7. Carbon and its compounds

Let us assess

1. Question

The names of some allotropes of carbon, their properties and uses are given in the table, but not in the correct order. Match them suitably.

Diamond	Two dimensional hexagonal structure	Bucky balls	Manufacture of ornaments
Graphite	Transparent	Smooth	Nano technology
Fullerene	Not volatile	High refractive index	Information technology
Graphene	Spherical shape	High strength	Lubricant

Answer

Diamond	Transparent	High refractive index	Manufacture of ornaments
Graphite	Not volatile	Smooth	Lubricant
Fullerene	Spherical shape	Bucky balls	Information technology
Graphene	Two-dimensional hexagonal structure	High strength	Nano technology

2. Question

Some statements related to carbon monoxide and carbon dioxide are given. Classify them correctly

a) formed as a result of the incomplete combustion of carbon containing substances

b) aqueous solution shows acidic nature

c) poisonous gas

d) used in fire extinguishers

e) can be used as a fuel

f) formed as a result of the complete combustion of substances

g) can be prepared from carbonates and bicarbonates

h) is a component of producer gas and water gas.

Answer

Statements related to carbon monoxide are:

a) formed as a result of the incomplete combustion of carbon containing substances.

c) poisonous gas

e) can be used as a fuel

h) is a component of producer gas and water gas

Statements related to carbon dioxide are:

b) aqueous solution shows acidic nature

d) used in fire extinguishers

f) formed as a result of the complete combustion of substances

g) can be prepared from carbonates and bicarbonates

3. Question

a) Write the chemical formula of calcium carbonate.

b) Which gas is produced when calcium carbonate reacts with acids?

c) What is the name of an aqueous solution of this gas?

d) Write any two substances that contain calcium carbonate.

Answer

a) $CaCO_3$

b) CO_2

$H_2SO_4 + CaCO_3 \rightarrow CaSO_4 + H_2O + CO_2$

c) Carbonic acid (H_2CO_3).

$CO_2 + H_2O \rightarrow H_2CO_3$

d) Chalk and Marble.

4. Question

Write the chemical formula of the compounds that are missing in the homologues series given below.

A	CH_4	.....	C_3H_8	C_4H_{10}	.....	C_6H_{14}
B	C_2H_4	C_3H_6	.....	.....	C_6H_{12}	.....
C	.....	C_3H_4	C_4H_6	.....	.....	C_7H_{12}

Answer

A	CH_4	C_2H_6	C_3H_8	C_4H_{10}	C_5H_{12}	C_6H_{14}
B	C_2H_4	C_3H_6	C_4H_8	C_5H_{10}	C_6H_{12}	C_7H_{14}
C	C_2H_2	C_3H_4	C_4H_6	C_5H_8	C_6H_{10}	C_7H_{12}

The homologous series of alkane, alkene and alkyne have general formulae C_nH_{2n+2}, C_nH_{2n} and C_nH_{2n-2}.

5. Question

Given below are the chemical formulae of some hydrocarbons

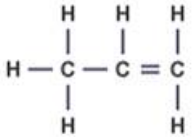
C_3H_6, C_2H_6, C_3H_4

a) Represent their structure

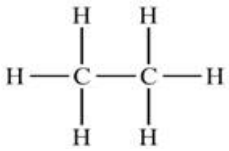
b) Based on their structure, classify them into alkane, alkene and alkyne.

Answer

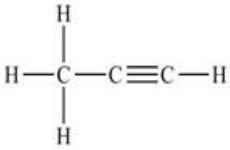
a)



(C_3H_6)



(C_2H_6)



(C_3H_4)

b) In C_3H_6, there is double bond so it is alkene.

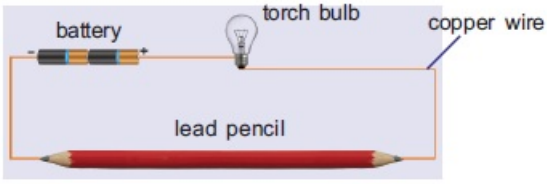
In C_2H_6, there are all single bonds so it is alkane.

In C_3H_4, there is triple bond so it is alkyne.

Extended activities

1. Question

Arrange the objects as shown in the figure and conduct the experiment. Based on your observations, what is the conclusion that you reach at?



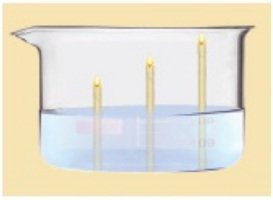
Answer

When we will pass the current through lead pencil then it will conduct due to presence of free electrons in lead because lead is made up of graphite. And graphite is a good conductor of electricity. So the bulb will glow on passing the current.

2. Question

Lighted candles of different heights are arranged in a trough as shown in the figure. Pour a

saturated solution of sodium bicarbonate (baking soda) into the trough. Add a little vinegar to the solution. What do you observe? Give reasons for the observation.



Answer

When we add little vinegar to sodium bicarbonate (baking soda) then CO_2 gas will evolve due to presence of carboxylic acid in vinegar because when acids react with bicarbonates then CO_2 gas evolves. And this CO_2 gas will put out the candles. Small candle will be put out first and large candle will be put out at last.

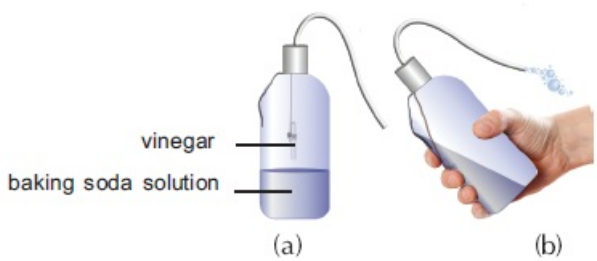
$NaHCO_3 + CH_3COOH \rightarrow CH_3COONa + H_2O + CO_2$

3. Question

Making a fire extinguisher.

Arrange the apparatus as shown in Figure (a). Add the vinegar contained in the test tube to the sodium

bicarbonate (baking soda) solution (Figure (b)) by tilting the wash bottle. Introduce the resultant gas to a candle flame. Record your observation. What is your inference?



Answer

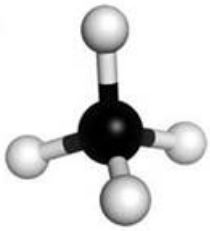
When vinegar will react with baking soda solution then CO_2 gas will evolve because acetic acid is present in vinegar. And when this gas will pass to candle flame then this gas will put out the candle flame. So from this it is clear that CO_2 gas is non-supporter of combustion.

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

4. Question

Construct and display the ball and stick models of some hydrocarbons.

Answer



Methane (CH_4)

Ethane (C_2H_6)

Ethene (C_2H_4)

Ethyne (C_2H_2)

5. Question

Prepare a write up on the topic ‘Importance of organic chemistry’ and present it in your class.

Answer

In organic chemistry we study about carbon compounds. Organic chemistry is important because it is the study of life and all of the chemical reactions related to life. Organic chemistry plays a vital role in the development of chemicals, medicines, foods, plastics, fuels. Medicines are made up of organic compounds like antibiotics, painkillers, anaesthetics, etc. And food materials are also made up of carbon compounds like carbohydrates, proteins and fats. And we can see carbon compounds are found to be highly valuable, durable and hardest in the world. Like Diamond and graphite are both carbon compounds. These are both highly used and expensive. Their properties are studies in organic chemistry. Petroleum is also a most valued resources on the earth for fuels and it is one of the factors which influence the world economy. Organic chemistry helps us to synthesize many compounds which are needed on a large scale. So organic chemistry is very important to us.