



NCERT Solutions for Class 10th Science: Chapter 4 Carbon and Its Compounds



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NCERT Solutions for Class 10 Science: Chapter 4 Carbon and Its Compounds

Class 10: Science Chapter 4 solutions. Complete Class 10 Science Chapter 4 Notes.

NCERT Solutions for Class 10th Science Chapter 4 - Carbon and Its Compounds

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NCERT Solutions for Class 10 Science Chapter 4 Carbon and Its Compounds is provided on this page. Answers to all exercises are provided

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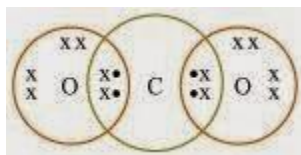
in details. These solutions are provided by expert teachers at IndCareer. Students looking for NCERT Solutions for Trigonometry Chapter in Science subject of Class 10 can also download the chapter-wise PDFs.

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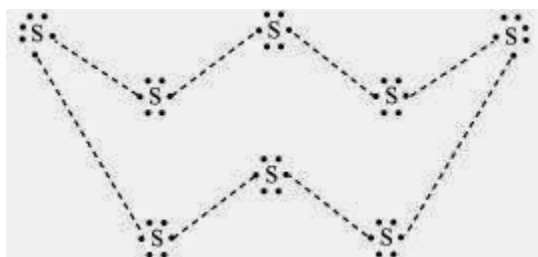
1. What would be the electron dot structure of carbon dioxide which has the formula CO_2 ?

Answer



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.)

Answer



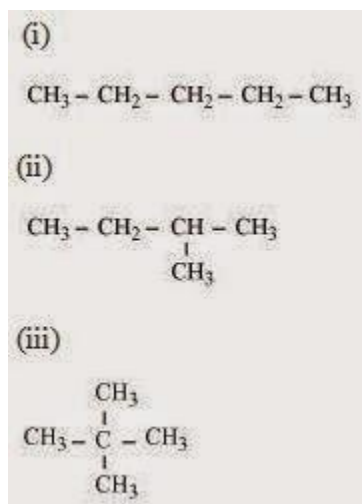
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1. How many structural isomers can you draw for pentane?

Answer

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Three structural isomers are possible for pentane.



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

Answer

The two features of carbon that give rise to a large number of compounds are as follows:

→ Catenation - It is the ability to form bonds with other atoms of carbon.

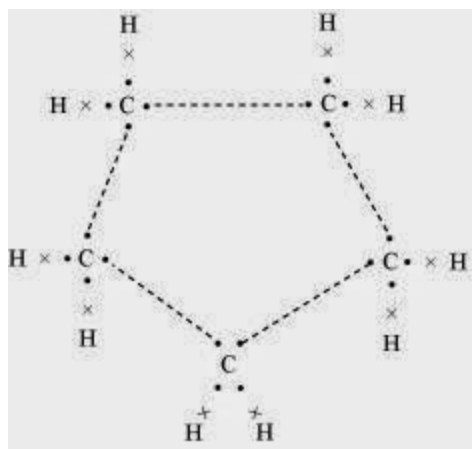
→ Tetravalency - With the valency of four, carbon is capable of bonding with four other atoms.

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

Answer

The formula for cyclopentane is C_5H_{10} . Its electron dot structure is given below.

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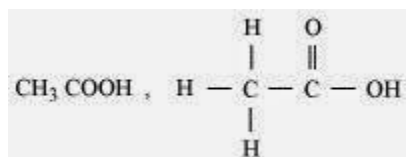
4. Draw the structures for the following compounds.

(i) Ethanoic acid (ii) Bromopentane*

(iii) Butanone (iv) Hexanal

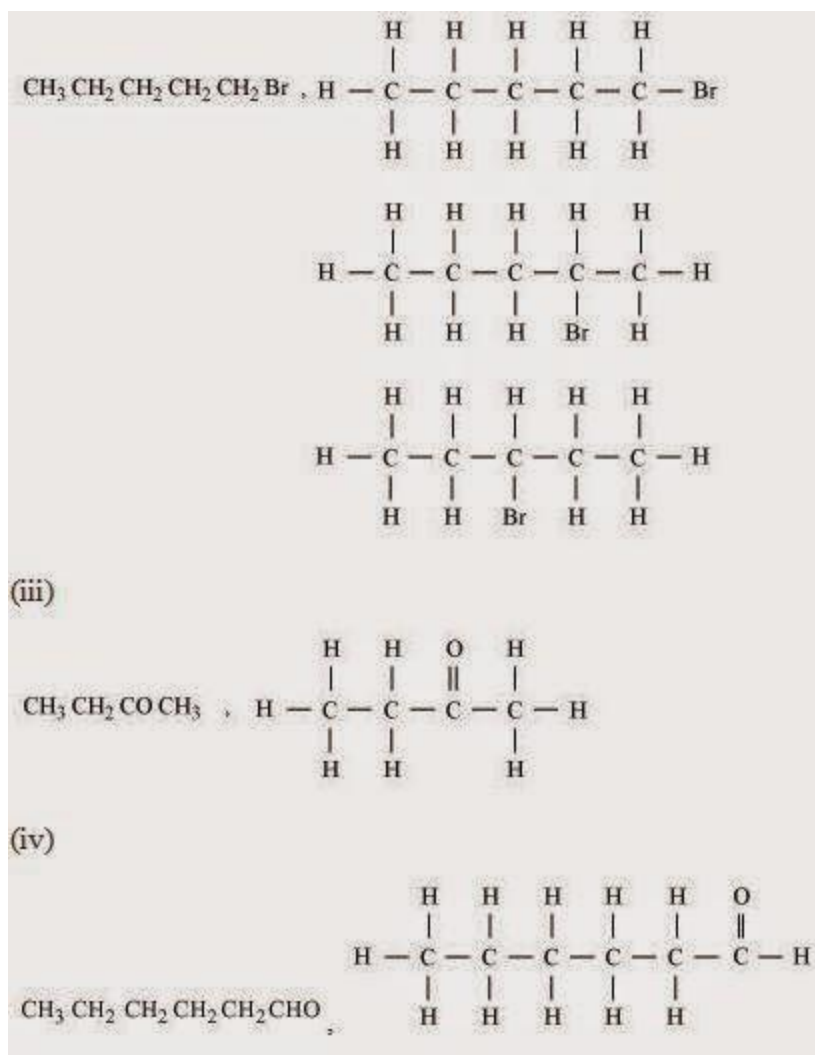
***Are structural isomers possible for bromopentane?**

Answer



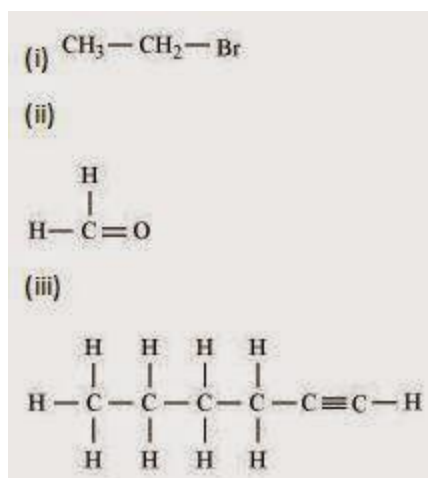
(ii) There are many structural isomers possible for bromopentane. Among them, the structures of three isomers are given.

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5. How would you name the following compounds?

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Answer

- (i) Bromoethane
- (ii) Methanal (formaldehyde)
- (iii) Hexyne

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

Answer

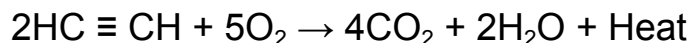


Since, in this reaction one oxygen is added to ethanol, hence it is an oxidation reaction.

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

Answer

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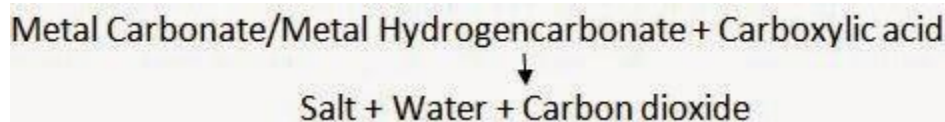
When ethyne is burnt in air, it gives a sooty flame. This is due to incomplete combustion caused by limited supply of air. However, if ethyne is burnt with oxygen, it gives a clean flame with temperature 3000°C because of complete combustion. This oxy-acetylene flame is used for welding. It is not possible to attain such a high temperature without mixing oxygen. This is the reason why a mixture of ethyne and air is not used.

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

Answer

We can distinguish between an alcohol and a carboxylic acid on the basis of their reaction with carbonates and hydrogen carbonates. Acid reacts with carbonate and hydrogen carbonate to evolve CO_2 gas that turns lime water milky.



Alcohols, on the other hand, do not react with carbonates and hydrogen carbonates.

2. What are oxidising agents?

Answer

Oxidising agents are the substances that gain electrons in redox reaction and whose oxidation number is reduced.

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

Answer

Detergent gives lather with hard and soft water both, while a soap gives lather with soft water only. Thus, it is not possible to check if water is hard; by using a detergent.

2. 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?

Answer

A soap molecule has two parts namely hydrophobic and hydrophilic. With the help of these, it attaches to the grease or dirt particle and forms a cluster called micelle. These micelles remain suspended as a colloid. To remove these micelles, it is necessary to agitate clothes.

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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.

► (b) 7 covalent bonds.

2. Butanone is a four-carbon compound with the functional group

(a) carboxylic acid.

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(b) aldehyde.

(c) ketone.

(d) alcohol.

► (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.

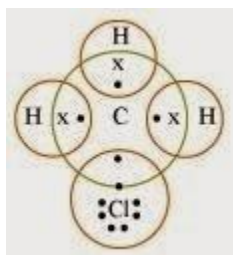
(d) the fuel is burning completely.

► (b) the fuel is not burning completely.

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

Answer

The structure of CH_3Cl is given below:



Carbon has four valence electrons. It shares 1 electron each with 3 hydrogen atoms and 1 electron with chlorine. The bond between C and Cl

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atoms is covalent but due to higher value of electro-negativity of Cl, the C–Cl bond is polar in nature.

5. Draw the electron dot structures for

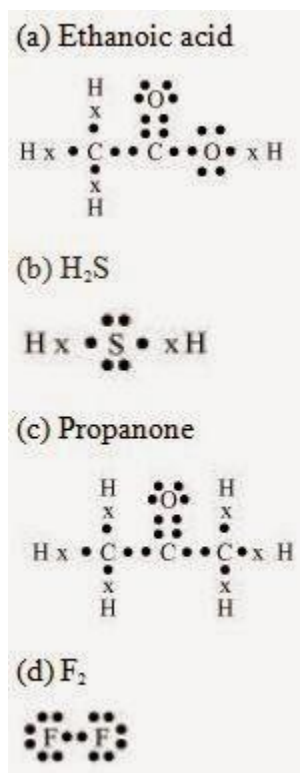
(a) ethanoic acid.

(b) H_2S .

(c) propanone.

(d) F_2 .

Answer



6. What is a homologous series? Explain with an example.

Answer

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

For example, methane, ethane, propane, butane, etc. are all part of the alkane homologous series. The general formula of this series is C_nH_{2n+2} .

Methane CH_4

Ethane CH_3CH_3

Propane $CH_3CH_2CH_3$

Butane $CH_3CH_2CH_2CH_3$

It can be noticed that there is a difference of $-CH_2$ unit between each successive compound.

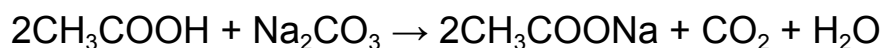
7. How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties?

Answer

Ethanol and Ethanoic acid be differentiated on the basis of their following properties:

→ Ethanol is a liquid at room temperature with a pleasant smell. Ethanoic acid has a melting point of $17^\circ C$. Since it is below the room temperature so, it freezes during winter. Moreover, ethanoic acid has a smell like vinegar.

→ Ethanol does not react with metal carbonates while, ethanoic acid reacts with metal carbonates to form salt, water and carbon dioxide. For example,



→ Ethanol does not react with NaOH while ethanoic acid reacts with NaOH to form sodium ethanoate and water. For example,

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$\text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O}$ → Ethanol is oxidized to give ethanoic acid in presence of acidified KMnO_4 while, no reaction takes place with ethanoic acid in presence of acidified KMnO_4 .

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?

Answer

Soap molecule has two ends. One end is hydrophilic and another end is hydrophobic. When soap is dissolved in water and clothes are put in the soapy solution, soap molecules converge in a typical fashion to make a structure; called micelle. The hydrophobic ends of different molecules surround a particle of grease and make the micelle; which is a spherical structure. In this, the hydrophilic end is outside the sphere and hydrophobic end is towards the centre of the sphere. This is why micelle formation takes place when soap is added to water.

Since ethanol is not as polar as soap, so micelles will not be formed in other solvents such as ethanol.

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

Answer

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

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

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Answer

Hard water often contains salts of calcium and magnesium. Soap molecules react with the salts of calcium and magnesium and form a precipitate. This precipitate begins floating as an off-white layer over water. This layer is called scum. Soaps lose their cleansing property in hard water because of formation of scum.

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

Since soap is basic in nature, it will turn red litmus blue. However, the colour of blue litmus will remain blue.

12. What is hydrogenation? What is its industrial application?**Answer**

Hydrogenation is the chemical reaction between hydrogen and other compounds in the presence of catalyst. Hydrogenation is used mainly to reduce saturated hydrocarbons. Hydrogenation is an addition reaction. For Example: When ethene is heated with the catalyst nickel it is reduced to ethane.

Industrial application:

→ >Hydrogenation is used in many industrial applications. For example; in Petrochemical Industry, hydrogenation is used to convert alkenes into alkanes (paraffins) and cycloalkanes.

→ It is also used to prepare vegetable ghee from vegetable oils.

13. Which of the following hydrocarbons undergo addition reactions:

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C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4 .

Answer

Unsaturated hydrocarbons undergo addition reactions. Being unsaturated hydrocarbons, C_3H_6 and C_2H_2 undergo addition reactions.

14. Give a test that can be used to differentiate chemically between butter and cooking oil.

Answer

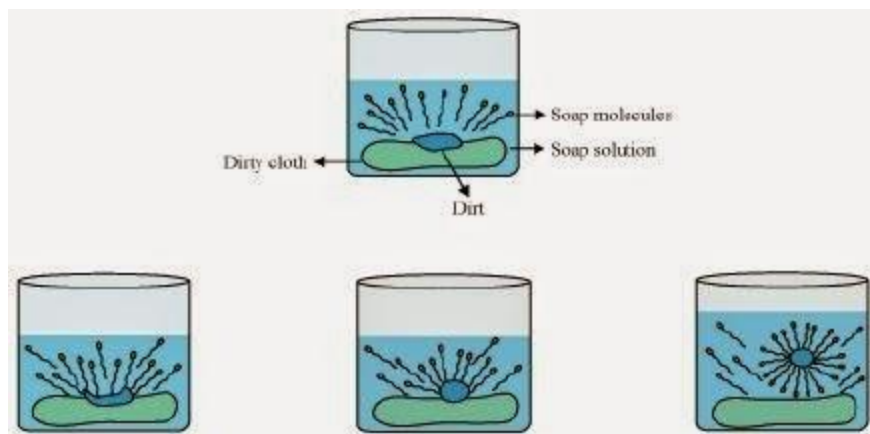
Butter contains saturated fats. Therefore, it cannot be hydrogenated. On the other hand, oil has unsaturated fats. That is why it can be hydrogenated to saturated fats (solids).

15. Explain the mechanism of the cleaning action of soaps.

Answer

The dirt present on clothes is organic in nature and insoluble in water. Therefore, it cannot be removed by only washing with water. When soap is dissolved in water, its hydrophobic ends attach themselves to the dirt and remove it from the cloth. Then, the molecules of soap arrange themselves in micelle formation and trap the dirt at the centre of the cluster. These micelles remain suspended in the water. Hence, the dust particles are easily rinsed away by water.

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- Chapter 3 Metals and Non-metals
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