

# CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based: Questions with Answers)

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## CARBON AND ITS COMPOUNDS

### SHORT ANSWER TYPE QUESTIONS ( 2 MARKS)

1. Explain why carbon generally forms compounds by covalent bonds.

**Answer.** Carbon cannot lose four electrons easily because very high energy is required. It cannot gain four electrons easily because six protons cannot hold 10 electrons. It can easily share four electrons forming covalent bonds.

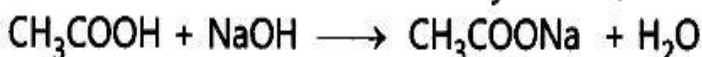
2. Write the names and molecular formula of two organic compounds having functional r group suffixed as '-oic acid'. With the help of a balanced chemical equation and explain what happens when any one of them reacts with sodium hydroxide.

**Answer.**

Methanoic acid, its molecular formula is  $\text{CH}_2\text{O}_2$ .

Ethanoic acid, its molecular formula is  $\text{C}_2\text{H}_4\text{O}_2$ .

When acid reacts with sodium hydroxide, its sodium salt and water is formed.



Ethanoic acid

Sodium ethanoate    Water

3. What is the IUPAC name of (i)  $\text{CH}_3\text{—CH}_2\text{—CH=CH}_2$  (ii)  $\text{CH}_3\text{CHO}$ ?

**Answer.** (i) But-1-ene (ii) Ethanal

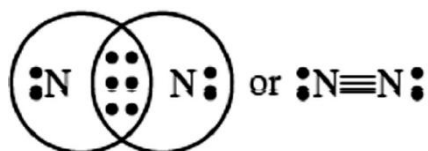
4. Atom of an element contains five electrons in its valence shell. This element is major component of air. It exists as a diatomic molecule.

(i) Identify the element.

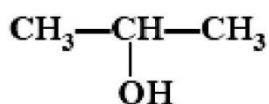
(ii) Show the bond formed between two atoms of this element.

(iii) Write the nature of the bond between the two atoms.

**Answer:-** (i) Nitrogen. (ii)



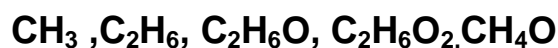
**(iii) Covalent bond.**



5. Write IUPAC names of (i)  $\text{CH}_3\text{COCH}_2\text{CH}_3$  (ii)  $\text{HCOOH}$  (iii)  $\text{CH}_3\text{COOCH}_3$

**Answer.** (i) Butanone (ii) Methanoic acid (iii) Methyl ethanoate

6. What is a homologous series? Which two of the following organic compounds belong to the same homologous?



**Answer.** Homologous series is a series of organic compounds which have same functional group and similar chemical properties. Each member of this series is differ by  $-\text{CH}_2-$  in its molecular formula and 14 u in its molecular mass.

$\text{C}_2\text{H}_6\text{O}$  ( $\text{C}_2\text{H}_5\text{OH}$ ) and  $\text{CH}_4\text{O}$  ( $\text{CH}_3\text{OH}$ ) belong to same homologous series.

### SHORT ANSWER TYPE QUESTIONS II ( 3 MARKS)

7(a) What is meant by a functional group in an organic compound?

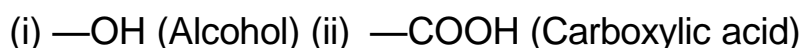
Name the functional group present in



(b) State one point of difference between soap and synthetic detergent.

**Answer.**

(a) Functional group is an atom or group of atoms or reactive part of compound, which determines chemical properties of compounds.



(b) Soaps do not work well with hard water, detergents work well with hard water.

**8. Give reasons for the following observations:**

- (a) The element carbon forms a very large number of compounds.
- (b) Air holes of a gas burner have to be adjusted when the heated vessels get blackened by the flame.
- (c) Use of synthetic detergents causes pollution of water.

**Answer.**

- (a) Carbon forms large number of compounds since carbon is small in size and can form stable covalent bonds (catenation) and it shows tetravalency.
- (b) Air holes of gas burner are made open (adjusted) so that air can pass through, which is needed for complete combustion, so that heated vessels do not get blackened.
- (c) Some synthetic detergents are non-biodegradable, therefore, cause pollution of water.

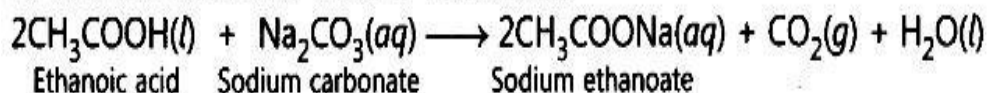
**9. What is ethanoic acid? Write the formula of the functional group present in this acid. What special name is given to its 5 – 8% solution in water? How does ethanoic acid react with sodium carbonate? Write a chemical equation of the reaction and common name of the salt produced.**

**Answer.**

$\text{CH}_3\text{COOH}$  is ethanoic acid.  $-\text{COOH}$  is the formula of the functional group present in ethanoic acid.

Its 5 to 8% solution in water is called vinegar.

Sodium ethanoate and brisk effervescence due to carbon dioxide gas are formed on reaction of ethanoic acid with sodium carbonate.



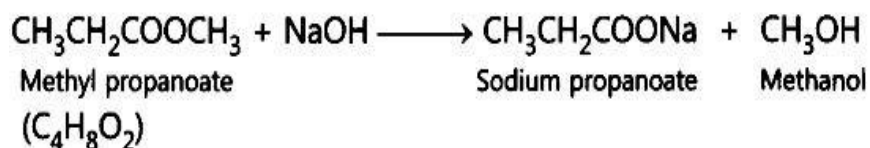
Ethanoic acid      Sodium carbonate      Sodium ethanoate

The salt produced has common name sodium acetate.

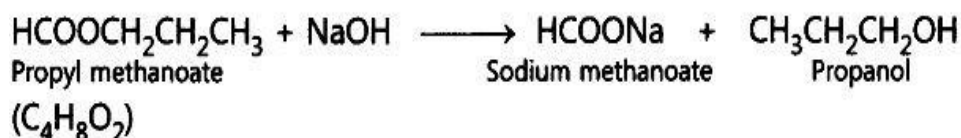
**10. An ester has the molecular formula  $\text{C}_4\text{H}_8\text{O}_2$ . Write its structural formula. What happens when this ester is heated in the presence of sodium hydroxide solution? Write the balanced chemical equation for the reaction and name the products. What is a Saponification reaction?**

**Answer.**

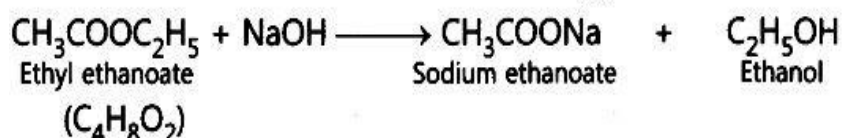
There are three possible structural formulae of ester with molecular formula  $C_4H_8O_2$ .  
 $CH_3CH_2COOCH_3$ ,  $HCOOCH_2CH_2CH_3$ ,  $CH_3COOC_2H_5$



*Or*



*Or*



Saponification is the process in which an ester is treated with sodium hydroxide to form sodium salt of acid and alcohol is formed.

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