Topics: Carbon and its Compounds

Subtopics:Some important Carbon Compounds - Ethanol and Ethanoic acid

Subtopics:Soaps and Detergents

Questions

Q1. How is vinegar made?
Q2.What is glacial acetic acid?
Q3.Intake of even a small quantity of methanol can be lethal. Comment.
Q4.Some esters are added to food items for special smells. An ester can be made from ethanol and ethanoic acid:
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.
Q5.How can ethanol and ethanoic acid be differentiated on the basis of their physical properties?
Q6.How can ethanol and ethanoic acid be differentiated on the basis of their chemical properties?
Q7.Why does micelle formation take place when soap is added to water ? Will a micelle be formed in other solvents such as ethanol also ?
Q8.Explain the formation of scum when hard water is treated with soap.
Q9.Explain the cleansing action of soaps.
Q10.Write the name and the formula of the two compounds formed when the ester, $CH_3COOC_2H_5$ undergoes saponification.

Answers

1. Vinegar is made by adding 5-8 percent of water in acetic acid.
2. Pure ethanoic acid is called glacial acetic acid because it form crystals at low temperature. It is a strong acid.
3.Methanol (CH_3OH) is oxidised to methanal (HCHO) in the liver.
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 even a small quantity of methanol can be lethal.

4. i. Ethyl ethanoate ester is formed from ethanoic acid and ethanol.

$$\underset{\text{Ethanoic acid}}{CH_3COOH} + \underset{\text{Ethanol}}{CH_2CH_3OH} \xrightarrow{\text{Conc. } H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOCH_2CH_3} + H_2O$$

ii. The process is called esterification.

5.

Difference on the basis of physical properties

Property	Ethanol	Ethanoic acid
(i) State	Liquid	Liquid
(ii) Odour	Sweet smell	Pungent vinegar-like smell
(iii) Melting point	156 K	290 K
(iv) Boiling point	351 K	391 K

6.

Difference on the basis of chemical properties

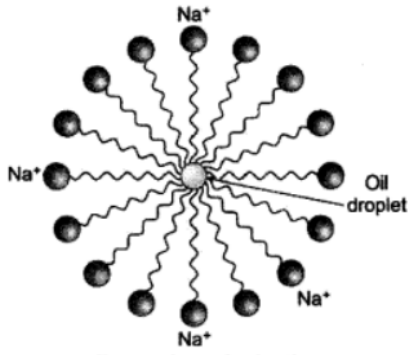
Test	Ethanol	Ethanoic acid
(i) Litmus test	No change in the colour of litmus solution.	Blue litmus solution turns red.
(ii) Sodium hydrogen carbonate test	$C_2H_5OH + NaHCO_3 \rightarrow$ No reaction No brisk effervescence.	$CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$ Brisk effervescence due to evolution of CO_2.

7.Micelle formation takes place when soap is added to water because the hydrocarbon chains of soap molecules are hydrophobic (water repelling) which are insoluble in water, but the ionic ends of soap molecules are hydrophilic (water attracting) and hence soluble in water.
Such micelle formation will not be possible in other solvents like ethanol in which sodium salt or fatty acids do not dissolve.

8.Hard water contains salts of calcium and magnesium. Calcium and magnesium on reacting with soap form insoluble precipitate called scum. The scum formation lessens the cleansing property of soaps in hard water.

9.

When a dirty cloth is put in water containing dissolved soap, then the hydrocarbon end of the soap molecules in micelle attach to the oil or grease particles present on the surface of dirty cloth. In this way the soap micelle entraps the oily or greasy particles by using its hydrocarbon ends. The ionic ends of the soap molecules in the micelles, however, remain attached to water. When the dirty cloth is agitated in soap solution, the oily and greasy particles present on its surface and entrapped by soap micelles get dispersed in water due to which the soap water becomes dirty but the cloth gets cleaned. The cloth is cleaned thoroughly by rinsing in clean water a number of times.



Formation of micelles

10.

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.

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