

SCIENCE

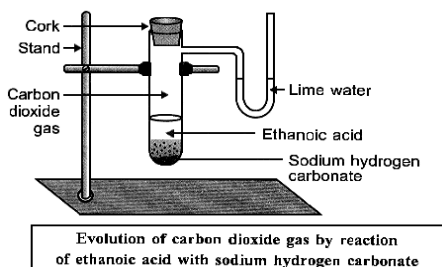
Carbon and its Compounds

41. When ethanoic acid reacts with sodium hydrogen carbonate a salt X is formed along with a gas Y. Name X and Y. Describe an activity and draw the diagram of the apparatus used to prove that the gas Y is one which you have named. Also write the chemical equation for the reactions involved.

Ans: 'X' is sodium ethanoate. 'Y' is CO₂ gas.

Aim: To demonstrate the reaction of carboxylic acid with sodium hydrogen carbonate and sodium hydrogen carbonate.

Materials Required: Ethanoic acid, sodium hydrogen carbonate, sodium hydrogen carbonate



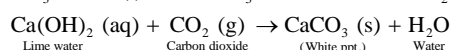
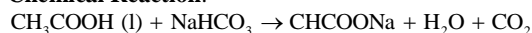
(.....Contd)

Procedure:

1. Set the apparatus as shown in diagram.
2. Take 1 g of NaHCO₃ and add 2 ml of ethanoic acid into it.
3. Pass the gas formed through lime water and note down the observations.
4. Repeat the same procedure with sodium hydrogen carbonate and record your observations.

Observation: Brisk effervescence due to carbon dioxide formed which turns lime water milky.

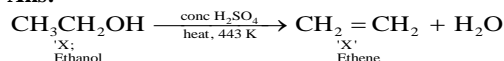
Chemical Reaction:



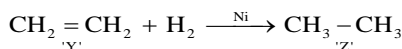
Conclusion: Carboxylic acid reacts with sodium hydrogen carbonate to liberate CO₂ gas which turns lime water milky.

42. An organic compound 'X' on heating with conc. H₂SO₄ forms a compound 'Y' which on addition of one molecule 'Z'. One molecule of compound 'Z' on combustion forms two molecules of CO₂ and three molecules of H₂O. Identify giving reasons the compounds 'X', 'Y' and 'Z'. Write the chemical equations for all the chemical reactions involved.

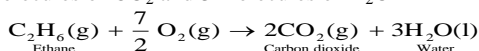
Ans:



Ethanol, on dehydration with conc. H₂SO₄ gives ethene. Ethene, on addition with H₂ in presence of Ni as catalyst as undergoes hydrogenation to form ethane.



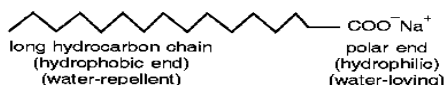
One molecule of Ethane on combustion gives 2 molecules of CO₂ and 3 molecules of H₂O



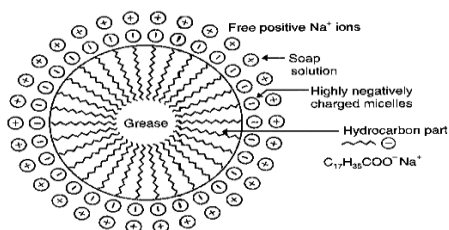
45. What is the difference between the chemical composition of soaps and detergents? State in brief the action of soaps in removing an oily spot from a shirt. Why are soaps not considered suitable for washing where water is hard?

Ans: Soaps are sodium or potassium salts of fatty acids having -COONa group. Detergents are sodium or potassium salts of sulphonic acids having -SO₃Na and -SO₄Na group.

Cleansing Action of Soap: Soaps consist of a large hydrocarbon tail which is hydrophobic (water-hating or water repelling) with a negatively charged head which is hydrophilic (water-loving) as shown in figure.



When a soap is dissolved in water, the molecules associate together as clusters called micelles in which, water molecules being polar in nature, surround the ions and the hydrocarbon part of the molecule attracts grease, oil and dirt. Hard water



has Ca²⁺ and Mg²⁺ ions when react with soap to form insoluble compound and soap goes waste.

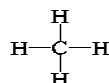
43. (a) What are hydrocarbons? Give examples.

(b) Give the structural differences between saturated hydrocarbons and unsaturated hydrocarbons with two examples each.

(c) What is a functional group? Give examples of two different functional groups.

Ans: (a) Compounds of carbon and hydrogen are called hydrocarbons e.g., CH₄ and C₂H₆ are hydrocarbons.

(b) Saturated hydrocarbons have single bonds only e.g.,



Unsaturated hydrocarbons have double or triple bonds.

(c) Functional group is an atom or group of atoms which determines chemical properties of the compound.

OH (alcohol) -COOH (carboxylic acid)

(Contd.....)