Chapter 9 – Carbon and Its Compounds

Question 1.

Fill in the blanks.

(a) **Carbon** is present in both living and non-living things.

(b) The tendency of an element to exist in two or more forms but in the same physical state is called **Allotropy.**

(c) **Crystalline** and **non-crystalline** are the two major crystalline allotropes of carbon.

(d) **Diamond** is the hardest substance that occurs naturally.

(e) The name 'carbon' is derived from the Latin word **carbo.**

Question 2.

Choose the correct alternative.

(a) In combined state, carbon occurs as

(i) coal

(ii) diamond

(iii) graphite

(iv) petroleum

Answer: (iv) petroleum

(b) A crystalline form of carbon is

(i) lamp black

(ii) gas carbon

(iii) sugar

(iv) fullerene

Answer: (iii) sugar

(c) Graphite is not found in

(i) Bihar

(ii) Maharashtra

(iii) Orissa

(iv) Rajasthan

Answer: (ii) Maharashtra

(d) Diamond is used for

(i) making the electrodes of electric furnaces.

(ii) making crucible for melting metals.

(iii) cutting and drilling rocks and glass.

(iv) making carbon brushes for electric motors.

Answer: (iii) cutting and drilling rocks and glass.

(e) Carbon forms innumerable compounds because

(i) it has four electrons in its outermost shell.

(ii) it behaves as a metal as well as a non-metal.

(iii) carbon atoms can form long chains.

(iv) it combines with other elements to form covalent compounds.

Answer: (iii) carbon atoms can form long chains.

Question 3.

Write 'true' or 'false' against the following statements.

(a) Carbon constitutes 0.03% of the earth's crust.

Solution: True

(b) Graphite is the purest form of carbon.

Solution: False

(c) Coloured diamonds are costlier than colourless and transparent diamonds.

Solution: False

(d) Graphte has layers of hexagonal carbon bondings.

Solution: True

(e) Diamond is insoluble in all solvents.

Solution: True.

Question 4.

Define the following terms:

(a) Allotropy

(b) Carat

(c) Crystal

(d) Catenation

Solution:

(a) Allotropy: The phenomenon due to which an element exists in two or more forms in the same physical state

with identical properties but with different physical properties is known as allotrophy.

(b) Carat: The weight of diamond is expressed in carats [1 carat = 0.2 g]

(c) Crystal: A homogeneous solid in which particles such as atoms, molecules or ions are arranged in definite pattern due to which they have definite geometrical shape with plane surfaces is called a crystal. e g. sugar and sodium chloride.

(d) Catenation: There is a unique property of carbon called catenation through which the large number of organic compounds is due to the ability of carbon atom to form long chains with other carbon atoms through the sharing of electrons.

Question 5.

State the terms:

(a) Substances whose atoms or molecules are arranged in a definite pattern.

Solution: Crystals.

(b) Different forms of an element found in the same physical state.

Solution: Allotropy.

(c) The property by which atoms of an element link together to form long chain or ring compounds.

Solution: Catenation

Question 6.

Name the following:

(a) The hardest naturally occurring substance.

Solution: Diamond.

(b) A greyish black non-metal that is a good conductor of electricity.

Solution: Graphite.

(c) The third crystalline form of carbon.

Solution: Fullerenes.

Question 7.

Answer the following questions:

(a) Why is graphite a good conductor of electricity but not diamond?

Solution:

One valence electron of each carbon atom remains free in a graphite molecule, thus making graphite a good conductor of electricity. Whereas in diamond, they have no free mobile electron. That is why diamond are bad conductor of electricity.

(b) Why is diamond very hard?

Solution:

A diamond is a giant molecule. There are 4 valence electrons in carbon atom where each carbon atom is linked with four neighboring carbon atoms. Thus forming a rigid tetrahedral structure. It is the strong bonding that makes diamond the hardest substance.

(c) What are fullerenes? Name the most common fullerenes.

Solution:

Fullerenes: Fullerenes are the third crystalline form of carbon. They have been found to exist in interstellar dust as well though they were discovered only recently as in the geological formations of the earth. Common fullerenes are C-32, C-50, C-70 and C-76

(d) What impurity is present in black diamond?

Solution:

Copper oxide present in black diamond is impurity.

(e) Explain the softness of graphite with reference to its structure.

Solution:

Each carbon atoms is linked with three neighboring carbon atoms in a graphite molecule. Thus forming a hexagonal arrangement of atoms. These hexagonal grouping of carbon atoms are arranged as layers or sheets piled on the top of other. The layers are held together by weak forces such that they can slide over one another. That is why graphite is soft.

Question 8.

Give two uses of

(a) graphite

(b) diamond.

Solution:

(a) Two uses of graphite:

1. For making the electrodes of electric furnaces.
2. For making crucibles for melting metals due to its high melting points.

(b) Two uses of diamond:

1. Diamond is used in jewellery as a gem

2. It is used for cutting and drilling rocks, glass,

Question 9.

Write three differences between graphite and diamond.

Solution:

Differences between diamond and graphite.

Diamond	**Graphite**
1. Pure diamond is colourless and transparent.	1. Graphite is greyish black opaque and shiny.
2. It is the hardest naturally occurring substance.	2. It is soft and greasy to touch.
3. It has high density i.e. 3.5 g/cm^3	3. It has low density i.e. 2.39g/cm^3.
4. It is bad conductor of electricity.	4. It is good conductor of electricity.
5. It burns in air at 900°C to form carbon dioxide.	5. It burns in air at 700°C to form carbon dioxide.

Exercise – II

Question 1.

Fill in the blanks:

(a) **Charcoal** is formed when charcoal is burnt in a limited supply of air.

(b) Coal is a **amorphous** form of carbon.

(c) **Peat** is the most inferior form of coal.

(d) Wood charcoal is a **bad** conductor of heat and electricity.

(e) **Lampblack** is used in making black shoe polish.