

## UNIQUE STUDY POINT

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### CLASS X: IMPORTANT QUESTIONS CHAPTER -4

#### Carbon And Its Compound

#### MULTIPLE CHOICE QUESTIONS

Which of these compounds can be classified as alkynes?

Q.1. The electronic configuration of an element is found to be 2, 4. How many bonds can one carbon atom form in a compound?

- (a) only (A) (b) only (B)  
(a) 1 (b) 2 (c) 4 (d) 6

Q.2. Carbon forms four covalent bonds by sharing its four valance electrons with four univalent atoms, e.g hydrogen. After the formation of four bonds, carbon attains the electronic configuration of

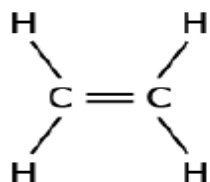
- (a) helium (b) neon (c) argon (d) krypton  
(c) both (A) and (D) (d) both (B) and (C)

Q.3. The image represents the structure of a few hydrocarbon compounds.

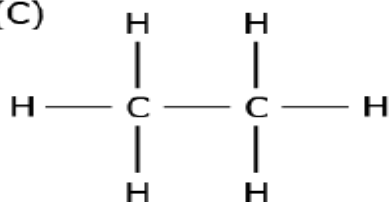
(A)



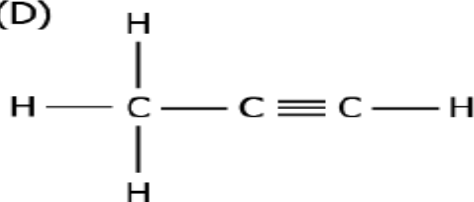
(B)



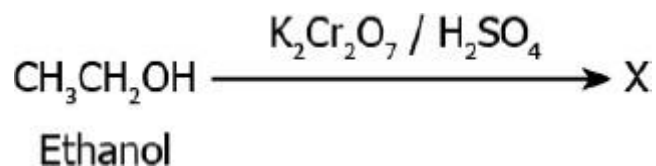
(C)



(D)



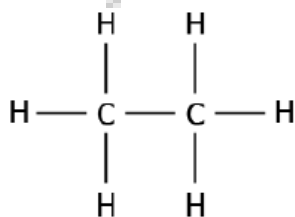
Q.1. The image represents a chemical reaction where ethanol is oxidized using potassium dichromate and sulphuric acid.



Which option represents the product "X"?

- (a)  $\text{CH}_2\text{O}$                       (b)  $\text{CH}_3\text{OH}$                       (c)  $\text{CH}_3\text{H}_2\text{O}$                       (d)  $\text{CH}_3\text{COOH}$

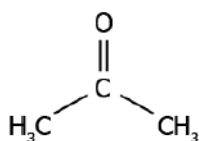
Q.5. The image represents the structure of a carbon compound known as ethane.



Which functional group is present in the compound?  
Which option explains the naming of ethane?

- (a) the presence of functional group connected with a single bond  
(b) as it contains two carbon atoms and a single bond connects the carbon atoms  
(c) carbon compound with a total number of eight atoms are named as ethane  
(d) as it contains six hydrogen atoms and a single bond connects the carbon and hydrogen atom

Q.6. The image represents a carbon compound.



- (a) alcohol                      (b) aldehyde                      (c) carboxylic acid                      (d) ketone

**Q.7. A carbon compound contains two atoms of carbon. Which name should the carbon compound bear?**

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

**Q.8. The chemical reaction shows the addition of chlorine gas to hydrocarbon in the presence of sunlight.**



**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

**Q.9. Methane, ethane and propane are said to form a homologous series because all are-**

- (a) Hydrocarbons                      (b) saturated compounds  
(c) aliphatic compounds                      (d) differ from each other by a  $\text{CH}_2$  group

**Q.10. Which of the following belongs to a homologous series of alkynes?**



- (a)  $\text{C}_6\text{H}_6$                       (b)  $\text{C}_2\text{H}_6$                       (c)  $\text{C}_2\text{H}_4$                       (d)  $\text{C}_3\text{H}_4$

**Q.11. The gas evolved when ethanol reacts with sodium metal is**

- (a)  $\text{H}_2$                       (b)  $\text{CO}_2$                       (c)  $\text{H}_2\text{O}$                       (d)  $\text{CO}$

**Q.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

**Q.13. When ethanoic acid reacts with ethanol a sweet smelling product is formed . The functional group present in the product is**

- (a) Aldehyde
- (b) Ketone
- (c) Alcohol
- (d) Ester

**Q.14. Glacial acetic acid is a**

- (a) Frozen acetic acid
- (b) 5-8% of solution of acetic acid in water
- (c) Mixture of acetic acid and alcohol
- (d) None of these

**Q.15. Which of the following is incorrectly matched?**

- (a) Vinegar → carboxylic acid
- (b)  $C_2H_6$  → alkane
- (c) Ethanol → alcohol
- (d) Methanol → ketone

**Q.16. The number of structural isomers for alkane with a molecular weight 72 is**

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

**Q.17. 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

**Q.18. The property of carbon atom by virtue of which it forms bond with other carbon atom is called**

- (a) chemical bonding
- (b) polymerization

- (c) catenation
- (d) carbonization

**Q.19. 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

**Q.20. The hetero atoms present in  $\text{CH}_3\text{-CH}_2\text{-O-CH}_2\text{-CH}_2\text{-Cl}$  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)

**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.

**Q.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.

**Q.2. Assertion(A)** : If the first member of a homologous series is methanal, its third member will be propanal.

**Reason (R)** : All the members of a homologous series show similar chemical properties.

**Q.3. 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 forms are called allotropes.

**Q.4. Assertion(A)** : Soaps are not suitable for washing purpose when water is hard.

**Reason (R)** : Soaps have relatively weak cleansing action.

**Q.5. Assertion(A)** : Carbon compounds can form chain, branched and ring structures.

**Reason (R)** : Carbon exhibits the property of catenation.

**Q.6. Assertion (A)** : Carbon monoxide is extremely poisonous in nature.

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

### CASE STUDY BASED QUESTIONS:

**Q.1. Read the following and answer the questions :**

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.

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

- (a) Butane and iso-butane
- (b) Cyclohexane and hexene

(C) Propanal and propanone

(d) All of these

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

(a) 2

(b) 3

(c) 4

(d) 5

**1.3. 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

**1.4. Among the following the one having longest chain is**

(a) neo-pentane

(b) iso-pentane

(C) 2-methylpentane

(d) 2,2-dimethylbutane

**1.5. The number of isomers of pentane is**

(a) 2

(b) 3

(c) 4

(d) 5

**Q.2. Read the following and answer the questions :**

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.

**2.1. 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

**2.2. 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

**2.3. Which of the following are isomers?**

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

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

- (a) Soot
- (b) Graphite
- (c) Diamond
- (d) Carborundum

**2.5. Pentane has the molecular formula  $C_5H_{12}$ . It has**

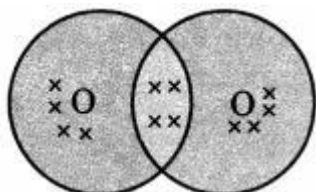
- (a) 5 covalent bonds
- (b) 12 covalent bonds
- (c) 16 covalent bonds
- (d) 17 covalent bonds



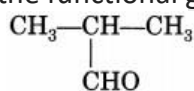
### VERY SHORT ANSWER TYPE QUESTIONS

Q.1. Draw the electron dot notation of O<sub>2</sub> molecule.

Ans:



Q.2. Identify the functional group present in the following compound:



Ans:-Aldehyde.

Q.3. Write the name and formula of the 2<sup>nd</sup> member of homologous series having general formula C<sub>n</sub>H<sub>2n</sub>

Q.4. Write the molecular formula of an alkyne containing 10 atoms of hydrogen.

Q.5. What is the function of conc. H<sub>2</sub>SO<sub>4</sub> in the formation of ethene from ethanol?

### SHORT ANSWER TYPE

Q.1. Covalent compounds have low melting and boiling

Ans: Covalent compounds have low melting and boiling points because the forces of attraction

between molecules of covalent compounds are very weak. On applying a small amount of heat these molecular forces break.

Q.2. What are covalent compounds? Why are they different from ionic compounds? List their three characteristic properties.

**Ans:** Covalent compounds are those compounds which are formed by sharing of valence electrons between the atoms e.g., hydrogen molecule is formed by mutual sharing of electrons between two hydrogen atoms.

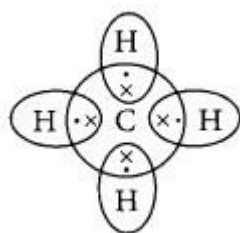
They are different from ionic compounds as ionic compounds are formed by the complete

transfer of electrons from one atom to another e.g., NaCl is formed when one valence electron of sodium gets completely transferred to outer shell of chlorine atom. The characteristic properties of covalent compounds are:

- (i) They are generally insoluble or less soluble in water but soluble in organic solvents.
- (ii) They have low melting and boiling points.
- (iii) They do not conduct electricity as they do not contain ions.

Q.3. What are covalent bonds? Show their formation with the help of electron dot structure of . Why are covalent compounds generally poor conductors of electricity?

Ans: Covalent bonds are those bonds which are formed by sharing of the valence electrons between two atoms. Electron dot structure of methane is shown in the figure.



Covalent compounds are generally poor conductors of electricity because they do not have free electrons or ions.

Q.4. Give reasons for the following:

- (i) Element carbon forms compounds mainly by covalent bonding.
- (ii) Diamond has high melting point.
- (iii) Graphite is a good conductor of electricity.

Ans: (i) As carbon has four valence electrons and it can neither lose nor gain four electrons thus, it attains noble gas configuration only by sharing of electrons. Thus, it forms covalent compounds.

(ii) In diamond, each carbon atom is bonded to four other carbon atoms forming a rigid three-dimensional structure. This makes diamond the hardest known substance. Thus, it has high melting point.

(iii) In graphite, each carbon atom is bonded to three other carbon atoms by covalent bonds in the same plane giving a hexagonal array. Thus, only three valence electrons are used for bond formation and hence, the fourth valence electron is free to move. As a result, graphite is a good conductor of electricity.

Q.5. Write the next homologue of each of the following:

(i)  $C_2H_4$

(ii)  $C_4H_6$

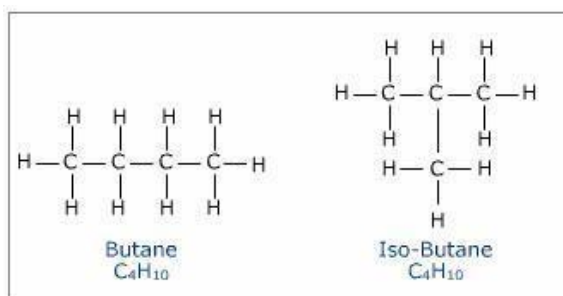
### LONG ANSWER TYPE QUESTION

Q.1. Why carbon and its compounds are used as fuels for most applications?

Ans: Carbon and its compounds give large amount of heat on combustion due to high percentage of carbon and hydrogen. They have high optimum ignition temperature with high calorific values and are easy to handle and their combustion can be controlled. Therefore, carbon and its compounds are used as fuels.

Q.2. What is meant by isomers? Draw the structures of two isomers of butane. Explain why we cannot have isomers of first three members of alkane series?

Ans: Isomers are compounds having the same molecular formula but different structures. Since branching is not possible, isomers are not possible for the first three members of alkanes series. The two isomers of butane,  $C_4H_{10}$  are:



Q.3. State the reason why carbon can neither form  $C^{+4}$  cation nor  $C^{-4}$  anions but forms covalent compound.

Ans: Carbon has atomic number 6. This means that it has 4 electrons in its outermost shell. It needs to gain or lose 4 electrons to achieve noble gas configuration. But it cannot form  $C^{+4}$  cation because the removal of 4 electrons requires a large amount of energy. And also, cannot form  $C^{-4}$  anion as it would be difficult for its nucleus with 6 protons to hold on to 10 electrons. Therefore, Carbon atoms share electrons and form covalent compounds

Q.4. What is a homologous series? List any of its two features.

Ans: A homologous series is a series of carbon compounds that have different numbers of carbon atoms but contain the same functional group.

Characteristics of homologous series:

1. The members of the homologous series can be represented by a general formula.
2. The successive members differ from each other in the molecular formula by a  $\text{CH}_2$  unit.

Q.5. The element carbon forms a very large number of compounds. Give reason for this fact.

Ans: Carbon forms large number of compounds because of tetravalency and catenation property.

Tetravalency- Carbon has valency 4 to attain noble gas configuration carbon shares its valence electrons with other elements like hydrogen chlorine etc.

Catenation-Carbon also shows the property of self-linking in which it forms long branched or cyclic chains to form large number of compounds.

Q.6. List Any three difference between soap and detergent.

Ans:

soap	detergent
i) Soaps are sodium salts of fatty acids.	Detergents are sodium salt of sulphonic acids.
ii) Soaps clean well in soft water but do not clean well in hard water	detergents clean well with both with hard and soft water
Soaps are biodegradable and do not cause pollution.	Some detergents are non-biodegradable and cause of pollution

### Answer key

#### MCQs

Q.1.	C	Q.6.	D	Q.11.	A	Q.16.	B
Q.2.	B	Q.7.	B	Q.12.	B	Q.17.	B
Q.3.	C	Q.8.	C	Q.13.	D	Q.18.	C
Q.4.	D	Q.9.	D	Q.14.	B	Q.19.	A

Q.5.	B	Q.10.	D	Q.15.	D	Q.20.	D
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**Assertion (A) and Reason(R) Questions**

Q.1-d    Q.2-b    Q.3-a    Q.4-b    Q.5-a    Q.6--c

**Case study Based Question**

Q.1.    1.1-d    1.2-c    1.3-a    1.4-c    1.5-b  
Q.2.    2.1-d    2.2-c    2.3-d    2.4-d    2.5-c

