

UNIT

4

Carbon and its Compounds



TEXTBOOK EVALUATION

I. Choose the correct answer.

- 1 A phenomenon in which an element exists in different modification in same physical state is called

(a) Isomerism (b) Allotropy
(c) Catenation (d) Crystallinity

Ans: (b) Allotropy

- 2 Number of free electron(s) in each carbon of graphite is

(a) one (b) Two
(c) Three (d) Four

Ans: (a) one

- 3 The carbon atoms in fullerene are arranged in mixed

(a) Tetragon and Pentagon
(b) Pentagon and Hexagon
(c) Hexagon and Heptagon
(d) Heptagon and Octagon

Ans: (b) Pentagon and Hexagon

- 4 Carbon forms large number of organic compounds due to

(a) Allotropy (b) Isomerism
(c) Tetravalency (d) Catenation

Ans: (d) Catenation

- 5 Diamond is not a good conductor of electricity because

(a) it is very hard
(b) it has no free electron
(c) its structure is uniform
(d) it is insoluble in water

Ans: (b) it has no free electron

- 6 Which of the following does not contain double bond

(a) CO_2 (b) C_2H_4
(c) HCl (d) O_2

Ans: (c) HCl

- 7 Which of the following is highly toxic?

(a) Carbon dioxide
(b) Carbon monoxide
(c) Calcium carbonate
(d) Sodium bicarbonate

Ans: (b) Carbon monoxide

- 8 Raagav brings his lunch every day to school in a plastic container which has resin code number 5. The container is made of

(a) Polystyrene (b) PVC
(c) Polypropylene (d) LDPE

Ans: (c) Polypropylene

- 9 Plastics made of Polycarbonate (PC) and Acrylonitrile Butadiene Styrene (ABS) are made of resin code _____

(a) 2 (b) 5 (c) 6 (d) 7

Ans: (d) 7



10 Which of the following plastic items are banned by the Government of Tamil Nadu as of 1st January 2019?

- (a) Plastic sheets
- (b) Plastic tea cups
- (c) Plastic water packets
- (d) All the above

Ans: (d) All the above

11 Graphite is used as lubricant in machines because

- (a) it is good conductor of electricity
- (b) it is made of slippery layers and has high melting point
- (c) it has high density
- (d) it is strong and soft

Ans: (b) it is made of slippery layers and has high melting point

12 The lead pencil contains

- (a) Graphite
- (b) Diamond
- (c) Lead
- (d) Charcoal

Ans: (a) Graphite

13 Graphene is one atom thick layer of carbon obtained from

- (a) Diamond
- (b) Fullerene
- (c) Graphite
- (d) Gas Carbon

Ans: (c) Graphite

14 Plastic resin codes are shown as three chasing arrows in a _____ with a number in the middle or letters (an acronym of that plastic type).

- (a) Logo
- (b) Recycling symbol
- (c) Square
- (d) Triangle

Ans: (d) Triangle

15 The legal measures to prevent plastic pollution come under the _____ Protection Act 1988.

- (a) Forest
- (b) Wildlife
- (c) Environment
- (d) Human Rights

Ans: (c) Environment

II. Fill in the blanks.

1. _____ named carbon.

Ans: Antoine Lavoisier

2. Buckminster Fullerene contains _____ carbon atoms.

Ans: 60

3. Compounds with same molecular formula and different structural formula are known as _____.

Ans: Isomers

4. Different methods of formation of carbon is the main reason for its _____.

Ans: allotropes

5. There are _____ plastic resin codes.

Ans: 7

III Match the following

Alkyne	-	Bucky Ball
Andre Geim	-	Oxidation
C ₆₀	-	Graphene
Thermocol	-	Triple bond
Burning	-	Polystyrene

Ans:

Alkyne	-	Triple bond
Andre Geim	-	Graphene
C ₆₀	-	Bucky Ball
Thermocol	-	Polystyrene
Burning	-	Oxidation

IV Answer very briefly.

1. How many valence electrons are there in carbon?

There are **Four valence electrons** in Carbon.

2. Who is called 'Father of Modern Organic Chemistry'?

Friedrich Wohler is called 'Father of Modern Organic Chemistry'.

3. Which three resin codes are unsafe?

The safe resin codes are **3,6 and 7**

V. Answer in brief.

1. Differentiate graphite and diamond

Diamond	Graphite
Each carbon has four covalent bonds.	Each carbon has three covalent bonds.
Hard, heavy and transparent.	Soft, slippery to touch and opaque.
It has tetrahedral units linked in three dimension.	It has planar layers of hexagon units.
It is non-conductor of heat and electricity.	It is conductor of heat and electricity.

2. What are saturated and unsaturated compounds called?

Organic compounds containing carbon. Carbon single bonds are known as saturated compounds. Organic compounds containing one (or) more double (or) triple bonds are known as unsaturated compounds.

3. Carbon do not form ionic compounds. Why?

It has four electrons in its outermost orbit. According to Octet Rule, carbon requires four electrons to attain nearest noble gas (Neon) electronic configuration. So carbon has the tendency to share its four electrons with other atoms to complete its octet. So carbon do not form ionic compounds.

4. What is the valency of carbon in carbon monoxide?

The valency of carbon in carbon monoxide is two.

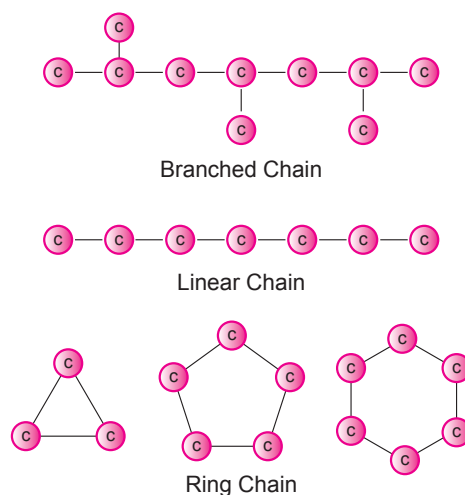
5. Why are one-time use and throwaway plastics harmful?

Use and throwaway plastics cause short and long-term environmental damage. Half of all the plastic made today is used for throwaway plastic items. These block drains and pollute water bodies. One-time use plastic causes health problems for humans, plants and animals.

VI. Answer in detail.

1. What is catenation? How does carbon form catenated compounds?

Catenation is **binding of an element to itself or with other elements through covalent bonds** to form open chain or closed chain compounds. Carbon is the most common element which undergoes catenation and forms long chain compounds. Carbon atom links repeatedly to itself through covalent bond to form linear chain, branched chain or ring structure.



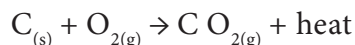
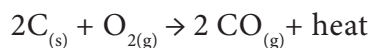
Catenation in carbon

This property of carbon itself is the reason for the presence of large number of organic carbon compounds. So organic chemistry essentially deals with catenated carbon compounds.

2. What are the chemical reactions of carbon?

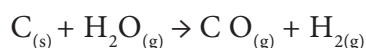
Oxidation – (Reaction with oxygen)

Carbon combines with oxygen to form its oxides like carbon monoxide (CO) and carbon dioxide (CO₂) with evolution of heat.



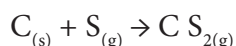
Reaction with steam

Carbon reacts with steam to form carbon monoxide and hydrogen. This mixture is called water gas.



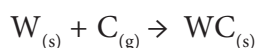
Reaction with sulphur

With sulphur, carbon forms its disulphide at high temperature.









Reaction with metals

At elevated temperatures, carbon reacts with some metals like iron, tungsten, Titanium, etc. to form their carbides.



3. Name the three safer resin codes of plastics and describe their features.

RESIN CODE	OTHER NAMES	COMMON ITEMS	ABOUT
	PEHD	Bottles (shampoo, detergent, etc.), toys, plastic bags and waste bins.	Considered one of the safer plastics. It is light, very strong and widely recycled. 
	PELD, LLDPE	Food packaging, plastic bags, food storage containers and plastic coating on the inside of paper cups.	Considered one of the safer plastics. It is very flexible and soft but strong. 
		Bottle caps, straws, food containers, hard pencil cases and plastic chairs.	Considered one of the safer plastics. It feels waxy or greasy. It is light and hard but scratches easily. 

VII. HOTS

1. Why do carbon exist mostly in combined state?

Carbon exist mostly in combined state because of catenation, Tetra valency and formation of multiple bonds.

2. When a carbon fuel burns in less aerated room, it is dangerous to stay there. Why?

When a carbon fuel burns in less aerated room, it produces carbon monoxide, which is highly toxic because it affects the oxygen carrying capacity of haemoglobin. so it is dangerous to stay there.

3. Explain how dioxins are formed, which plastic type they are linked to and why they are harmful to humans.

Burning of PVC releases dioxins. Dioxins are very toxic to humans, because they cause skin, liver problems and affect nervous, endocrine and reproductive systems.

4. Yugaa wants to buy a plastic water bottle. She goes to the shop and sees four different kinds of plastic bottles with resin codes 1, 3, 5 and 7. Which one should she buy? Why?

Resin codes 1,3,7 are harmful plastics but resin code 5 is PP(poly propylene). It is a safer plastic. Therefore she should buy the plastic bottle with resin code 5.

VIII. Answer the following by rearranging the jumbled letters.

- It is the hardest allotrope of carbon.
mnodaidd Ans: **diamond**
- Organic compounds having double bond between carbon atoms are
knelaes Ans: **alkenes**
- Reaction of carbon with oxygen gives
osdiexs Ans: **oxides**
- In this molecule, carbon is attached with four hydrogen atoms.
emathen Ans: **methane**
- Carbon combines with other elements through _____ bond.
lnaocvet Ans: **Covalent**
- It is used as gun powder.
ocahrcla Ans: **Charcoal**
- Plastics made of _____ are represented by resin code #6.
sytlopynere Ans: **polystyrene**
- One-time use plastics are also known as _____ plastics.
awyrhotwa Ans: **throwaway**
- One-time use plastics cause _____ damage.
trnvomenialne Ans: **environment**
- Expanded polystyrene is commercially known as
mthreolco Ans: **thermocol**

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