exothermic reaction.

25 The molecular formula of carbon dioxide is CO_2. Draw the electron-dot srtucture (without showing circle) and line structure for CO_2.

Ans a. electron-dot structure of carbon dioxide, CO_2 is



b. The line structure of carbon dioxide is

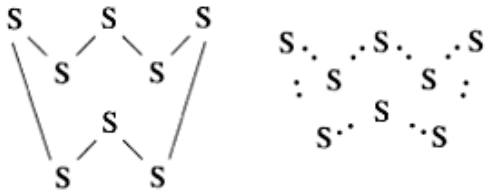


26 Hydrogen peroxide decomposes on its own by the following reaction.
H-O-O-H → 2H-O-H + O_2
From this, what will be your inference about the strenght of O-O covalent bond?

Ans The O−O covalent bond in hydrogen peroxide, H−O−O−H is very weak. Hence, hydrogen peroxide decomposes to water and oxygen.

27 The molecular formula of sulphur is S_8 in which eight sulphur atoms are bonded to each other to form one ring. Draw an electron-dot structure for S_8 without showing the circles.

Ans

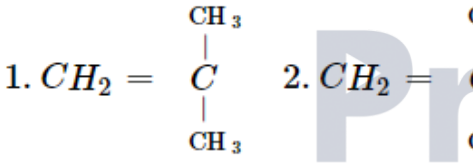


The above S_8 molecule of sulphur has crown shaped structure. One molecule of sulpur is made up of eight atoms of sulphur.

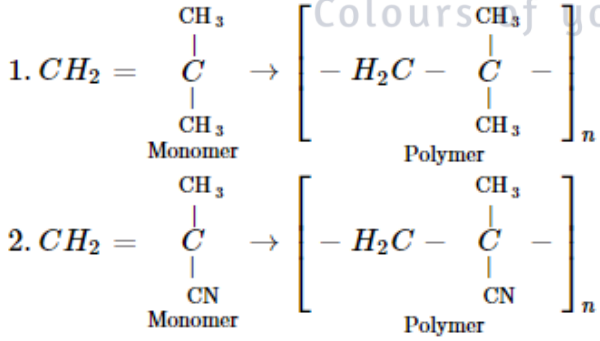
28 To which group in the periodic table does the element carbon belongs? Write down the electronic configuration of carbon and deduce the valency of carbon.

Ans Carbon belongs to group 14 of the Periodic table. Its atomic number is 6. Electronic configuration is (2, 4) and valency of carbon is 4.

29 Structural formulae of some monomers are given below. Write the structural formula of the homopolymer formed from them.



Ans



30 Propane (C_3 H_8) is one of the combustible component of L.P.G. Write down the reaction for Propane (C_3 H_8)

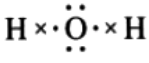
Ans Propane undergoes combustion to give carbon dioxide and water vapour. The reaction is exothermic with evolution of heat.
$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

31 What are the chemical substances that make cloth, furniture and elastic objects?

Ans Clothes, furniture and elastic objects are made up of polymers such as nylon, cellulose, rubber, silk, etc.

32 The molecular formula of water is H_2O. Draw electron-dot and line structures for this triotomic molecule. (Use dots for electron of oxygen atom and crosses for electrons of hydrogen atoms.)

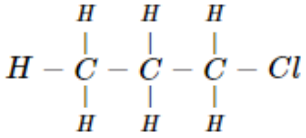
Ans The required electron-dot and line structures for triatomic molecule are:



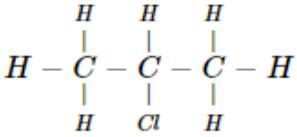
33 In the chlorination, substitutuion reaction of propane two isomeric products containing one chlorine atom are obtained. Draw their structural formulae and give their IUPAC names.

Ans The IUPAC names and structural formulae of the two products are :

i. 1-Chloropropane



ii. 2-Chloropropane



34 Two test tubes contain two colourless liquids ethanol and ethanoic acid. Explain by writing reaction which chemical test you would perform to tell which substance is present in which test tube.

Ans Ethanol and ethanoic acid can be distinguished using sodium bicarbonate or sodium carbonate.

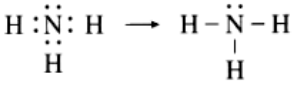
i. The compound which produces brisk effervescence of carbon dioxide, on reacting with sodium bicarbonate is ethanoic acid.

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Sodium bicarbonate}}{NaHCO_3} \longrightarrow \underset{\text{Sodium ethanoate}}{CH_3COONa} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{CO_2\uparrow}$$

ii. The other compounds which does not react with sodium bicarbonate to give effervescence is ethanol.

35 The molecular formula of ammonia is NH_3. Draw electron-dot and line structures for ammonia molecule.

Ans The required electron-dot and line structures for ammonia molecule are:



36 How many methylene units are less in the formula of the second member than the third member of the homologous series of alkenes?

Ans One unit of methylene ($-CH_2-$) is less in the formula of the second member than the third member of the homologous series of alkenes.

37 Which is the component of biogas that makes it useful as fuel?

Ans Methane is the component of biogas which makes it useful as fuel.

38 Give the names n-pentane, 1(i-pentane) and neopentane to the above three structural formulae. (Use the same logic as used in the names of the isomeric butanes for this purpose.)

Ans In the above question, (a) n-pentane (b) 1 (i-pentane) or isopentane (c) neopentane. For the isomers of butane

39 What is meant by a chemical bond?

Ans Atoms of different elements excepting noble gases do not have complete octet so they combine with other atoms to form chemical bond. The force which holds the atoms or ions together within the molecule is called a chemical bond and the process of their combination is called chemical bonding.

40 Write down structural formulae of the first four members of the various homologous series formed by making use of the functional groups.

Ans

Functional group Halo - X(Cl, Br, -I)	**Functional group Aldehyde - CHO**	**Functional group Carboxylic acid - COOH**	**Functional group Amine- NH_2**
CH_3Cl Chloromethane	HCHO Methanal	HCOOH Methanoic acid	CH_3NH_2 Methenamine
$CH_3 - CH_2 - Cl$ Chloroethane	CH_3CHO Ethanal	CH_3COOH Ethanoic acid	$CH_3CH_2NH_2$ Ethanamine

CH_3 - CH_2 - CH_2 - Cl 1 - Chloropropane	CH_3CH_2CHO Propanal	CH_3CH_2COOH Propanoic acid	$CH_3CH_2CH_2NH_2$ Propanamine
CH_3 - CH_2 - CH_2 CH_2 - Cl 1 - Chlorobutane	$CH_3CH_2CH_2$ CHO Butanal	$CH_3CH_2CH_2$ COOH Butanoic acid	$CH_3CH_2CH_2$ CH_2NH_2 Butanamine

41 Explain by writing a reaction, which product will be formed on heating n - butyl alcohol with concentrated sulphuric acid.

Ans $CH_3 - CH_3 - CH_2 - OH \xrightarrow[\text{Conc. } H_2SO_4]{170^\circ C} CH_3 - CH_2 - CH = CH_2 + H_2O$
On heating n-bulyl alcohol with concentrated sulphuric acid, the product formed are butene and water.

42 Tell from the above example whether oxygen has catenation power or not.

Ans Oxygen has only a little catenation power because the O−O bond is very weak.

43 Which product is formed by the combustion of elemental carbon?

Ans Carbon dioxide is formed by the combustion of elemental carbon.

44 Give names of three natural polymers. Write the place of their occurrance and names of monomers from which they are formed.

Ans

Natural polymers	Monomer unit	Occurance
(1) Polysaccaride	Glucose	Starch
(2) Cellulose	Glucose	Wood (cell wall of plant cells)
(3) Proteins	alpha aminoacids	Muscles, Hairs, Skin, Egg.
(4) D.N.A.	Nucleotide (base-deoxyribose-phosphate)	Chromosomes of animals
(5) R.N.A	Nucleotide (base-ribose-phosphate)	Chromosomes of plants
(6) Rubber	Isoprene ($CH_2 = C (CH_3) - CH = CH_2$)	Latex of rubber tree

45 Explain the reaction that would take place when a peice of sodium metal is dropped in ethanoic acid.

Ans When a piece of sodium metal is dropped in ethanoic acid, sodium acetate and hydrogen gas is formed.
$2CH_3COOH + 2Na \rightarrow 2CH_3COONa + H_2\uparrow$
Ethanoic acid Sodium Sodium ethanoate

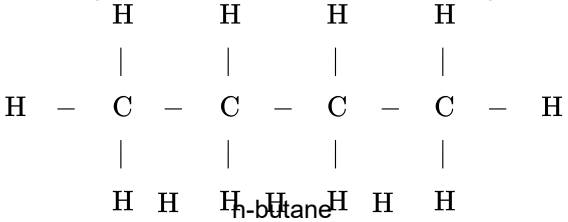
46 The molecular formula ethyne is $C_2 H_2$. From this draw its structural formula and electron - dot structure.

Ans **Ethyne:** Molecular formula: C_2H_2
H - C≡C - H H : C ⋮⋮ C : H

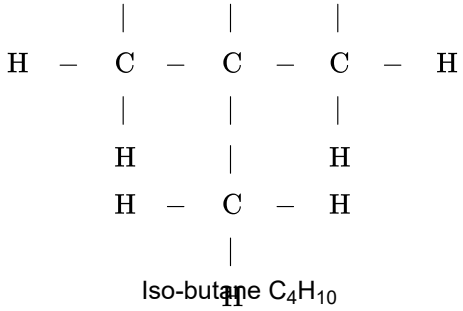
Q.2 **Draw neat labelled diagrams.** **4**

1 Draw all possible structural formulae of compounds from their molecular formula - C_4H_{10}

Ans



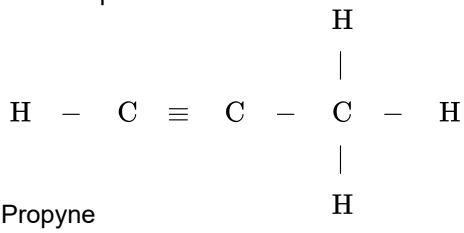
n-butane



Iso-butane C_4H_{10}

2 Draw all possible structural formulae of compounds from their molecular formula - C_3H_4

Ans



Propyne

Q.3 **Match the pair** **3**

1

Column "A"	Column "B"
i. C_2H_6	a. Unsaturated hydrocarbon
ii. C_2H_2	b. Molecular formula of alcohol
	c. Saturated hydrocarbon

Ans

i. C_2H_6	Saturated hydrocarbon
ii. C_2H_2	Unsaturated hydrocarbon

2

Column "A"	Column "B"
i. CH_4O	a. Saturated hydrocarbon
ii. C_3H_6	b. Molecular formula of alcohol
	c. Double bond

Ans

i. CH_4O	Molecular formula of alcohol
ii. C_3H_6	Double bond

3

Column "A"	Column "B"
i. C_2H_6	a. Triple bond
ii. C_2H_2	b. Molecular formula of alcohol
	c. Saturated hydrocarbon

Ans

i. C_2H_6	Saturated hydrocarbon
ii. C_2H_2	Triple bond

Q.4 **Name the following** **19**

1 Write the IUPAC name of the following
CH_3-CHO

Ans CH_3-CHO - **Ethanal**

2 Write structural formula for the following IUPAC name
Butanone

Ans Butanone - **CH_3-CO-CH_2-CH_3**

3 Write structural formula for the following IUPAC name
2-chlorobutane

Ans 2-chlorobutane - **CH_3-CH_2-CH-CH_3**
Cl

4 Write structural formulae for the following IUPAC names
Methanol

Ans Methanol - **CH_3-CHO**

5 Write the IUPAC name of the following
CH_3-CH-OH-CH_3

Ans CH_3-CH-OH-CH_3 - **Propan-2-ol**

6 Write the IUPAC names of the following structural formulae.
CH_3 - CH_2 - COOH

Ans propanoic acid

Q.5 **Chemical reactions with equations.** **2**

Q.6 **Laws/define/principles** **2**

Q.7 **Explain with the help of examples** **24**

Q.8 **Answer the following** **6**

Q.9 **Answer the following in detail** **5**