

NCERT Solutions for Class 10 Science

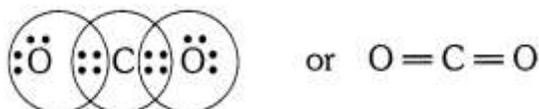
Chapter 4 – Carbon and its Compounds

Intext Questions with Solutions of Class 10 Science Chapter 4 – Carbon and its Compounds

1.

What would be the electron dot structure of carbon dioxide which has the formula CO_2 ?

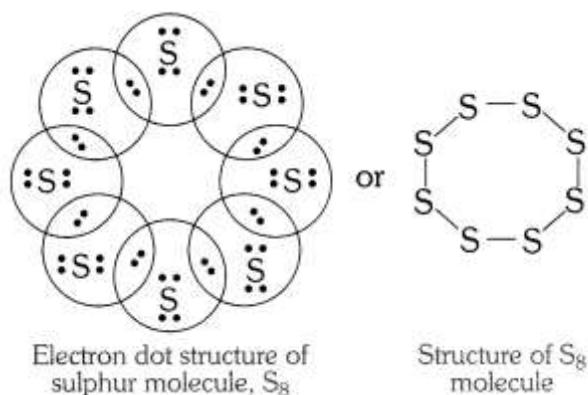
Ans:



2.

What would be the electron dot structure of a molecule of sulphur which is made up of eight atoms of sulphur? (Hint – The eight atoms of sulphur are joined together in the form of a ring.)

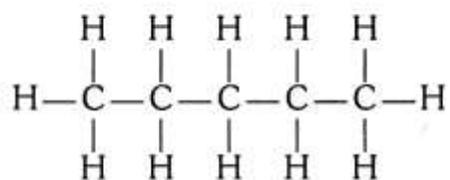
Ans:



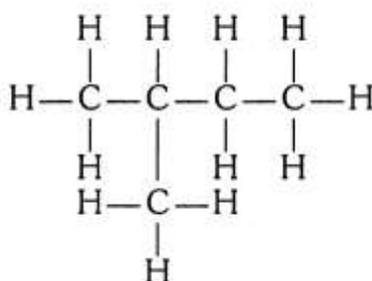
3.

How many structural isomers can you draw for pentane?

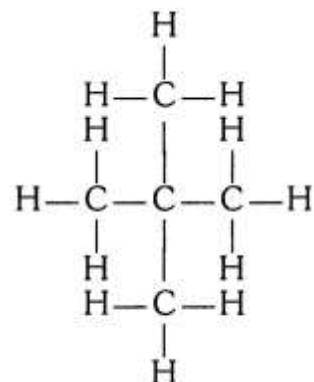
Ans: There are Three structural isomers that can be draw from pentane they are: n-pentane, iso-pentane and neo-pentane.



n-pentane



Iso-pentane



Neo-pentane

4.

What are the two properties of carbon which lead to the huge number of carbon compounds we see around us?

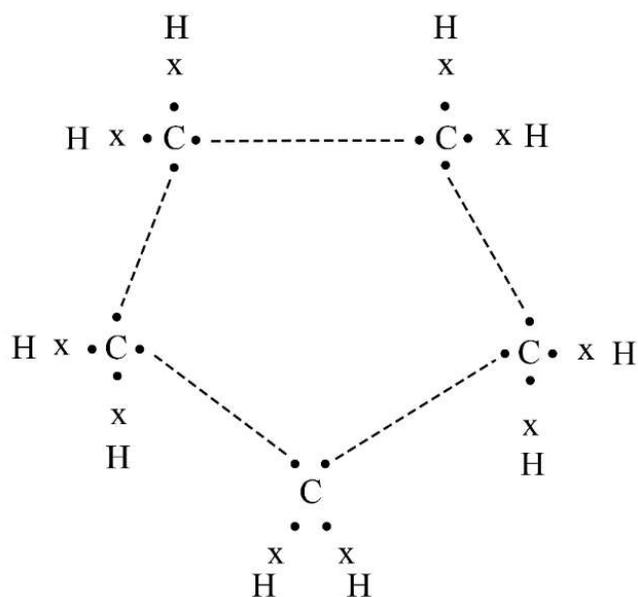
The following are two characteristics of carbon that contribute to the vast quantity of carbon compounds we encounter in our environment:

1. In actuality, carbon contains a large number of valence electrons—six.
2. Carbon atoms and many others, including oxygen, chlorine, nitrogen, sulfur, hydrogen, etc., readily form covalent bonds.

5.

What will be the formula and electron dot structure of cyclopentane?

Ans: C₅H₁₀(cyclopentane)



6.

Draw the structures for the following compounds.

(i) Ethanoic acid

(ii) Bromopentane*

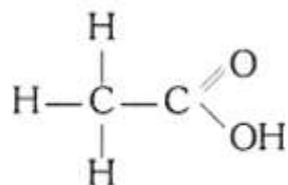
(iii) Butanone

(iv) Hexanal.

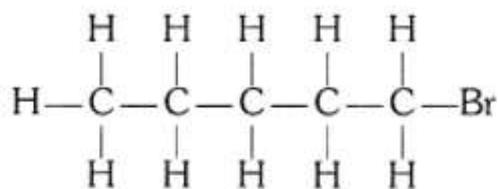
*Are structural isomers possible for bromopentane?

Ans:

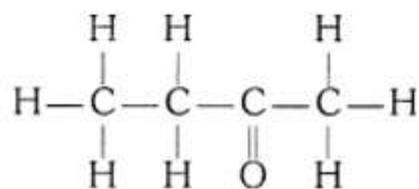
(i) Ethanoic acid (CH_3COOH)



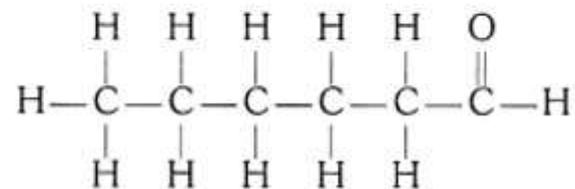
(ii) Bromopentane ($\text{C}_5\text{H}_{11}\text{Br}$)



(iii) Butanone ($\text{CH}_3 - \text{CH}_2 - \text{COCH}_3$)

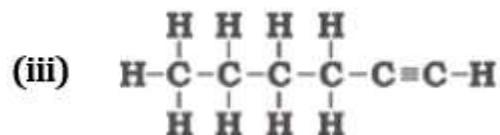
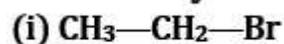


(iv) Hexanal ($\text{C}_5\text{H}_{11}\text{CHO}$)



7.

How would you name the following compounds?



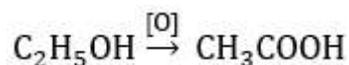
Ans:

- i. Bromoethane
- ii. Methanal or Formaldehyde
- iii. 1 – Hexyne

8.

Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

Ans: Since the addition of oxygen to a substance is known as oxidation, the conversion of ethanol into ethanoic acid is an example of an oxidation reaction. Here, an oxidizing agent, such as acidified potassium dichromate or alkaline potassium permanganate, adds oxygen to ethanol, causing it to change into acid.



9.

A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used?

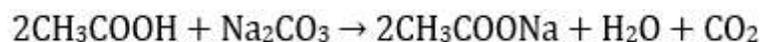
Ans: Because ethyne is unsaturated, it produces a sooty flame when burned in the air. When ethyne and oxygen are burned together, full combustion results in a clear flame at a temperature of 2500°C. For welding, an oxy-acetylene flame is utilized. A mixture of ethyne and air is not employed since it is difficult to reach this high of a temperature without combining oxygen.

10.

How would you distinguish experimentally between an alcohol and a carboxylic acid?

Ans: Alcohols do not produce the carbon dioxide gas that renders lime water milky when carboxylic acids react with sodium carbonate. It is possible to differentiate between alcohol and carboxylic acid with this technique.

The carboxylic acid and sodium carbonate's reaction:



11.

What are oxidising agents?

Ans: In a redox reaction, an oxidizing agent is a reactant that takes electrons away from other reactants. For instance, acidified potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) and alkaline potassium permanganate (KMnO_4)

12.

Would you be able to check if water is hard by using a detergent?

Ans: No, because detergents can create a good lather even in hard water. They do not create insoluble salts of calcium or magnesium (scum). Upon interaction with the calcium ions and magnesium ions found in hard water.

13.

People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?

Ans: Agitation is important to get clean garments because it helps soap micelles trap oil, grease, and other impurities that need to be removed. When they are beaten or agitated, the particles are taken from the surfaces of the clothing and deposited in the water, cleaning them.

Exercise Questions with Solutions of Class 10 Science Chapter 4 – Carbon and its Compounds

1.

Ethane, with the molecular formula C_2H_6 has

- (a) 6 covalent bonds.**
- (b) 7 covalent bonds.**
- (c) 8 covalent bonds.**
- (d) 9 covalent bonds.**

Ans: (c) 7 covalent bonds.

2.

Butanone is a four-carbon compound with the functional group

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

Ans: (c) Ketone.

3.

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

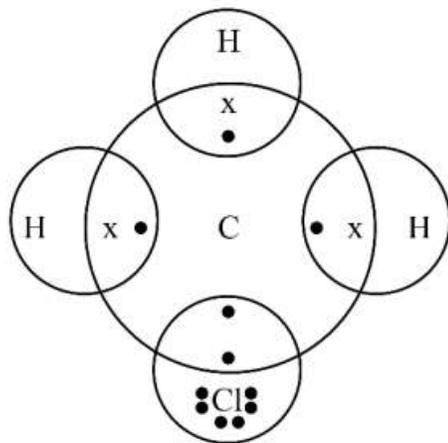
- (a) the food is not cooked completely.
- (b) the fuel is not burning completely.
- (c) the fuel is wet.
- (d) the fuel is burning completely

Ans: (b) The fuel is not burning completely.

4.

Explain the nature of the covalent bond using the bond formation in CH_3Cl .

Ans: In nature, carbon is tetravalent. There are four electrons in the outermost shell of carbon. It takes more energy to remove these electrons and more energy to get the four electrons. Carbon must share its four electrons with other carbon atoms or with other atoms in order to complete the octet. Three bonds are formed between carbon and hydrogen, and one with chlorine.



5.

Draw the electron dot structures for

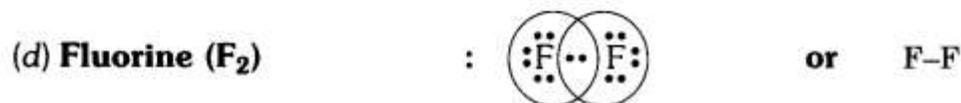
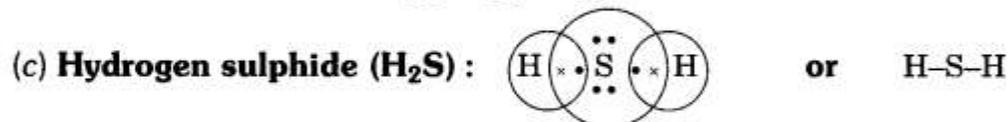
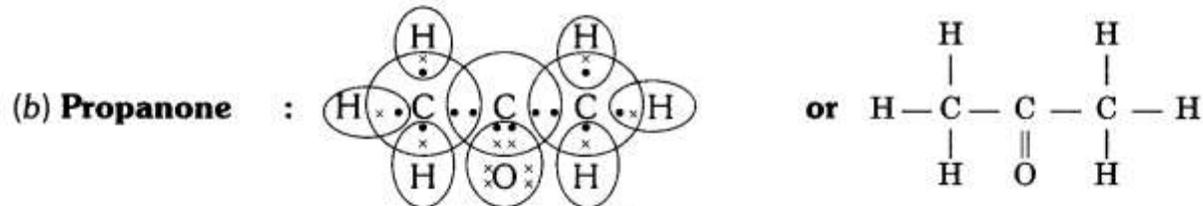
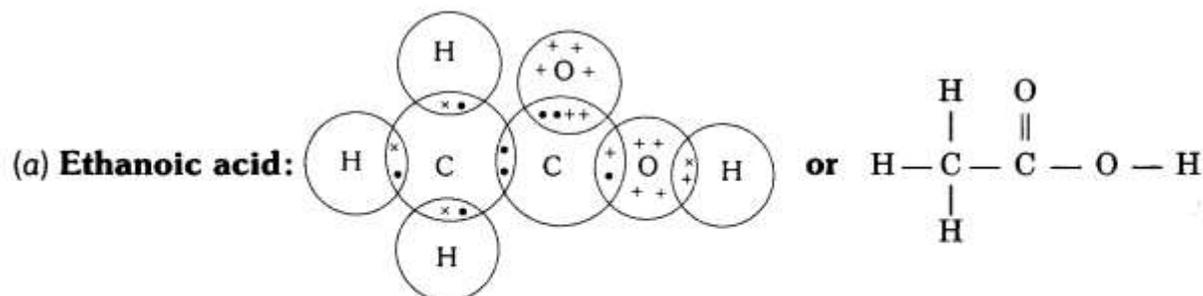
(a) ethanoic acid.

(b) H_2S .

(c) propanone.

(d) F_2 .

Ans:



6.

What is an homologous series? Explain with an example.

Ans: A group of substances with the same functional group is called a homologous series. This has comparable chemical properties and a generic formula as well. We can say that there would be an increase in molecular size and mass because of the change in physical attributes.

For example: Alkanes family. The general formula of Alkane is C_nH_{2n+2} .

Methane CH_4

Ethane CH_3CH_3

Propane $CH_3CH_2CH_3$

Butane $CH_3CH_2CH_2CH_3$

7.

How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

Ans:

Ethanol	Ethanoic acid
No action in litmus paper	Blue litmus paper to red
Melting point- 156 K	Melting point- 290 K
Boiling point- 351 K	Boiling point- 391 K
Sweet smell	Pungent vinegar-like smell
It does not react with sodium hydrogen carbonate	Bubbles and fizzes with sodium hydrogen carbonate

8.

Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?

Ans: When soap is put to water, micelle formation occurs because the ionic ends of the soap molecules are hydrophilic (attractive to water) and thus soluble in it, whereas the hydrocarbon chains of the soap molecules are hydrophobic (repellent to water).

Other solvents, such as ethanol, where the sodium salt of fatty acids does not dissolve, will not allow for the creation of such micelles.

9.

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

Ans: Carbon and its derivatives serve as the primary fuels for numerous applications due to their elevated calorific values and substantial energy output. A majority of carbon compounds release significant amounts of heat and light upon combustion in the atmosphere.

10.

Explain the formation of scum when hard water is treated with soap.

Ans: Soaps are the sodium or potassium salts of long-chain carboxylic acids. Hard water comprises calcium and magnesium in the form of chlorides and sulfates. The addition of soap to hard water results in reduced lather formation, indicating that a portion of the soap remains unutilized. This insoluble salt is referred to as scum.

11.

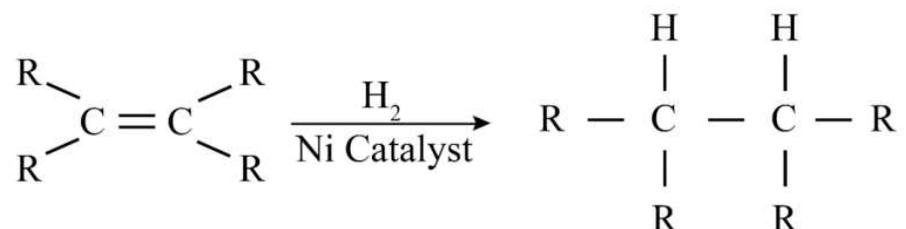
What change will you observe if you test soap with litmus paper (red and blue)?

Ans: Due to the basic nature of soap, blue litmus stays the same whereas red litmus turns blue.

12.

What is hydrogenation? What is its industrial application?

Ans: The process of adding hydrogen to unsaturated compounds is referred to as hydrogenation. This is an addition reaction facilitated by the presence of Ni, Pt, or Pd as catalysts. Unsaturated compounds undergo conversion to form saturated compounds. In this process, vegetable oil undergoes a transformation into ghee.



13.

Which of the following hydrocarbons undergo addition reactions:

C₂H₆, C₃H₈, C₃H₆, C₂H₂ and CH₄.

Ans: Unsaturated hydrocarbons participate in addition reactions. C₃H₆ and C₂H₂ are unsaturated hydrocarbons that participate in addition reactions.

14.

Give a test that can be used to differentiate between saturated and unsaturated hydrocarbons.

Ans: While cooking oil is an unsaturated carbon compound, butter is a saturated carbon compound. Bromine water can be decolorized by an unsaturated molecule, but not by a saturated one. Thus, the bromine water allows us to chemically differentiate between butter and cooking oil. In separate test tubes, combine a small amount of butter and frying oil with bromine water.

1. Bromine water becomes decolorized by cooking oil, indicating that it is an unsaturated substance.
2. The fact that butter does not discolor bromine water indicates that it is a saturated substance.

15.

Explain the mechanism of the cleaning action of soaps.

Ans: The hydrocarbon end of the soap molecules in the micelle clings to the oil or grease particles on the surface of the filthy fabric when it is submerged in water with dissolved soap. In this manner, the soap micelle uses its hydrocarbon endings to trap the greasy or oily particles. However, the micelles' soap molecules' ionic ends stay connected to the water. The oily and greasy particles on the cloth's surface that are trapped by soap micelles are released into the water when the dirty fabric is stirred in soap solution, which causes the soap water to get soiled while the cloth is cleaned. Rinsing the cloth several times in clean water thoroughly cleans it.

