PETIT SEMINAIRE HIGHER SECONDARY SCHOOL – PUDUCHERRY

UNIT – 11 CARBON AND ITS COMPOUNDS

STD: X SELF – EVALUATION

I. Choose the best answer:

1. **(B)** Alkene
2. **(D)** Alcohol
3. **(C)** – al
4. **(A)** C_3H_8 and C_4H_{10}
5. **(B)**Combustion of ethanol
6. **(A)** 95.5 %
7. **(B)** Ethers
8. **(C)** Fatty acid
9. **(A)** It is a sodium salt of long chain fatty acids.

II. Fill in the blanks:

1. Functional group
2. C_nH_{2n-2}
3. Root word
4. Unsaturated
5. Ethene
6. Absolute alcohol
7. Blue, red
8. Saponification
9. Straight

III. Match the following:

S.No	Column 1	Column 2
1	Functional group - OH	Alcohol
2	Heterocyclic	Furan
3	Unsaturated	Ethene
4	Soap	Potassium stearate
5	Carbocyclic	Benzene

IV. Assertion & Reasoning:

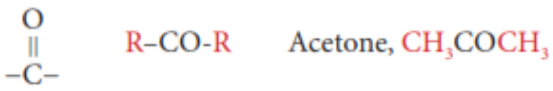
1. (i) A and R are correct, R explains the A.
2. (iv) A and R are correct, R doesn't explains A.

V. Short answers questions:

1. Name: Acetone

   IUPAC Name: Propanone

   Structural Formula: CH_3COCH_3



S.No	Name of the simplest ketone	Structural Formula
1	Propanone	CH_3-CO-CH_3
2	Butanone	CH_3-CO-CH_2-CH_3
3	2- pentanone	CH_3-CO-CH_2-CH_2-CH_3
4	3 – pentanone	CH_3-CH_2-CO-CH_2-CH_3

2.

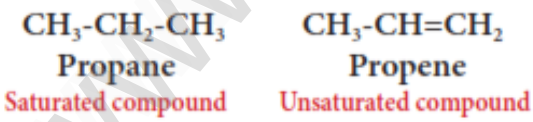
(i) Propane – Acyclic (or) Open chain saturated hydrocarbon

(ii)Benzene – Aromatic carbocyclic compound

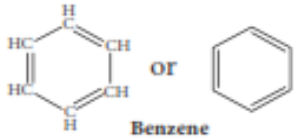
(iii) Cyclobutane – Alicyclic compound

(iv) Furan – Heterocyclic compound

(i) Propane

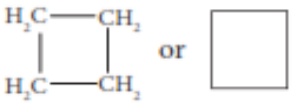


(ii) Benzene



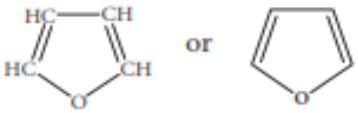
Benzene
Aromatic Compound

(ii) Cyclobutane



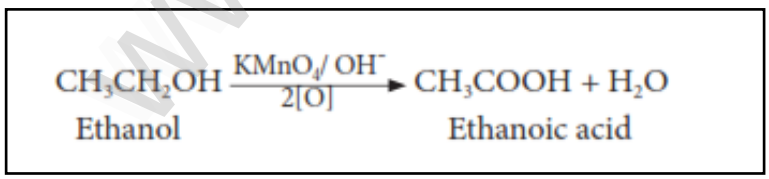
Cyclobutane
Alicyclic Compound

(ii) Furan



Furan
Heterocyclic Compound

3. Ethanoic acid is prepared in large scale, by the oxidation of ethanol in the presence of alkaline potassium permanganate or acidified potassium dichromate.



4. Some detergents having a branched hydrocarbons chain are not fully biodegradable by micro – organisms present in water. So, they cause water pollution.

   Remedial Solutions:

   Use bio degradable detergents. They have straight hydrocarbon chains,

which can be easily degraded by bacteria. They do not give any water pollution.

5. Ans:

Soap	Detergent
It is a sodium salt of long chain fatty acids.	It is sodium salts of Sulphonic acids.
The ionic part of a soap is $-COO^- Na^+$	The ionic part in a detergent is $-SO_3^- Na^+$
It is prepared from animal fats or vegetable oils.	It is prepared from hydrocarbons obtained from crude oil.
Its effectiveness is reduced when used in hard water.	It is effective even in hard water.
It forms a scum in hard water.	Does not form a scum in hard water.
It has poor foaming capacity	It has rich foaming capacity.
Soaps are biodegradable	Most of the detergents are non – biodegradable.

VI. Long Answers Questions:

1. It is a group or a class of organic compounds having same general formula and similar chemical properties in which the successive members differ by a $-CH_2$ group.

   Characteristics:

   - Each member of the series differs from the preceding or succeeding member by one methylene group ($-CH_2$) and hence by a molecular mass of 14 amu.
   - All members of a homologous series contain the same elements and functional group.
   - They are represented by a general molecular formula. Ex: Alkane,

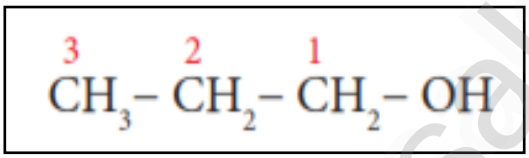
C_nH_{2n+2}.

- Chemical properties of the members of a homologous series are similar.
- All the members can be prepared by a common method.
- The members in each homologous series show a regular gradation in their physical properties with respect to their increase in molecular mass.

2. Step: 1 The parent chain consists of 3 carbon atoms. The root word is "prop".

   Step: 2 There are single bonds between the carbon atoms of the chain. So the primary suffix is "ane".

   Step: 3 since the compound contains –OH group, it is an alcohol. The carbon chain is numbered from the end which is closest to –OH group (Rule 3),



   Step: 4 The locant number of –OH group is 1 and thus the secondary suffix is "1-ol".

   The name of the compound is Prop + an***e*** + (1-ol) = Propan–1–ol.

   Note: Terminal "***e***" of "ane" is removed as per Rule 5.

3. Ethanol is manufactured in industries by the fermentation of molasses, which is a by – product obtained during the manufacture of sugar from sugarcane.

   Molasses is a dark coloured syrupy liquid left after the crystallization of sugar from the concentrated sugarcane juice. Molasses contain about 30% of sucrose, which cannot be separated by crystallization. It is converted into ethanol by the following steps:

   (i) Dilution of molasses:

   Molasses is first diluted with water to bring down the concentration of sugar to about 8 to 10 percent.

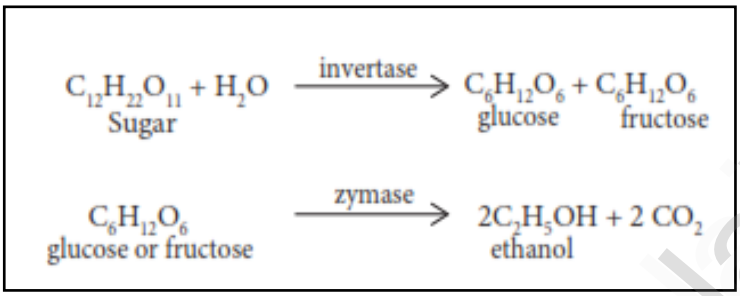
   (ii) Addition of Nitrogen Source:

   Molasses usually contains enough nitrogenous matter to act as

food for yeast during the fermentation process. If the nitrogen content of the molasses is poor, it may be fortified by the addition of ammonium sulphate or ammonium phosphate.

(iii) Addition of yeast:

The solution obtained in step (ii) is collected in large 'fermentation tanks' and yeast is added to it. The mixture is kept at about 303 K for a few days. During this period, the enzymes invertase and zymase present in yeast, bring about the conversion of sucrose into ethanol.



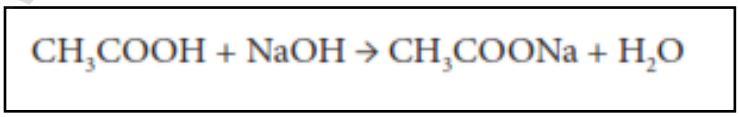
The fermented liquid is technically called wash.

(iv) Distillation of 'wash':

The fermented liquid (i.e wash), containing 15 to 18 percent alcohol, is now subjected to fractional distillation. The main fraction drawn is an aqueous solution of ethanol which contains 95.5% of ethanol and 4.5% of water. This is called rectified spirit. This mixture is then refluxed over quicklime for about 5 to 6 hours and then allowed to stand for 12 hours. On distillation of this mixture, pure alcohol (100%) is obtained. This is called absolute alcohol.

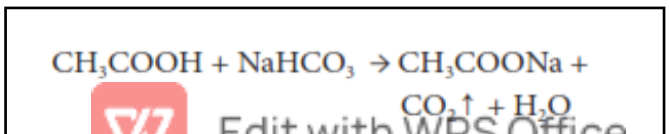
4. (i) Neutralization of NaOH with ethanoic acid:

Reaction with base: Ethanoic acid reacts with sodium hydroxide to form sodium ethanoate and water.



(ii) Evolution of carbon dioxide by the action of ethanoic acid with $NaHCO_3$:

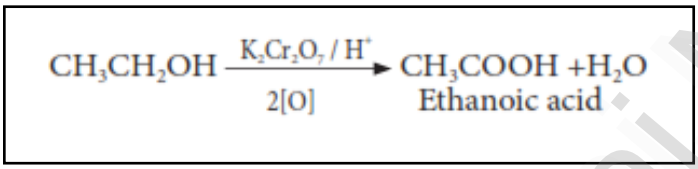
Ethanoic acid reacts with sodium bicarbonate, which are weaker bases and liberates CO_2, with brisk effervescence.



(iii) Oxidation of ethanol by acidified potassium dichromate.

Oxidation:

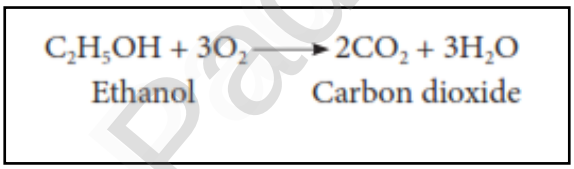
Ethanol is oxidized to ethanoic acid with acidified $K_2Cr_2O_7$



During this reaction, the orange colour of $K_2Cr_2O_7$ changes to green. Therefore, this reaction can be used for the identification of alcohols.

(iv) Combustion of ethanol:

Ethanol is highly inflammable liquid. It burns with oxygen to form carbon dioxide and water.



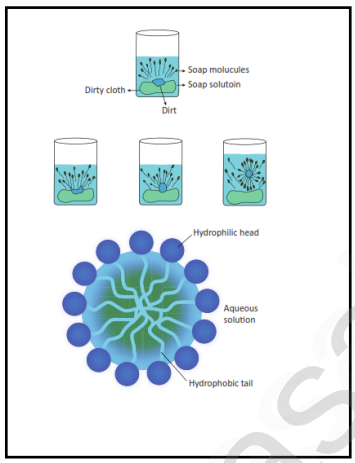
5. Ans:

- A soap molecule contains two parts that interact differently with water.
- It has one pole end, which is a short head with a carboxylate group (-COONa) and one non – polar end having the long tail made of the hydrocarbon chain.
- The polar end is hydrophilic (water loving) in nature and non polar end is hydrophobic (water hating) in nature.
- Polar end is attracted to water. Non – polar end is attracted to dirt (or) oil on the cloth.
- The non polar end (hydrophobic part) of the soap molecule traps

the dirt or oil and the polar end (hydrophilic part) make the entire molecule soluble in water.

- When a soap is dissolved in water, the molecules join together as clusters called micelles.

- The polar end of the soap molecules makes the micelles soluble in water. Thus the dirt is washed away with the soap.



VII. HOT question:

1 2 3 4

1. (i) CH_3-CH(OH)-CH_2-CH_3

   (ii) Butan – 2 - ol.

   (iii) Saturated (C –C single bond)

2. (i) Compound A is Ethanoic acid (or) acetic acid (CH_3COOH)

   (ii) Ethyl Ethanoate.

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{conc.}H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + H_2O$$

   (iii) Esterification:

The reaction of an alcohol with a carboxylic acid gives a compound having fruity odour. This compound is called an ester and the reaction is esterification. Ethanol reacts with ethanoic acid in the

presence of conc. H_2SO_4 to form ethyl ethanoate, an ester.