Chapter - 4

Carbon and Its Compounds

MULTIPLE CHOICE QUESTIONS

1. Pentane has the molecular formula C_5H_{12} . It has

- (a) 5 covalent bonds
- (b) 12 covalent bonds
- (c) 16 covalent bonds
- (d) 17 covalent bonds

2. Identify the unsaturated compounds from the following

(i) Propane (ii) Propene (iii) Propyne (iv) Chloropropane

- (a) (i) and (ii)
- (b) (ii) and (iv)
- (c) (iii) and (iv)
- (d) (ii) and (iii)

3. In which of the following compounds, - OH is the functional group?

- (a) Butanone
- (b) Butanol
- (c) Butanoic acid
- (d) Butanal

4. The hetero atoms present in CH₃-CH₂-O-CH₂-CH₂-Cl are

(i) oxygen (ii) carbon (iii) hydrogen (iv) chlorine

- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (iii) and (iv)
- (d) (i) and (iv)

5. Oils on treating with hydrogen in the presence of palladium or nickel catalyst forms fats. This is an example of

- (a) addition reaction
- (b) substitution reaction
- (c) displacement reaction
- (d) oxidation reaction

6. The carbon exist in the atmosphere in the form of

- (a) Carbon monoxide only
- (b) Carbon monoxide in traces and carbon dioxide
- (c) carbon dioxide only
- (d) coal

7. Buckminsterfullerene is an allotropic form of

- (a) phosphorus
- (b) sulphur
- (c) carbon
- (d) tin

8. The functional group present in propanal is-

- (a) -OH
- (b) -COOH
- (c) -CO-
- (d) -CHO

9. When vegetable oil is treated with hydrogen in the presence of nickel Or (Palladium) as a catalyst, it forms vegetable ghee. This process shows

- (a) Anodising reaction
- (b) Substitution reaction
- (c) Displacement reaction
- (d) Addition reaction

10. The number of structural isomers for alkane with a molecular weight 72 is

- (a) 2
- (b) 3
- (c) 4
- (d) 5

11. Which of the following is incorrectly matched?

- (a) Vinegar \rightarrow carboxylic acid
- (b) C2H6 \rightarrow alkane
- (c) Ethanol \rightarrow alcohol
- (d) Methanol \rightarrow ketone

12. While cooking, if bottom of the vessel is getting blackened on the outside, it means that

- (a) The food is not cooked properly
- (b) The fuel is not burning properly
- (c) The fuel is wet
- (d) The fuel is burning completely

13. The chemical reaction shows the addition of chlorine gas to hydrocarbon in the presence of sunlight.

 $\mathsf{CHCl}_3 + \mathsf{Cl}_2 \twoheadrightarrow \mathsf{CCl}_4 + \mathsf{HCl}$

How does chlorine react to a hydrocarbon compound in the presence of sunlight?

- (a) it adds hydrogen into the compound
- (b) it adds an oxygen atom into the compound
- (c) it substitutes hydrogen atom from the compound
- (d) it breaks double and triple bonds into a single bond

14. A carbon compound contains two atoms of carbon. Which name should the carbon compound bear?

(a) Butane

- (b) Ethane
- (c) Methane
- (d) Propane

15. The electronic configuration of an element is found to be 2, 4. How many bonds can one carbon atom form in a compound?

- (a) 1
- (b) 2
- (c) 4
- (d) 6

CASE STUDY BASED QUESTIONS

1. The compounds which have the same molecular formula but differ from each other in physical or chemical properties are called isomers and the phenomenon is called isomerism. When the isomerism is due to difference in the arrangement of atoms within the molecule, without any reference to space, the phenomenon is called structural isomerism. In other words. Structural isomers are compounds that have the same molecular formula but different structural formulas, i.e., they are different in the order in which different atoms are linked. In these compounds, carbon atoms can be linked together in the form of straight chains, branched chains or even rings.

1. Which of the following sets of compounds have the same molecular formula?

- (a) Butane and iso-butane
- (b) Cyclohexane and hexene
- (c) Propanal and propanone
- (d) All of these

2. In order to form branching, an organic compound must have a minimum of carbon atoms

- (a) 2
- (b) 3
- (c) 4
- (d) 5

3. Which of the following is an isomeric pair?

- (a) Ethane and propane
- (b) Ethane and ethene
- (c) Propane and butane
- (d) Butane and 2-methylpropane

4. Among the following the one having longest chain is

- (a) neo-pentane
- (b) iso-pentane
- (c) 2-methylpentane
- (d) 2,2-dimethylbutane

5. The number of isomers of pentane is

- (a) 2
- (b) 3
- (c) 4
- (d) 5

2. Nisha observed that the bottoms of cooking utensils were turning black in colour while the flame of her stove was yellow in colour. Her daughter suggested cleaning the air holes of the stove to get a clean, blue flame. She also told her mother that this would prevent the fuel from getting wasted.

- 1. Identify the reasons behind the sooty flame arising from the stove.
- 2. Can you distinguish between saturated and unsaturated compounds by burning them? Justify your answer.

3. Why do you think the colour of the flame turns blue once the air holes of the stove are cleaned?

3. Food, clothes, medicines, books, or many of the things are all based on this versatile element carbon. In addition, all living structures are carbon based. The earth's crust has only 0.02% carbon in the form of minerals. The element carbon occurs in different forms in nature with widely varying physical properties. Both diamond and graphite are formed by carbon atoms, the difference lies in the manner in which the carbon atoms are bonded to one another. Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules. This property is called catenation.

1. From the given alternatives, whose chemical and physical properties are not same?

- (a) Graphite and Diamond
- (b) Phosphorous and Sulphur
- (c) Carbon and Hydrogen
- (d) Methyl alcohol and Acetic acid

2. Which of the following statements is not correct?

- (a) Graphite is much less dense than diamond
- (b) Graphite is black and soft
- (c) Graphite has low melting point
- (d) Graphite feels smooth and slippery

3. Which of the following are isomers?

- (a) Butane and isobutene
- (b) Ethane and ethene
- (c) Propane and propyne
- (d) Butane and isobutane

4. Which one of the following is not an allotrope of carbon?

- (a) Soot
- (b) Graphite

(c) Diamond

(d) Carborundum

5. Pentane has the molecular formula C₅H₁₂. It has

(a) 5 covalent bonds

(b) 12 covalent bonds

(c) 16 covalent bonds

(d) 17 covalent bonds

ASSERTION AND REASON QUESTIONS

DIRECTION: Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

1. Assertion (A): Carbon is the only element that can form large number of compounds.

Reason (R): Carbon is tetravalent and shows the property of catenation.

Ans. A is false but R is true.

2. Assertion (A): Diamond and graphite are allotropes of carbon.

Reason (R): Some elements can have several different structural forms while in the same physical state. These differing forms are called allotropes.

Ans. Both A and R are true and R is the correct explanation of A.

3. Assertion (A): In alkanes, alkenes and alkynes the valency of carbon is always four.

Reason (R): All hydrocarbons except alkanes contain double bonds.

Ans. (c) A is true but R is false.

4. Assertion (A): The functional group present in alcohols is – OH.

Reason (R): It is the same group as present in water, hence water and alcohol have similar properties.

Ans. (c) A is true but R is false.

5. Assertion (A): Carbon monoxide is extremely poisonous in nature.

Reason (R): Carbon monoxide is formed by complete combustion of carbon.

Ans. (c) A is true but R is false.

Answer Key

MULTIPLE CHOICE QUESTIONS

Que	Answer
1	С
2	D
3	В
4	D
5	А
6	В
7	С
8	D
9	D
10	В
11	D
12	В
13	С
14	В
15	С

CASE STUDY BASED QUESTIONS

Que	Answer	
1	1. D	
	2. C	
	3. A	
	4. C	
	5. B	

2	1. Sooty deposit is due to incomplete combustion of fuel.	
	2. Yes, Saturated compounds will generally burn in excess of air with a blue flame but unsaturated hydrocarbons burn with a yellow flame with lots of black smoke (sooty flame).	
	3. Clean holes supply sufficient air(oxygen) and complete combustion of fuel will give blue flame.	
3	1. D	
	2. C	
	3. D	
	4. D	