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. **Out of HCl and CH_3COOH, which one is a weak acid and why? Describe an activity to support your answer.**

Answer. Acetic acid (CH_3COOH) is a weaker acid because it does not dissociate completely into its ions in aqueous solution. .

Activity: Add zinc metal in HCl and CH_3COOH respectively. The hydrogen gas will be evolved faster in HCl and slowly in CH_3COOH. It shows acetic acid is a weak acid.

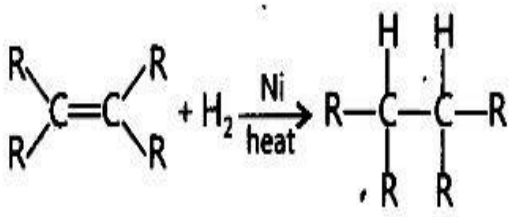
Alternative Method:

If we use pH paper, the colour of pH paper will be dark red in HCl and light red in CH_3COOH which shows HCl is a strong acid and CH_3COOH is a weak acid.

2. **Name the functional group of organic compounds that can be hydrogenated. With the help of suitable example explain the process of hydrogenation mentioning the conditions of the reaction and any one change in physical property with the formation of the product. Name any one natural source of organic compounds that are hydrogenated.**

Answer.

Double bond =, Triple bond ≡ are functional groups (reactive part of compounds) which can be hydrogenated.



When unsaturated hydrocarbons are heated with hydrogen in the presence of nickel as catalyst, saturated hydrocarbons are formed. If the starting unsaturated hydrocarbons are liquids, they will change into solids. Vegetable oils are hydrogenated to form vegetable ghee. Plants are natural sources of vegetable oils which can be hydrogenated.

3. **An organic compound 'A' is an essential constituent of wine and beer. Oxidation of 'A' yields an organic acid 'B' which is present in vinegar. Name the compounds 'A' and 'B' and write their structural formula. What happens when 'A' and 'B' react in the presence of an acid catalyst? Write the chemical equation for the reaction.**

Answer.

'A' is ethanol (C_2H_5OH) which is essential constituent of wine and beer and 'B' is acetic acid (CH_3COOH) which is present in vinegar.

$$\underset{\text{(Present in wine and beer) 'A'}}{CH_3CH_2OH} + 2[O] \xrightarrow[\text{Oxidation}]{\text{Alkaline } KMnO_4} \underset{\text{Acetic acid (Present in vinegar) 'B'}}{CH_3COOH} + H_2O$$

When 'A' and 'B' react in the presence of an acid catalyst, ethyl ethanoate is formed.

$$\underset{\text{'B'}}{CH_3COOH(l)} + \underset{\text{'A'}}{C_2H_5OH(l)} \xrightarrow{\text{conc. } H_2SO_4} CH_3COOC_2H_5(l) + H_2O(l)$$

4. **What is ethanol? State its two properties. What happens when it is heated with excess of cone. H_2SO_4 at 443 K? What role does cone. H_2SO_4 play in this reaction? Write chemical equation of the reaction involved and the structural formula of the main product formed. Answer.**

Ethanol is C_2H_5OH.

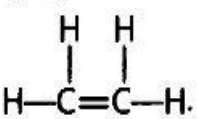
(*i*) It has specific smell.

(*ii*) It is soluble in water.

When ethanol is heated with excess of conc. H_2SO_4, ethene is formed along with water.

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[443\,K]{\text{conc. } H_2SO_4} \underset{\text{Ethene}}{CH_2=CH_2} + \underset{\text{Water}}{H_2O}$$

Conc. H_2SO_4 acts as dehydrating agent.

Structural formula of ethene is 

5. **With the help of balanced chemical equations explain what happens when ethanol is heated with (i) alkaline solution of potassium permanganate, (ii) excess concentrated sulphuric acid at 443 K. Mention any two uses of ethanol.**

Answer.

(*i*) Ethanol gets oxidised to ethanoic acid.

$$\underset{\text{Ethanol}}{CH_3CH_2OH} + 2[O] \xrightarrow{\text{Alkaline } KMnO_4} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

(*ii*) Ethene will be formed.

$$\underset{\text{Ethanol}}{CH_3CH_2OH} \xrightarrow[443K]{\text{Conc. } H_2SO_4} \underset{\text{Ethene}}{CH_2{=}CH_2} + H_2O$$

Uses:

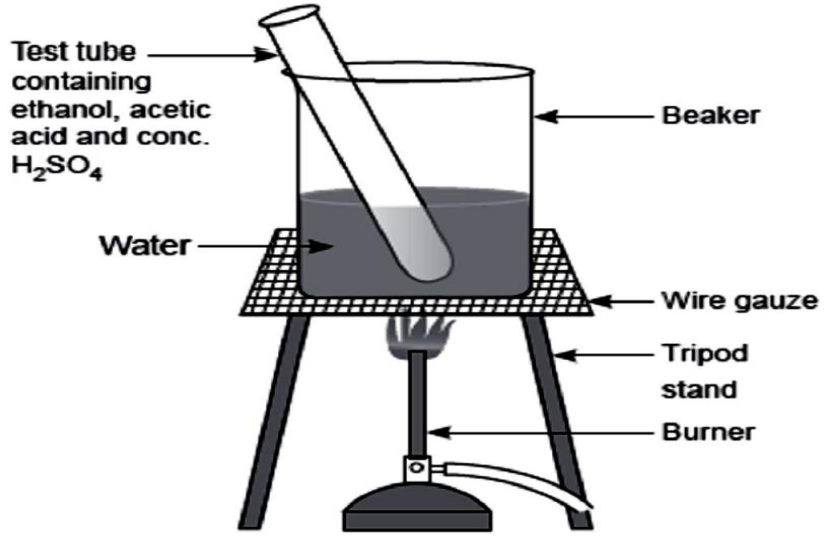
(*i*) It is used in tonics and cough syrups. (*ii*) It is used as fuel.
(*iii*) It is used as solvent. (*iv*) It is used in wine, beer and whisky.
(*any two*)

6. **What is an 'Esterification' reaction? Describe an activity to show Esterification.**

Answer. When carboxylic acid reacts with alcohol in presence of conc. H2SO4, pleasant fruity smelling compound is formed.

$$\underset{\text{Ethanoic acid}}{CH_3COOH(l)} + \underset{\text{Ethanol}}{C_2H_5OH(l)} \xrightarrow[H_2SO_4]{\text{Conc.}} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5(l)} + \underset{\text{Water}}{H_2O(l)}$$

Activity: Take 1 ml of ethanol in a test tube. Add 1 ml of acetic acid in this test tube. Add few drops of conc. H2SO4 in the mixture. Heat the content on water bath for 5 minutes. Smell the resulting mixture formed.



Result: Pleasant fruity smelling ester is formed.

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