13. Carbon - An important element
EXTRA QUESTIONS

Q.1 What remains behind on complete combustion of any organic compound?
Ans.- A black colour substance 'Carbon' remains behind on complete combustion of any organic compound.

Q.2 In a molecule of Buckminster fullerence? How many carbon atoms are present?
Ans.- In Buck minster fullerene approx. 30 to 900 carbon atoms are present.

Q.3 _____ is the essential element in all the organic compounds.
Ans.- Carbon.

Q.4 The organic compound having double or triple bond in them is termed as _____.
Ans.- Unsaturated Hydrocarbon.

Q.5 What is Methane also called as?
Ans.- Methane is also called as Marsh gas.

Q.6 What is the density of graphite?
Ans.- The density of graphite is 1.9 to 2.3 g/cm^3

Q.7 Methane and chlorine gases react with each other to form mainly methyl chloride, this reaction is called ____.
Ans.- Chlorination of Methane.

Q.8 On heating a mixture of hydrogen and carbon monoxide gases of 3000c in the presence of nickel (catalyst) _____ is formed.
Ans.- Methane gas.

Q.9 What are the organic compounds prepared from methane?
Ans.- The organic compounds prepared from methane are Ethane, Methyl chloride, Methylene chloride, Acetylene.

Q.10 Which chemicals are used in regular fire extinguisher.
Ans.- Sodium bicarbonate and dilute sulphuric acid.

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Q.11 What are components of biogas?

Ans.- Methane and carbon dioxide.

Q.12 Match the pairs.

Column A	Column B
1) Propyne	a) $CH_3 - CH_2 - CH_3$
2) Propene	b) $CH_3 - C = CH$
3) Propane	c) $CH_3 - CH = CH_2$

Ans.-

Column A	Column B
1) Propyne	a) $CH_3 - C \equiv CH$
2) Propene	b) $CH_3 - CH = CH_2$
3) Propane	c) $CH_3 - CH = CH_2$

Q.13 Match the pairs.

Column A	Column B
1) Fullerene	a) Lubricator
2) Diamond	b) Insulator
	c) Ornaments

Ans.-

Column A	Column B
1) Fullerene	a) Insulator
2) Diamond	b) Ornaments

Q.14 Hydrocarbons with double bonds are called as saturated hydrocarbons. Is the following statement true?

Ans.- False. Hydrocarbons with double bonds are called as unsaturated Hydrocarbons.

Q.15 Graphite, is used in making lubricants and lead pencils. True or false.

Ans.- True.

Q.16 What are two characteristics of carbon due to which carbon can form thousands, of compounds?

Ans.- (1) Carbon is a non-metallic element. It is found in nature in free as well as compound state.

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(2) Carbon conform a chain of carbon atoms by forming covalent bonds with other carbon atom.

Q.17 Write the uses of fullerenes.

Ans.- The uses of fullerenes are -
1) It is used in insulators.
2) It is used as a catalyst in water purification.
3) At a certain temperature, fullerene exhibits super conductivity.

Q.18 What are the uses of coal.
Ans.- Uses of coal are -
a) Coal is used in factories and homes.
b) Coal is used to obtain coke, coal gas and coal tar.
c) Coal is used in thermal power plants for generation of electricity.

Q.19 Graphite is a good conductor of electricity but Diamond is a bad conductor of electricity?
Ans.- Diamond is bad conductor of electricity as it does not have free electrons.

Q.20 Write the reaction that takes place while extinguishing fire.
Ans.-

$$2NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O + 2CO_2\uparrow$$

Sodium Bicarbonate	Sulphuric acid	Sodium Sulphate	Carbon dioxide

Q.21 What is meant by allotrope?
Ans.- Some elements are found in nature in more than one form. They have same chemical properties but different physical properties. These forms are called allotropes of an element.

Q.22 What are fossil fuels?
Ans.- The fuels formed over millions of years burial of plants and animals are called fossil fuels. They contain energy rich compounds originally made by plants coal, petroleum and natural gas are fossil fuels.

Q.23 What are the physical properties of carbon dioxide?

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Ans.- The physical properties of carbon dioxide are as follows -
1) Carbon dioxide is tasteless, odourless, and colorless gas.
2) It is heavier than air.
3) It is sparingly soluble in water.
4) Carbon dioxide neither burns nor supports burning.

Q.24 Write the properties of covalent compounds.
Ans.- The properties of covalent compounds-
1) Covalent compounds have low melting points and boiling points.
2) They are insoluble in water and soluble in organic solvents.
3) They are poor conductors of heat and electricity.

Q.25 Methane is called marsh gas. Explain.
Ans.- Methane is formed by the decomposition of plants and animals matter at the surface of marshy lands. Hence, Methane is called marsh gas.

Q.26 What is meant by a saturated hydrocarbon?
Ans.- The hydrocarbons containing only single bonds between carbon atoms are called saturated hydrocarbons.
Methane - CH_4, Ethane C_2H_6.

Q.27 What is meant by unsaturated hydrocarbons? Give example.
Ans.- The hydrocarbons containing at least one multiple bond are called unsaturated hydrocarbons.
Examples - Ethene ($CH_2 = CH_2$)
Ethyne ($HC \equiv CH$), Propene ($CH_3 - CH = CH_2$),
Propyne ($CH_3 - C \equiv CH$).

Q.28 Graphite is not used in ornaments. Explain.
Ans.- 1) In natural form, graphite has physical properties as it is soft, grayish black and slippery.
2) In preparation of ornaments, hard metals should be used.
3) As graphite is a soft and slippery substance, it cannot be used to prepare ornaments.

Q.29 The valency of carbon is 4.

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Ans.- 1) The electronic configuration of carbon is 2, 4. If four electrons are added to the second orbit of carbon, its octet is completed and its electronic configuration becomes stable like that of the nearest inert gas neon (2, 8). Therefore, the valency of carbon is 4.

Q.30 Distinguish in - Crystalline form of carbon and Non - Crystalline form of carbon.

Ans.-

Crystalline form of carbon	Non-crystalline form of carbon
1) A crystalline form of carbon has a regular and definite arrangement of atoms.	1) In non-crystalline form of carbon, the arrangement of carbon atoms is not regular.
2) In crystalline form, carbon is an extremely hard material.	2) In non-crystalline form, carbon is brittle.

Q.31 Differentiate in coal and coke.

Ans.-

Coal	Coke
1) It burns with smoke	1) It burns without smoke.
2) It contains some volatile matter.	2) It does not contain some volatile matter.
3) It produces less heat than coke.	3) It produces more heat than coal.

Q.32 Write the balanced chemical equation for the following.
Carbon dioxide is passed through a solution of sodium hydroxide.

Ans.- $2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$

Sodium Hydroxide + Carbon dioxide → Sodium carbonate + Water.

Q.33 Write balanced chemical equation for the following.
Carbon dioxide is passed through a solution of sodium carbonate.

Ans.- $Na_2CO_3 + H_2O + CO_2 \rightarrow 2NaHCO_3$

Sodium Carbonate + Water → Sodium bicarbonate.

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Q.34 Carbon dioxide is passed through lime water.

Ans.- When CO_2 is passed through lime water, it turns milky as white insoluble calcium carbonate, is formed

$$Ca(OH_2) + CO_2 \rightarrow CaCO_3 + H_2O$$

Calcium Hydroxide + Carbon dioxide → Calcium Carbonate + Water

Q.35 What will happen if Methane is burnt in air?

Ans.- When Methane is burnt in air, carbon dioxide is formed. Heat is given out in this process. About 213 kcal/mol heat is given out.

Q.36 Methane reacts with chlorine in the presence of uv light at the temperature $250^0c - 400^0c$.

Ans.- In this process, methyl chloride will be formed. This is called chlorination of Methane.

$$CH_4 + Cl_2 \xrightarrow{\text{Light}} CH_3Cl + HCl$$

Methane + Chlorine → Methyl Chloride

Q.37 What is a single layer of graphite called as?

Ans.- A single layer of graphite is called as graphene.

Q.38 What is an element. State their types.

Ans.- A substance which cannot be broken down into simpler components by any chemical reaction is called an element.

a) Metals : eg - gold, silver, copper

b) Non-metals : e.g- Carbon, sulphur, etc.

c) Metalloids : Silicon, germanium.

Q.39 What do you mean by allotropy?

Ans.- Allotropy means the elements that occur in more than one form, these forms exhibit same chemical properties but different physical properties.

An example of allotropy is carbon. Carbon exists in crystalline form like diamond, graphite etc and in amorphous forms like coal, coke, etc.

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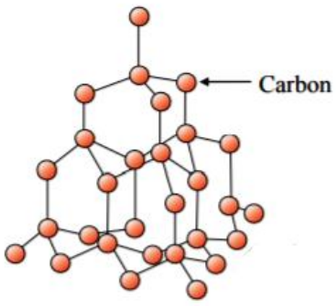
Q.40 Write a note an diamond.

Ans.- In diamond, each carbon atom is bonded to other four neighboring carbon atoms by covalent bonds. Diamond is a very hard substance. It has a tetragonal three dimensional structure.



Structure of carbon atoms in diamond

Properties of diamond -

1) It is the hardest known natural substance.

2) The melting point of diamond is 3500^0c.

3) Its density of 3.5 g/cm^3.

4) It is a bad conductor of electricity, as it does not have free electrons.

Q.41 State the uses of Methane.

Ans.- Uses of Methane -

1) Methane in the form of natural gas is used in industries such as fabric mills, paper mills, food processing industry, petrol purification etc.

2) It is the smallest hydrocarbon, the proportion of CO_2 released in the combustion of methane, is small and therefore, it is used as domestic fuel.

3) Methane is used in production of many organic compounds such as ethanol, methyl chloride and acetylene.

Q.42 Classify carbon.

Ans.- Carbon is classified in two types.

1) Crystalline forms and non-Amorphous forms. The crystalline forms of carbon are further classified into three types - Diamond, Graphite, Fullerene. The amorphous forms of carbon are further classified into following types.

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a) Coal - It is of four types.
Namely peat, lignite, bituminous coal and anthracite.
b) Charcoal
c) Coke.

Q.43 Explain any two types of coal and its uses.
Ans.- The following are different types of coal - Peat, lignite, bituminous coal and anthracite.
1) Peat - a) Peat formation is the first step in formation of coal. b) It is brown in color. It consist of partly decomposed matter. c) It contains less than 60%of carbon. d) It contains a high proportion of water. e) Dry form of Peat can be used as fuel.
2) Lignite - a) It is the second step in formation of coal. b) It is also called as Brown coal. c) Lignite is formed form peat, due to high pressure and temperature inside the earth. d) Carbon content is about 60 - 70 %. e) Lignite is used as fuel for steam electric power generation. It is used as an alternative to chemical pesticides.

Q.44 Name the scientists awarded the Nobel prize in chemistry for the discovery of fullerenes C_{60}.
Ans.- The scientists Harold Kroto, Robert Curl and Richard Smalley were awarded the Nobel prize for the discovery of fullerenes C_{60}.

Q.45 Besides carbon, name some other elements which show allotropy.
Ans.- Besides carbon, elements like sulphur, and phosphorous exhibit allotropy.

Q.46 What happens when diamond is heated at 800^0c in the presence of oxygen? CO_2 gas
Ans.- When diamond is heated at 800^0c in the presence of oxygen, CO_2 gas is given out. Besides CO_2, no other product is formed in this process.

Q.47 Which animal and plant sources is charcoal made form?

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Ans.- Charcoal is made from the bones and horns of animals. From plants, it is made by combustion of wood in an insufficient supply of air.

Q.48 Differentiate in Saturated and unsaturated hydrocarbons.

Saturated hydrocarbons	Unsaturated hydrocarbons
1) They have presence of all single carbon - carbon covalent bonds in their molecules.	1) They have presence of multiple bonds i.e. carbon - carbon double bond or triple bond in their molecules.
2) They are known as alkanes with general formula $CnH_2n + 2$.	2) They are known as alkanes and alkynes with general formula CnH_2n and $CnH_2n + 2$.

Q.49 Differentiate in Graphite and Fullerenes.

Graphite	Fullerenes
1) Graphite is found in natural state.	1) Fullerenes is rarely found in nature. It is found in soot and in interstellar space.
2) It is a good conductor of electricity.	2) It is used as an insulator.

Q.50 Graphite is a conductor of electricity.

Ans.- The structure of the graphite molecule is hexagonal. Inside each graphite layer, free electrons are moving continuously within the entire layer. These free electrons help graphite to conduct electricity.

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