

CBSE Class 10 Chemistry Chapter 4 Important Questions

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 $CH_3-CH_2-O-CH_2-CH_2-Cl$ 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-

9. a) -OH

10. b) -COOH

11. c) -CO-

12. d) -CHO

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

1. a) Anodising reaction

2. b) Substitution reaction

3. c) Displacement reaction

4. d) Addition reaction

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

(a) 2

(b) 3

(c) 4

(d) 5

10. Which of the following is incorrectly matched?

(a) Vinegar → carboxylic acid

(b) C_2H_6 → alkane

(c) Ethanol → alcohol

(d) Methanol → ketone

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

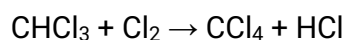
(a) The food is not cooked properly

(b) The fuel is not burning properly

(c) The fuel is wet

(d) The fuel is burning completely

12. 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

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

(a) Butane

(b) Ethane

(c) Methane

(d) Propane

14. 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

Q.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

Q.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?**

Q.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 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

1. What are the two properties of carbon which led to the huge number of carbon compounds we see around us? Define them.
2. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n}
3. Write the name and structural formulae of all the possible isomers of Pentane.
4. Write the molecular formula of an alkyne containing 10 atoms of hydrogen.
5. Is the given statement true? If not, rewrite the correct statement. 'Diamond and graphite are the covalent compounds of carbon elements.'
6. Give the name and structural formula of the third member of the homologous series of following:

(i) Alkane

(ii) Alkene

(iii) Alkyne

(iv) cycloalkane

Q.5. What is the function of conc. H_2SO_4 in the formation of ethene from ethanol?

SHORT ANSWER TYPE QUESTIONS

Q.1. Write the next homologue of each of the following:

(i) C_2H_4

(ii) C_4H_6

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

Q.3. Covalent compounds have low melting and boiling point. Why?

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.

LONG ANSWER TYPE QUESTIONS

1. 6.1ml glacial acetic acid and 1ml of ethanol are mixed together in a test tube. Few drops of concentrated sulphuric acid are added in the mixture are warmed in a water bath for 5 min

- a) Name the resultant compound formed.
- b) Represent the above change by a chemical equation.
- c) What term is given to such a reaction.
- d) What are the special characteristics of the compound formed?

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

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

4. What is the difference between soaps and detergents? State in brief the cleansing action of soaps in removing an oily spot from a fabric. Why are soaps not effective when a fabric is washed in hard water? How can this problem be resolved?

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

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): 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.

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

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

Q.5. 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.

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

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

ANSWER KEY

MULTIPLE CHOICE QUESTIONS

Que	Answer
1	C
2	D
3	B
4	D
5	A
6	B
7	C

8	D
9	D
10	B
11	D
12	B
13	C
14	B
15	C

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 5. C

VERY SHORT ANSWER TYPE QUESTIONS

1. What are the two properties of carbon which led to the huge number of carbon compounds we see around us? Define them.

Ans:- a) Catenation- Property to bond with itself on a large scale

1. **b) Tetravalency- property to make 4 covalent bonds.**

2. Write the name and formula of the 2nd member of homologous series having general formula C_nH_{2n}

Ans:- C_nH_{2n} : Alkene , 2nd member = C_3H_6 (propene)

3. Write the name and structural formulae of all the possible isomers of Pentane.
4. Write the molecular formula of an alkyne containing 10 atoms of hydrogen.

Ans:- C_6H_{10} .

5. Is the given statement true? If not, rewrite the correct statement. 'Diamond and graphite are the covalent compounds of carbon elements.'

Ans:- No. 'Diamond and graphite are allotropes of carbon.'

6. Give the name and structural formula of the third member of the homologous series of following:

(i) Alkane

(ii) Alkene

(iii) Alkyne

(iv) cycloalkane

Ans:- Alkane: Propane C_3H_8 , Alkene: Butene C_4H_8 , Alkyne: Butyne C_4H_6 , Cycloalkane: Cyclopentane C_5H_{10}

Q.5. What is the function of conc. H_2SO_4 in the formation of ethene from ethanol?

Ans: Dehydrating agent

SHORT ANSWER TYPE QUESTIONS

Q.1. Write the next homologue of each of the following:

(i) C_2H_4

(ii) C_4H_6

**Ans : (i) C_2H_4 belongs to alkene series having general formula, C_nH_{2n} .
Thus, next homologue will be $C_{3H_{2 \times 3}} = C_3H_6$**

**(ii) C_4H_6 belongs to alkyne series having the general formula, C_nH_{2n-2} .
Thus, next homologue will be $C_{5H_{2 \times 5 - 2}} = C_5H_8$**

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 the 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. Covalent compounds have low melting and boiling point. Why?

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.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.

LONG ANSWER TYPE QUESTIONS

1. 6.1ml glacial acetic acid and 1ml of ethanol are mixed together in a test tube. Few drops of concentrated sulphuric acid are added in the mixture are warmed in a water bath for 5 min

1. a) Name the resultant compound formed.

It gives an ester called ethyl ethanoate.

1. b) Represent the above change by a chemical equation.



1. c) What term is given to such a reaction.

Esterification reaction

1. d) What are the special characteristics of the compound formed

It is sweet smelling. It is used in perfumes and as a flavouring agent.

2. 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.

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.

4. What is the difference between soaps and detergents? State in brief the cleansing action of soaps in removing an oily spot from a fabric. Why are soaps not effective when a fabric is washed in hard water? How can this problem be resolved?

Soaps are the sodium or potassium salts of higher fatty acids. Synthetic detergents are the sodium salts of a long chain alkyl benzene sulphonic acids or long chain alkyl hydrogen sulphates. soap molecule contains a polar part ($\text{COO}^- \text{Na}^+$) called polar end and a non-polar part consisting of a long chain carbon atom. This part is called hydrocarbon end. The polar end is water soluble whereas hydrocarbon part is water-repellent and oil soluble.

When an oily (dirty) piece of cloth is put into soap solution, the hydrocarbon part of the molecule attaches itself to the oily drop and the -COO- end orients itself towards water. Na^+ ions in solution arrange themselves around the -COO- ions. The negatively charged micelle so formed entraps the oily dirt. The negatively charged micelle repel each other due to the electrostatic repulsion. As a result, the tiny oily dirt particles do not come together and get washed away in water during rinsing.

In hard water, soap does not form lather as hard water contains Ca^{2+} and Mg^{2+} ions. Soap reacts with these ions to form insoluble calcium and magnesium salts of fatty acids. Detergents can form lather well even in hard water as they do not form insoluble calcium or magnesium salts.

5. 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 CH_2 unit.

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