01 Given below are molecular formulae of some hyydrocarbons.

C_5H_8 C_7H_{14} C_6H_6 C_5H_{10} C_7H_{12} C_6H_{12}

(a) Which formula is same for cyclohexane as well as hexene ?

(b) What is the formula of benzene ?

(c) Which three formulae have open chain unsaturated hydrocarbons having double bonds ?

(d) Which two formulae have unsaturated hydrocarbons having triple bonds ?

(e) Which three formulae are of cyclic hydrocarbons ?

(a) The molecular formulae of cyclohexane and hexene respectively are same i.e., C_6H_{12}.

(b) The molecular formula of Benzene is C_6H_6.

(c) Three molecular formulae of open chain unsaturated hydrocarbons having double bonds are C_7H_{14}, C_5H_{10} and C_6H_{12}.

(d) The molecular formulae of unsaturated hydrocarbons having triple bonds are C_5H_8 and C_7H_{12}.

(e) The three molecular formulae of cyclic hydrocarbons are C_7H_{14}, C_5H_{10} and C_6H_{12}.

02 An organic acid X is a liquid, which often freezes during winter time in cold countries, having the molecular formula $C_2H_4O_2$. On warming it with methanol in the presence of a few drops of concentrated sulphuric acid, a compound Y with a sweet smell is formed.

(a) Write names of X and Y. Also write their formulae showing the functional group present in them.

(b) Write a chemical equation for the reaction involved.

(a) X is ethanoic acid, $CH_3-\overset{\overset{O}{\|}}{C}-OH$

Y is methyl ethanoate, $CH_3-\overset{\overset{O}{\|}}{C}-O-CH_3$

(b) $CH_3COOH + CH_3OH \xrightarrow[H_2SO_4]{\text{Conc.}} CH_3COOCH_3 + H_2O$

03 CO and CO_2 are two inorganic forms of carbon. CO is not a natural component but added to the atmosphere by incomplete combustion of a fuel. It is used for extraction of metals. CO_2 is a highly soluble, colourless and a non poisonous gas. It is a main component of photosynthesis process and non-combustible gas.

(i) Which gas is highly toxic ?

(ii) Which gas is important for plants ?

(iii) What is the use of CO in the extraction of metals ?

(iv) Which gas is non-combustible ?

(i) CO carbon monoxide is a hightly toxic gas.

(ii) CO_2 is important for plants as it is used by plants for photosynthesis process.

(iii) CO is a good reducing agent and reduces metal oxides to pure metal.

(iv) CO_2 Carbon dioxide is a non-combustible gas as it does not support burning.

04 A gas containing only one carbon atom in its molecule is collected by downward displacement of water. It burns in air with blue flame and the gas evolved turns lime water milky.

(i) What is the name of the gas ?

(ii) Write two properties of the above gas.

(iii) Write chemical equation for the reaction that takes place during burning of the above gas with oxygen.

(iv) Which gas is produced during burning and write chemical equation for the reaction between this gas and lime water.

(i) The gas is methane.

(ii) The gas is insoluble in water and forms an explosive mixture with air.

(iii) $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$

(iv) During burning of methane, carbon dioxide is produced. The gas turns limewater milky.

$Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O(l)$

Causes milkiness

05 A four carbon atom containing neutral organic compound X reacts with sodium metal to evolve a gas which burns with a 'pop' sound. Another four carbon atoms containing carbon compound reacts with sodium hydrogencarbonate to evolve a gas which turns lime water milky. When compounds X and Y are heated together in the presence of a little of concentrated sulphuric acid, then a new compound Z is formed.

(a) What is the name of compound X ? Write its formula.

(b) What is the name of compound Y formed ? Write its formula.

(c) Write the name of compound Z formed with its formula.

(d) What type of smell is given by compound Z ?

(e) What is the general name of compounds like Z ?

(f) What is the general name of the reaction which takes place between X and Y to form Z ?

(a) X is butanol, C_4H_9OH

(b) Y is butanoix acid, C_3H_7COOH

(c) Z is butyl butanoate, $C_3H_7COOC_4H_9$

(d) Sweet smell

(e) Esters

(f) Esterification