

SAMPLE QUESTIONS

Carbon And Its Compounds



1.

An element belonging to group 14 of the periodic table has two common allotropes A and B. A is very hard and a non-conductor of electricity while B is soft to touch and a good conductor of electricity. Identify the element. Name each of these allotropes.

Answer

The element of group 14 having two common allotropes is carbon. These two allotropes (A and B) of carbon element are diamond and graphite.

2.

A piece of black electrode used in dry cell on strong heating in air gave a colorless gas which turned lime water milky. What was the material of the electrode ?

Answer

We know that graphite is used for making the electrodes. So, the piece of black electrode used in the dry cell is made of graphite.

3.

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 Solution.

Answer

7 covalent bonds

4.

What is the general formula of alkenes ? Identify the alkenes from the following :

C₂H₆, C₂H₄, C₃H₄, C₂H₂, C₃H₆

Answer

The general formula of alkenes is C_nH_{2n} where n is the number of carbon atoms in one molecule of the alkene. Out of the above given hydrocarbons C₂H₄ and C₃H₆ are alkenes.

5.

Which of the following organic compounds is unsaturated ? CH₄, C₂H₄

Answer

C₂H₄ is unsaturated (because it is an alkene corresponding to the general formula of alkenes C_nH_{2n} with n = 2).

6.

A hydrocarbon molecule contains 4 hydrogen atoms. Give its molecular formula, if it is an : (i) alkane, (ii) alkene, (iii) alkyne.

Answer

- (i) An alkane containing 4 hydrogen atoms in its molecule is methane, CH₄.**
- (ii) An alkene containing 4 hydrogen atoms in its molecule is ethene, C₂H₄.**
- (iii) An alkyne containing 4 hydrogen atoms in its molecule is propyne, C₃H₄.**

7.

Name the element whose one of the allotropic forms is buckminsterfullerene.

8.

What are the two properties of carbon which lead to the formation of a large number of carbon compounds ?

9.

Buckminsterfullerene is a spherical molecule in which 60 carbon atoms are arranged in interlocking hexagonal and pentagonal rings of carbon atoms.

(a) How many hexagons of carbon atoms are present in one molecule of buckminsterfullerene ?

(b) How many pentagons of carbon atoms are present in one molecule of buckminsterfullerene ?

10.

a) What is the atomic number of carbon. Write its electronic configuration.

(b) What type of chemical bonds are formed by carbon ? Why ?

(c) Name the three allotropic forms of carbon.

11.

(a) Give IUPAC names and formulae of an organic compound containing single bonds and the other containing a triple bond.

(b) Which of the following is the molecular formula of benzene ?

C₆H₆, C₆H₁₀, C₆H₁₂, C₆H₁₄

(c) Which of the two has a branched chain : isobutane or normal butane ?

12.

(a) Explain the term 'isomers'. Give one example of isomers.

(b) Write (i) structural formula, and (ii) electron-dot structure, of any one isomer of n-heptane (C₇H₁₆) .

(c) Write IUPAC name of the compound having the formula n-C₄H₁₀.

13.

(a) What are hydrocarbons ? Explain with examples.

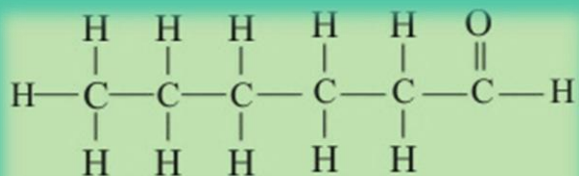
(b) Explain the meaning of saturated and unsaturated hydrocarbons with two examples each.

(c) Give the names and structural formulae of one saturated cyclic hydrocarbon and one unsaturated cyclic hydrocarbon.

(d) Give one example of a hydrocarbon, other than pentane, having more than three isomers.

14. Draw the structure for the following compound : Hexanal

Answer



15.

Write the molecular formula of ethanol.

16.

What is the next higher homologue of methanol?

17.

Write the name and chemical formula of the simplest organic acid.

18.

Give the name and structural formula of one homologue of HCOOH .

19.

Write the formulae of : (a) methanoic acid, and (b) ethanoic acid.

20.

(a) Give the names and structural formulae of the next two higher homologues of methane.

(b) The molecular formula of a hydrocarbon is $\text{C}_{10}\text{H}_{18}$. Name its homologous series.

(c) Select the hydrocarbons which are members of the same homologous series. Give the name of each series.

C_5H_{10} ; C_3H_8 ; C_6H_{10} ; C_4H_{10} ; C_7H_{12} ; C_8H_{16}

21.

Draw the structure of chloro butane.

Draw the structure for Bromo pentane. Are structural isomers possible for bromo pentane ?

22.

(a) What is meant by a functional group ? Explain with an example.

(b) Write three common functional groups present in organic compounds. Give their symbols/formulae.

(c) Name the functional groups present in the following compounds : (i) CH_3COOH (ii) $\text{CH}_3\text{CH}_2\text{CHO}$ (iii) $\text{C}_2\text{H}_5\text{OH}$ (iv) $\text{CH}_3\text{COCH}_2\text{CH}_3$

(d) Name the functional group which always occurs in the middle of a carbon chain. (e) Draw the structures for the following compounds : (i) Ethanal (ii) Propanal (iii) Butanal (iv) Pentanal

23.

Which of the following hydrocarbons undergo addition reactions ? C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4

Answer

The unsaturated hydrocarbons (alkenes and alkynes) undergo addition reactions. Out of the above hydrocarbons C_3H_6 is an alkene whereas C_2H_2 is an alkyne. So, C_3H_6 and C_2H_2 will undergo addition reactions.

24.

Name the gas evolved when ethanoic acid is added to sodium carbonate. How would you prove the presence of this gas ?

25.

Why does ethyne (acetylene) burn with a sooty flame ?

26.

Name the product formed when hydrogen is added to ethene.

27.

Name two catalysts which can be used in the hydrogenation of unsaturated compounds.

28.

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

29.

(a) Write the chemical equation of the reaction which takes place during the burning of ethanol in air.

(b) Why is ethanol used as a fuel ?

(c) State two uses of ethanol (other than as a fuel).

30.

Name the functional group of organic compounds that can be hydrogenated. With the help of a suitable example, explain the process of hydrogenation, mentioning the conditions of the reaction and any one change in physical property with the formation of the product. Name any one natural source of organic compounds that are hydrogenated.

31.

- (a) What happens when ethanol reacts with ethanoic acid in the presence of a little of concentrated sulphuric acid ? Write equation of the reaction involved.**
- (b) What happens when ethanol is heated with concentrated sulphuric acid at 170°C ? Write the equation of the reaction which takes place.**

32.

- (a) How does ethanoic acid react with sodium hydrogen carbonate ? Give equation of the reaction which takes place.**
- (b) Why are carbon and its compounds used as fuels for most applications ?**
- (c) Which of the two is better for washing clothes when the water is hard : soap or detergent ? Give reason for your answer.**

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