

Chapter 4 – Carbon and Its Compounds

In-text Questions and Exercise Answers

Answers to In-text Questions

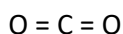
Question 1.

What will be the electron-dot structure of carbon dioxide (CO₂)?

Answer:

Carbon shares its four electrons and each oxygen atom shares two electrons.

Structure:



There are double bonds between carbon and oxygen atoms.

Question 2.

What will be the electron-dot structure of a sulphur molecule made up of eight sulphur atoms?

Answer:

Eight sulphur atoms join together in a ring-shaped structure (S₈).

Each sulphur atom shares two electrons with neighboring sulphur atoms.

Question 3.

How many structural isomers can you draw for pentane?

Answer:

Pentane (C₅H₁₂) has 3 structural isomers:

1. n-Pentane
2. Isopentane
3. Neopentane

Question 4.

What are the two properties of carbon because of which we find a large number of carbon compounds around us?

Answer:

1. Catenation
2. Tetravalency

Question 5.

Write the formula and electron-dot structure of cyclopentane.

Answer:

Formula: C_5H_{10}

In cyclopentane, five carbon atoms form a ring and are connected through single covalent bonds.

Question 6.

Draw the structures of the following compounds.

(i) Ethanoic acid

$CH_3 - COOH$

(ii) Bromopentane

$CH_3 - CH_2 - CH_2 - CH_2 - CH_2Br$

(iii) Butanone

$CH_3 - CO - CH_2 - CH_3$

(iv) Hexanal

$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CHO$

Are structural isomers of bromopentane possible?

Answer:

Yes, structural isomers of bromopentane are possible.

Question 7.

Name the following compounds.

(i) $CH_3 - CH_2 - Br$

Answer:

Bromoethane

(ii) $H - C = O$

Answer:

Methanal

(iii)

$CH_3 - CH_2 - CH_2 - CH_2 - C \equiv CH$

Answer:

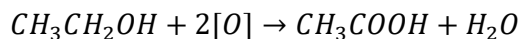
Hex-1-yne

Question 8.

Why is the conversion of ethanol into ethanoic acid called an oxidation reaction?

Answer:

Because oxygen is added and hydrogen is removed during the reaction.



Question 9.

Why is a mixture of ethyne and air not used for welding?

Answer:

Because ethyne does not undergo complete combustion in air and does not produce sufficient heat.

Question 10.

How can you distinguish between alcohol and carboxylic acid experimentally?

Answer:

Use blue litmus paper.

- Carboxylic acid turns blue litmus red.
- Alcohol shows no change.

Question 11.

What are oxidizing agents?

Answer:

Substances that provide oxygen or remove hydrogen from another substance are called oxidizing agents.

Question 12.

Can detergents be used to determine whether water is hard or soft?

Answer:

No, because detergents produce lather even in hard water.

Question 13.

Why is rubbing necessary while washing clothes?

Answer:

Rubbing helps soap micelles remove dirt particles and wash them away with water.

Exercise Answers

Question 1.

Ethane has the molecular formula C_2H_6 . It contains:

Answer:

(c) 8 covalent bonds

Question 2.

What is the functional group present in butanone?

Answer:

(c) Ketone

Question 3.

If the bottom of a cooking vessel becomes black, it means:

Answer:

(b) The fuel is not burning completely.

Question 4.

Explain the nature of covalent bonding using CH_3Cl .

Answer:

Carbon and chlorine share electrons to form covalent bonds.

Question 5.

Draw the electron-dot structures of:

(a) Ethanoic acid

CH_3COOH

(b) H_2S

$\text{H} - \text{S} - \text{H}$

(c) Propanone

$\text{CH}_3 - \text{CO} - \text{CH}_3$

(d) F_2

$\text{F} - \text{F}$

Question 6.

What is a homologous series? Explain with example.

Answer:

A series of organic compounds having the same functional group and similar chemical properties, where consecutive members differ by CH_2 , is called a homologous series.

Example:

Methane, Ethane, Propane

Question 7.

How can you distinguish between ethanol and ethanoic acid on the basis of physical and chemical properties?

Ethanol	Ethanoic Acid
No effect on litmus	Turns blue litmus red
Neutral	Acidic

Question 8.

Why does soap form micelles in water? Will micelles form in other solvents such as ethanol?

Answer:

Soap molecules have a hydrophilic end and a hydrophobic end, so they form micelles in water.

In ethanol:

No, micelles are not formed.

Question 9.

Why are carbon compounds mostly used as fuels?

Answer:

Because they produce a large amount of heat on combustion.

Question 10.

Why does soap produce less lather in hard water?

Answer:

Calcium and magnesium ions present in hard water form insoluble precipitates with soap.

Question 11.

What will you observe when soap is tested with litmus paper?

Answer:

- Red litmus turns blue.
- Blue litmus shows no change.

Question 12.

What is hydrogenation? Mention its industrial application.

Answer:

The process of adding hydrogen to unsaturated compounds is called hydrogenation.

Application:

Used in manufacturing vegetable ghee (vanaspati ghee).

Question 13.

Among the following hydrocarbons— C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 , and CH_4 —which undergo addition reaction?

Answer:

- C_3H_6
- C_2H_2

Because they are unsaturated hydrocarbons.

Question 14.

Describe a test to distinguish between saturated and unsaturated carbon compounds.

Answer:

Bromine water test:

- Unsaturated compounds decolourize bromine water.
- Saturated compounds do not.

Question 15.

Explain the cleansing action of soap.

Answer:

The hydrophobic end of soap attaches to oil and dirt, while the hydrophilic end attaches to water.

This forms micelles, which remove dirt and wash it away with water