**CBSE Important Questions for Class 10 Science Chapter 4:** Chapter 4 of Class 10 Science Carbon and its Compounds covers important concepts about carbon's unique properties and its vast range of compounds.

Understanding the significance of carbon compounds in daily life, such as their role in fuels, plastics, and pharmaceuticals is important. By studying these key areas students can enhance their comprehension and performance in examinations.

**CBSE Sample Papers for Class 10**

# CBSE Important Questions for Class 10 Science Chapter 4 Overview

The notes for Chapter 4 of Class 10 Science Carbon and its Compounds are prepared by Physics Wallah experts provide a clear overview of important concepts about carbon and its compounds. These notes explain how carbon is unique because it can form four bonds, allowing it to create many different organic compounds. Students will learn about different forms of carbon, like graphite, diamond and fullerenes and their special properties.

The notes also cover key topics like hydrocarbons, functional groups and the role of carbon compounds in everyday life. With simple explanations and important questions, these notes are a helpful resource for students to improve their understanding and do well in their exams.

# CBSE Important Questions for Class 10 Science Chapter 4 PDF

CBSE Important Questions for Class 10 Science Chapter 4 Carbon and its Compounds are now available in PDF format.

The PDF are a valuable study guide, helping students reinforce their understanding of carbon's unique properties and its various compounds. Students can download the PDF using the link provided below to enhance their exam preparation effectively.

**CBSE Important Questions for Class 10 Science Chapter 4 PDF**

# CBSE Important Questions for Class 10 Science Chapter 4 Carbon and its Compounds

Here we have provided CBSE Important Questions for Class 10 Science Chapter 4 Carbon and its Compounds -

## Multiple Choice Type Questions

**Q1. $C_3H_8$ belongs to the homologous series of**

**(a ) Alkynes**

**(b ) Alkenes**

**(c ) Alkanes**

**(d ) Cycloalkanes**

**Answer:**

(c ), $C_3H_8$ belongs to the homologous series of alkanes.

**Q2. Which of the following will undergo an addition reaction?**

**(a ) $CH_4$**

**(b ) $C_3H_8$**

**(c ) $C_2H_6$**

**(d ) $C_2H_4$**

**Answer:**

(d ) $C_2H_4$ is an alkene. Hence it will undergo an addition reaction.

**Q3. In a diamond, each carbon atom is bonded to four other carbon atoms to form**

**(a ) A hexagonal array**

**(b ) A rigid three-dimensional structure**

**(c ) A structure in the shape of a football**

**(d ) A structure of a ring**

**Answer:**

(b ), In a diamond, each carbon atom is bonded to four other carbon atoms to form a rigid three-dimensional structure.

**Q4. The allotrope of carbon which is a good conductor of heat and electricity is**

**(a ) Diamond**

**(b ) Graphite**

**(c ) Charcoal**

**(d ) None of these**

**Answer:**

(b ) The allotrope of carbon which is a good conductor of heat and electricity is graphite.

**Q5. How many double bonds are there in a saturated hydrocarbon?**

**(a ) One**

**(b ) Two**

**(c ) Three**

**(d ) Zero**

**Answer:**

(d ) A saturated hydrocarbon has zero double bonds.

## Short Answer Type Questions

**Q1. Draw the structural formula of ethyne.**

**Answer:**

Structural Formula: H – C ≡ C – H

**Q2. Write the names of the following compounds.**

**Answer:**

(a ) Pentan-1-oic Acid

(b ) But-1-yne

(c ) Heptan-1-al

(d ) Pentan-1-ol

**Q3. Identify and name the functional groups present in the following compounds.**

**Answer:**

(a ) Propan-1-ol

(b ) Propan-1-oic Acid

(c ) Pent-3-one

(d ) But-1-ene

**Q4. A compound X is formed by the reaction of carboxylic acid $C_2H_4O_2$ and alcohol in the presence of a few drops of $H_2SO_4$. The alcohol on oxidation with alkaline $KMnO_4$ followed by acidification gives the same carboxylic acid as used in this reaction. Give the names and structures of (a) carboxylic acid, (b) alcohol and (c) compound X. Also, write the reaction.**

**Answer:**

Here, the carboxylic acid is ethanoic acid, alcohol is ethanol, and compound X is ethyl ethanoate.

Structure of Ethanoic Acid:

Structure of Ethanol:

Structure of Ethyl Ethanoate:

Reactions Involved:

$CH_3COOH + CH_3CH_2COOH \rightarrow CH_3COOC_2H_5 + H_2O$

$C_2H_5OH$ + Alkaline $KMnO_4 \rightarrow CH_3COOH$

**Q5. Why are detergents better cleansing agents than soaps? Explain.**

**Answer:**

Detergents are considered superior cleansing agents compared to soaps for several reasons. Firstly, they can effectively work in hard water, which contains high levels of calcium and magnesium ions. Soaps tend to react with these ions, forming an insoluble substance called scum that can hinder the cleaning process. In contrast, detergents do not react with these ions, allowing them to remain effective even in hard water conditions.

Detergents have a more powerful cleansing action due to their chemical structure. They are designed to be more soluble in water, which enhances their ability to penetrate and lift away dirt and grease from surfaces. This improved solubility and the presence of charged ends in detergents facilitate better interactions with dirt particles, making them more efficient in cleaning.

Overall, detergents provide a more reliable and effective cleaning experience, especially in situations where hard water is a factor making them the preferred choice over traditional soaps.

**Q6. Name the functional groups present in the following compounds**

**(a ) $CH_3COCH_2CH_2CH_2CH_3$**

**(b ) $CH_3CH_2CH_2COOH$**

**(c ) $CH_3CH_2CH_2CH_2CHO$**

**(d ) $CH_3CH_2OH$**

**Answer:**

(a ) A ketone functional group is present in the compound $CH_3COCH_2CH_2CH_2CH_3$.

(b ) A carboxylic acid functional group is present in the compound $CH_3CH_2CH_2COOH$.

(c ) An aldehyde functional group is present in the compound $CH_3CH_2CH_2CH_2CHO$.

(d ) An alcohol functional group is present in the compound $CH_3CH_2OH$.

**Q7. How is ethene prepared from ethanol? Give the reaction involved in it.**

**Answer:**

Ethanol is heated at 443 k in excess of concentrated sulphuric acid to obtain ethene.

$CH_3CH_2OH$ + Conc. $H_2SO_4 \rightarrow CH_2 = CH_2 + H_2O$

**Q8. Intake of a small quantity of methanol can be lethal. Comment.**

**Answer:**

The consumption of even a small amount of methanol can be extremely dangerous and potentially fatal. Methanol, or wood alcohol, is a toxic substance that the body metabolizes into formaldehyde and formic acid. These metabolites can rapidly interfere with cellular functions, leading to severe damage. Methanol causes coagulation of the protoplasm, which disrupts normal cell activity and can lead to cell death.

One of the most serious effects of methanol poisoning is its impact on the optic nerve, which can result in permanent blindness. This occurs due to the toxicity of its metabolites, which can damage the nerve cells in the eyes. Symptoms of methanol poisoning may include headache, dizziness, nausea, vomiting, and in severe cases, seizures, coma, or death. Therefore, it is crucial to avoid ingesting methanol and to seek immediate medical attention if exposure occurs.

**Q9. Gas is evolved when ethanol reacts with sodium. Name the gas evolved and write the balanced chemical equation of the reaction involved.**

**Answer:**

Hydrogen gas is evolved when ethanol reacts with sodium.

$2\ Na + 2\ CH_3CH_2OH \rightarrow 2\ CH_3CH_2ONa + H_2$

**Q10. Ethene is formed when ethanol at 443 K is heated with excess concentrated sulphuric acid. What is the role of sulphuric acid in this reaction? Write the balanced chemical equation of this reaction.**

**Answer:**

Concentrated sulphuric acid removes water from ethanol, thereby acting as a dehydrating agent.

$CH_3CH_2OH + \text{Conc } H_2SO_4 \rightarrow CH_2 = CH_2 + H_2O$

**Q11. Carbon, the Group (14) element in the Periodic Table, is known to form compounds with many elements. Write an example of a compound formed with**

**(a ) Chlorine (Group 17 of the periodic table)**

**(b ) Oxygen (Group 16 of the periodic table)**

**Answer:**

(a ) Carbon tetrachloride ($CCl_4$)

(b ) Carbon dioxide ($CO_2$)

**Q12. Crosses or dots in the electron dot structure represent the valence shell electrons.**

**(a) The atomic number of chlorine is 17. Write its electronic configuration**

**Answer:**

(a ) The electronic configuration of chlorine atom is 2, 8, 7

**Q13. Catenation is the ability of an atom to form bonds with other atoms of the same element. Both carbon and silicon exhibit it. Compare the ability of catenation of the two elements. Give reasons.**

**Answer:**

Catenation refers to the ability of an atom to form bonds with other atoms of the same element, creating long chains or structures. Both carbon and silicon exhibit this property, but their abilities to catenate differ significantly.

Carbon has a superior ability for catenation compared to silicon. This is primarily due to the strong carbon-carbon (C-C) bonds, which are stable and enable the formation of a wide variety of organic compounds. The bond energy of C-C bonds is high, resulting in stable long-chain and cyclic structures. This stability allows carbon to form complex molecules, such as hydrocarbons that can have extensive networks of carbon atoms.

On the other hand, silicon forms silicon-silicon (Si-Si) bonds that are generally weaker and more reactive than carbon-carbon bonds. While silicon can also catenate, the compounds formed are often less stable. Silanes (silicon analogs of alkanes) are more reactive and the Si-Si bonds can break down more easily under certain conditions. As a result, silicon compounds tend to have less versatility in terms of structure compared to carbon compounds.

**Q14. Unsaturated hydrocarbons contain multiple bonds between the two C-atoms and show addition reactions. Give the test to distinguish ethane from ethene.**

**Answer:**

The bromine water test can be used to distinguish between saturated and unsaturated hydrocarbons. Saturated compounds don't give an addition reaction. Hence, there won't be any change in the reaction mixture. In contrast, if an unsaturated hydrocarbon is added to bromine water, its colour will decolourise.

Saturated hydrocarbon + $Br_2$ → No Reaction (No Colour Change)

Unsaturated hydrocarbon + $Br_2$ → Reaction will occur (Decolourise)

**Q15. Match the reactions given in Column (A) with the names given in column (B).**

| **Column (A)** | **Column (B)** |
|---|---|
| **$CH_3OH + CH_3COOH + H^+ \rightarrow CH_3COOCH_3 + H_2O$** | **Addition reaction** |
| **$CH_2 = CH_2 + H_2 + Ni \rightarrow H_3C – CH_3$** | **Substitution reaction** |
| **$CH_4 + Cl_2 + Sunlight \rightarrow CH_3Cl + HCl$** | **Neutralisation reaction** |
| **$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$** | **Esterification reaction** |

**Answer:**

| Column (A) | Column (B) |
|---|---|
| $CH_3OH + CH_3COOH + H^+ \rightarrow CH_3COOCH_3 + H_2O$ | Esterification reaction |
| $CH_2 = CH_2 + H_2 + Ni \rightarrow H_3C - CH_3$ | Addition reaction |
| $CH_4 + Cl_2 + Sunlight \rightarrow CH_3Cl + HCl$ | Substitution reaction |
| $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$ | Neutralisation reaction |

**Q16. Write the structural formulae of all the isomers of hexane.**

**Answer:**

There are five isomers of hexane.

**Q17. What is the role of metal or reagents written on arrows in the given chemical reactions?**

**Answer:**

(a ) Ni acts as a catalyst.

(b ) Concentrated $H_2SO_4$ acts as a catalyst and a dehydrating agent.

(c ) Alkaline $KMnO_4$ acts as an oxidising agent.

## Long Answer Type Questions

**Q1. A salt X is formed, and gas is evolved when ethanoic acid reacts with sodium hydrogen carbonate. Name the salt X and the gas evolved. Describe an activity and draw the diagram of the apparatus to prove that the evolved gas is the one you have named. Also, write a chemical equation of the reaction involved.**

**Answer:**

The salt X is sodium ethanoate ($CH_3COONa$), and the evolved gas is carbon dioxide ($CO_2$).

Take a test tube and add ethanoic acid ($CH_3COOH$). Add sodium bicarbonate ($NaHCO_3$) to the acid, close the test tube's mouth with a cork, and attach a delivery tube.

Take lime water in another test tube and attach it to the delivery tube. The lime water turns milky. This indicates that the evolved gas is carbon dioxide.

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

The milkiness is due to the formation of $CaCO_3$.

Reaction Involved: $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$ (g)

**Q2. (a ) What are hydrocarbons? Give examples.**

**(b ) Give the structural differences between saturated and unsaturated hydrocarbons with two examples each.**

**(c ) What is a functional group? Give examples of four different functional groups.**

**Answer:**

(a ) A hydrocarbon is any of a class of organic compounds made up of carbon and hydrogen. Methane and Ethane are examples of hydrocarbons.

(b )

| S. No. | Saturated hydrocarbon | Unsaturated hydrocarbon |
|---|---|---|
| 1. | Saturated hydrocarbons contain carbon-carbon single bonds. | Unsaturated hydrocarbons contain at least one carbon-carbon double or triple bond. |
| 2. | They have $sp^3$ hybridised carbon atoms having a general formula $C_nH_{2n+2}$. | They have $sp^2$ or sp hybridised carbon atoms having a general formula $C_nH_{2n}$ or $C_nH_{2n-2}$. |

(c ) A functional group is the atoms group in a molecule that specifies the chemical behaviour of the molecule. Atoms in a functional group are bonded by the covalent bond.

**Q3. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail.**

**Answer:**

Vegetable oils generally have long chains of unsaturated carbons, while animal fats have long chains of saturated carbons. An addition reaction is used in the conversion of vegetable oils to fats. It is known as the hydrogenation of oil.

An addition reaction is carried out in the presence of Ni as a catalyst.

**Q4. (a ) Write the formula and draw the electron dot structure of carbon tetrachloride.**

**(b ) What is saponification? Write the reaction involved in this process.**

**Answer:**

(a ) The formula of carbon tetrachloride is $CC_4$.

Electron dot structure of Carbon tetrachloride:

(b ) Saponification is a methodology of manufacturing soap by the hydrolysis of fats or oils with a base like sodium hydroxide.

Reaction: $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

**Q5. Esters are sweet-smelling substances and are used in making perfumes. Suggest some activity and reaction in preparing an ester with a well-labelled diagram.**

**Answer:**

Esters are produced by heating carboxylic acids with alcohols in the presence of an acid catalyst. The catalyst that can be used is concentrated sulphuric acid.

$CH_3COOH + CH_3CH_2OH + \text{Conc. } H_2SO_4 \rightarrow CH_3CH_2COOCH_2CH_3 + H_2O$

**Q6. A compound C (molecular formula, $C_2H_4O_2$) reacts with Na – metal to form a compound R and evolves into a gas which burns with a pop sound. Compound C on treatment with an alcohol A in the presence of an acid forms a sweet-smelling compound S (molecular formula, $C_3H_6O_2$). On addition of NaOH to C, it also gives R and water. S on treatment with NaOH solution gives back R and A. Identify C, R, A, and S and write down the reactions involved.**

**Answer:**

Here, compound C is ethanoic acid ($CH_3COOH$), compound R is sodium ethanoate ($CH_3COONa$), compound A is ethanol ($C_2H_5OH$), and compound S is ethyl ethanoate ($CH_3COOC_2H_5$).

- Ethanoic acid (CH3COOH) reacts with sodium metal to form sodium ethanoate ($CH_3COONa$).

$2\ CH_3COOH + 2\ Na \rightarrow 2\ CH_3COONa + H_2$

- Ethanoic acid ($CH_3COOH$) on treatment with ethanol ($C_2H_5OH$) in the presence of an acid forms a sweet-smelling ethyl ethanoate ($CH_3COOC_2H_5$).

$CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

- On adding NaOH to ethanoic acid ($CH_3COOH$), it also gives sodium ethanoate ($CH_3COONa$) and water.

$CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

Thus, compound C is Ethanoic acid.

**Q7. Look at Figure 4.1 and answer the following questions**

**(a ) What change would you observe in the calcium hydroxide solution taken in tube B?**

**(b ) Write the reaction involved in test tubes A and B.**

**(c ) Would you expect the same change if ethanol is given instead of ethanoic acid?**

**(d ) How can a solution of lime water be prepared in the laboratory?**

**Answer:**

(a ) Calcium hydroxide solution in test tube B will become milky due to the formation of calcium carbonate.

(b ) Reaction in test tube A:

$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + CO_2 + H_2O$

Reaction in test tube B:

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

(c ) If ethanol is given instead of ethanoic acid, similar changes won't be observed because ethanol does not react with sodium hydrogen carbonate.

(d ) First, take distilled water in a beaker and mix calcium carbonate powder. After stirring entirely, wait till the mixture settles down. Decant the clear liquid from the beaker. This liquid is lime water.

**Q8. How would you bring about the following conversions? Name the process and write the**

**reaction.**

**(a) Ethanol to Ethene.**

**(b) Propanol to Propanoic acid.**

**Answer:**

(a) Ethanol is heated at 443 K in the presence of an excess of conc. Sulphuric acid. This reaction is known as dehydrogenation.

$CH_3CH_2OH$ + Conc. $H_2SO_4 \rightarrow CH_2 = CH_2 + H_2O$.

(b) Propanol is treated with alkaline potassium permanganate or acidified potassium dichromate to get propanoic acid.

$CH_3CH_2CH_2OH$ + Alkaline $KMnO_4$ / Acidified $K_2Cr_2O_7 \rightarrow CH_3CH_2COOH$

**Q9. Draw the possible isomers of the compound with the molecular formula $C_3H_6O$ and give their electron dot structures.**

**Answer:**

The two possible isomers of the compound with the molecular formula $C_2H_6O$ are

Electron dot structures of the compound with the molecular formula $C_2H_6O$ are

**Q10. Explain the given reactions with the examples**

**(a) Hydrogenation reaction**

**(b) Oxidation reaction**

**(c) Substitution reaction**

**(d) Saponification reaction**

**(e) Combustion reaction**

**Answer:**

(a) Addition of hydrogen to an unsaturated hydrocarbon to get a saturated hydrocarbon is known as a hydrogenation reaction.

$CH_2 = CH_2 + H_2 + Ni \rightarrow CH_3 - CH_3$

(b) When oxygen is added to alcohol to make carboxylic acid, it is known as an oxidation reaction.

$CH_3CH_2CH_2OH$ + Alkaline $KMnO_4$ / Acidified $K_2Cr_2O_7 \rightarrow CH_3CH_2COOH$

(c ) A substitution reaction is a class of chemical reactions in which another atom or group substitute an atom or group of atoms.

$CH_4 + Cl_2$ + Sunlight $\rightarrow CH_3Cl + HCl$

(d) Saponification is a methodology of manufacturing soap by the hydrolysis of fats or oils with a base like sodium hydroxide.

Reaction: $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

(e) A combustion reaction is a chemical reaction in which a compound and an oxidant react to form heat and a new product.

Example: Burning of wood.

**Q11. An organic compound A on heating with concentrated $H_2SO_4$ forms a compound B which on the addition of one mole of hydrogen in presence of Ni forms a compound C. One mole of compound C on combustion forms two moles of $CO_2$ and 3 moles of $H_2O$. Identify the compounds A, B and C and write the chemical equations of the reactions involved.**

**Answer:**

Compound A is ethanol ($CH_3CH_2OH$). When it is heated with concentrated sulphuric acid, we get ethene ($CH_2 = CH_2$). Thus, compound B is ethene ($CH_2 = CH_2$).

$CH_3CH_2OH + Conc.H_2SO_4 \rightarrow CH_2 = CH_2 + H_2O$

When ethene ($CH_2 = CH_2$) is heated in the presence of nickel, we get ethane ($CH_3 - CH_3$).

Thus, compound C is ethane ($CH_3 - CH_3$).

$CH_2 = CH_2 + Ni \rightarrow CH_3 - CH_3$

When 1 mole of ethane ($CH_3 - CH_3$) is burnt, we get 2 moles of carbon dioxide ($CO_2$) and 3 moles of water ($H_2O$).

$2\ CH_3 - CH_3 + 7\ O_2 \rightarrow 4\ CO_2 + 6\ H_2O$

# Benefits of CBSE Important Questions for Class 10 Science Chapter 4

- **Focused Revision**: Important questions highlight key concepts and topics, allowing students to concentrate their revision efforts on what is most relevant for exams.
- **Better Understanding**: By practicing these questions students can deepen their understanding of the properties, reactions and applications of carbon compounds, which are essential for mastering the chapter.
- **Enhanced Problem-Solving Skills**: Working through important questions helps improve critical thinking and problem-solving skills, as students learn to apply their knowledge to different scenarios.
- **Exam Preparation**: Familiarity with important questions can boost confidence and readiness for exams, as students will feel more prepared to tackle similar questions in the actual test.

- **Identification of Weak Areas**: By reviewing and answering important questions, students can identify topics they find challenging, allowing them to focus on these areas for improvement.