CBSE Test Paper 05

Chapter 04 Carbon and its Compounds

1. **Statement A:** Valerie acid is the common name of hexane.
   Statement B: Glycerol is added in the manufacturing of soap. **(1)**

   a. Statement A is true and statement B is false
   b. Both the statements A and B are false
   c. Statement B is true and statement A is false
   d. Neither statement A nor statement B is false

2. The molecules involving ionic bond(s) are**: (1)**

   A. H_2O
   B. NaCl
   C. Na_2O
   D. MgO

   a. B, C and D
   b. A and C
   c. All of these
   d. A and B

3. How many structural isomers are possible for pentane? **(1)**

   a. 2
   b. 1
   c. 4
   d. 3

4. Which of the following compounds contain the functional group -OH? **(1)**

   A. Propane
   B. Propanol
   C. Ethanoic acid
   D. Ethanol

a. All of these
b. B and D
c. A and C
d. B and C

5. Which of the following ingredients are not used in making soap? **(1)**

   a. Cotton seed oil, KOH
   b. Soyabean oil, $\mathrm{Ca(OH)_2}$
   c. Castor oil, NaOH
   d. Mustard oil, NaOH

6. How man covalent bonds are there in a molecule of ethane $\left(\mathrm{C_2H_6}\right)$? **(1)**

7. Name the compound which is added to synthetic detergent to keep the dust particles suspended in water, and helps in cleansing process. **(1)**

8. How do the melting and boiling points of the hydrocarbons change with increase in molecular mass? **(1)**

9. What is an unsaturated hydrocarbon? Give two examples. **(1)**

10. Some esters are added to food items for special smells. An ester can be made from ethanol and ethanoic acid. **(3)**

    i. Name the ester which is obtained due to the chemical reaction between ethanol and ethanoic acid in the presence of concentrated sulphuric acid and write the chemical equation.
    ii. Name the process.

11. A student reports the police about the illegal vending of alcohol near his school. He also knew about denatured alcohol. **(3)**

    i. What is denatured alcohol?
    ii. What would happen if somebody consumes denatured alcohol?

12. What happens when ethyl alcohol and acetic acid react with each other in presence of

conc. H_2SO_4? Write the chemical equation. **(3)**

13. Intake of small quantity of methanol can be lethal. Comment. **(3)**

14. i. Give a chemical test to distinguish between saturated and unsaturated hydrocarbon.
    ii. Name the products formed when ethane burns in air. Write the balanced chemical equation for the reaction showing the types of energies liberated.
    iii. Why is reaction between methane and chlorine in the presence of sunlight considered a substitution reaction? **(5)**
15. i. How is vinegar made?
    ii. What is glacial acetic acid? What is its melting point?
    iii. Why is butanoic acid a weak acid?
    iv. Write the name and the formula of the two compounds formed when the ester, $CH_3COOC_2H_5$ undergoes saponification. **(5)**

CBSE Test Paper 05

Chapter 04 Carbon and its Compounds

Answers

1. b. Both the statements A and B are false
   Explanation: Valeric acid is another name for pentanoic acid, **Soaps** are sodium or potassium salts of long chain fatty acids. When triglycerides in fat/oil react with aqueous NaOH or KOH, they are converted into **soap** and glycerol.
2. a. B, C and D
   Explanation: Water molecule is a covalent compound formed by the sharing of electrons between the hydrogen atoms and the oxygen atom. Metals like Na and Mg are electropositive in nature and form ionic compounds with electronegative non-metals.
3. d. 3
   Explanation: 3 structural isomers are possible for pentane (C_5H_{12}). These are n-pentane, iso-pentane and neo-pentane.
4. d. B and D
   Explanation: Ethanol and **propanol** are alcohols and contain the functional group -OH. Ethanol is C_2H_5OH and propanol is C_3H_7OH. Ethanoic acid contains the carboxylic group (-COOH).
5. b. Soyabean oil,
   Explanation: Soap is made by heating animal oil or vegetable oil with concentrated sodium hydroxide solution. Castor oil and NaOH are the ingredients for making soap. Similarly, cotton seed oil and KOH, and mustard oil and NaOH are also the ingredients for making soap.
6. There are 7 covalent bonds in a molecule of ethane.
7. CMC : Carboxymethylcellulose is added to synthetic detergent to keep the dust particles suspended in water, and helps in cleansing process.
8. With increase in molar mass, the melting point and boiling points of hydrocarbons

increases generally. It is because, with increase in molar mass, the molecule becomes larger and so the vander waal's forces become stronger, which holds the particles together. so it requires more energy to break these bonds and thus the melting and boiling points of the hydrocarbons increases.

9. A hydrocarbon in which at least two carbon atoms are joined by a double (=) or a triple (≡) bond, is called an unsaturated compound.
   e.g. ethane and ethyne (or acetylene) are unsaturated hydrocarbons.
   Example: (i) $CH_2 = CH_2$

10. i. Ethyl ethanoate ester is formed from ethanoic acid and ethanol.
    $$\underset{Ethanoic\ acid}{CH_3COOH} + \underset{Ethanol}{CH_2CH_3OH} \xrightarrow{Conc.\ H_2SO_4} \underset{Ethyl\ ethanoate}{CH_3COOCH_2CH_3} + H_2O$$
    ii. The process is called esterification.

11. i. Denatured alcohol is ethanol made unfit for human consumption by adding one or more chemicals (denaturants) to it. Denaturing refers to removing a property from the alcohol (being able to drink it), not to chemically altering or decomposing it, so denatured alcohol contains ordinary ethyl alcohol.

    ii. If someone consumes denatured alcohol, it results in coagulation of protoplasm causing acute nausea, blindness and even death.

12. When ethyl alcohol reacts with acetic acid in presence of conc. H_2SO_4 a sweet smelling ester called ethyl acetate is formed as main product.
    $$CH_3COOH + C_2H_5OH \xrightarrow[H_2SO_4]{Conc} CH_3COOHC_2H_5(Ester) + H_2O$$

13. Methanol (CH_3OH) is oxidised to methanal (HCHO) in the liver.
    $$2CH_3OH + O_2 \rightarrow 2HCHO + 2H_2O$$
    Methanal (HCHO) reacts rapidly with the components of body cells. It causes the protoplasm of the cells to coagulate. It also affects the optic nerve and causes blindness. Therefore, intake of small quantity of methanol can be lethal.

14. i. Saturated hydrocarbon burn with blue and non-smoky flame due to their complete combustion and unsaturated hydrocarbons generally burn with sooty

flame due to their incomplete combustion.

Another test: Unsaturated compounds decolourises bromine colour.

e.g.

$$\underset{Ethene}{CH_2=CH_2} + \underset{\substack{Bromine\\(Brown)}}{Br_2(aq)} \rightarrow \underset{\substack{1,\ 2-dibromoethane\\(Colourless)}}{\begin{matrix} CH_2 & - & CH_2 \\ | & & | \\ Br & & Br \end{matrix}}$$

But, saturated compounds does not decolourise the bromine water. Bayer's test can also be used to distinguish saturated and unsaturated hydrocarbon.

ii. Carbon dioxide and water are formed when ethane burns in air.

$2CH_3CH_3 + 7O_2 \rightarrow 4CO_2 + 6H_2O$ + light + Heat

iii. The reactions in which a reagent substitutes (replace) atom or a group of atoms from the reactant (substrate) are called substitution reactions. These are generally shown by saturated compounds. When chlorine is added to hydrocarbons in the presence of sunlight, Cl replaces H-atoms one by one to give carbon tetrachloride as final product.

$$CH_4 + CL_2 \xrightarrow{Sunlight} CH_3CI + HCl$$
$$CH_3Cl + Cl_2 \xrightarrow{Sunlight} CH_2CI_2 + HCl$$
$$CH_2Cl_2 + Cl_2 \xrightarrow{Sunlight} CHCI_3 + HCl$$
$$CHCl_3 + Cl_2 \xrightarrow{Sunlight} CCI_4 + HCl$$

15. i. vinegar is made by adding 5-8 percent of water in acetic acid.

ii. Pure ethanoic acid is called glacial acetic acid because it form crystals at low temperature. It is a strong acid.

iii. Butanoic acid is a weak acid because it does not ionise completely.

iv. It is a reaction in which ester is heated in presence of a base (mainly NaOH) to give out ethanol & ethanoic acid, this process is used in making of soap.

$$CH_3COOC_2H_5 \xrightarrow{NaOH} CH_3COOH + C_2H_5OH$$

Ethyl Ethanoate Ethanoic acid Ethanol