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Matric no: 19/MHS 02/ 047

1) GIVE THE IUPAC NAME OF THE FOLLOWING

HCOOH = METHANOIC ACID

HOOCCH₂ CH₂ CH₂ COOH = PENTAN-1,5-DIOIC ACID

CH₃ CH₂ CH₂ COOH = BUTANOIC ACID

HO₂ C-CO₂H = ETHANEDIOIC ACID

CH₃ (CH₂)₄ COOH = HEXANOIC ACID

CH₃ CH=CH CH₂ CH₂ COOH – HEX- 4 ENE OIC ACID

2) DISCUSS BRIEFLY THE PHYSICAL PROPERTIES OF CARBOXYLIC ACIDS UNDER THE FOLLOWING HEADING

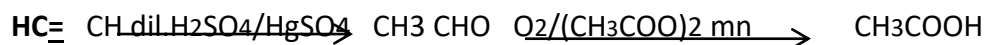
Physical appearance: All simple aliphatic carboxylic acids up to C₁₀ are liquids at room temperature. While most other carboxylic acids are solid at room temperature. Anhydrous carboxylic acids (acetic acids) are known as glacial ethanoic acid freezes to an ice like solid below the room temperature.

Boiling points: Boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

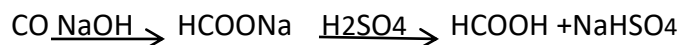
Solubility: Lower molecular mass carboxylic acid with up to four carbon atoms in their molecules are soluble in water, this is due to their ability to form hydrogen bond with water molecules. All carboxylic acids are soluble in organic solvents.

3) WRITE THE INDUSTRIAL PREPARATION OF CARBOXYLIC ACIDS

- I. **From ethanol:** Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using manganite (II) ethanoate catalyist. Ethanal itself is obtained from ethylene



- II. **From carbon (II) oxide:** Methanoic acid (formic acid) is manufactured by adding carbon (II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate (VI) acid (H₂SO₄)

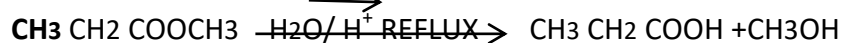
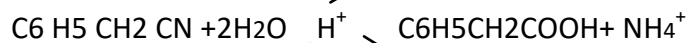
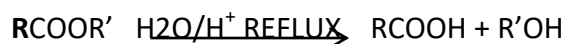
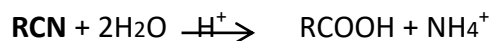


4) SYNTHETIC PREPARATION OF CARBOXYLIC ACID

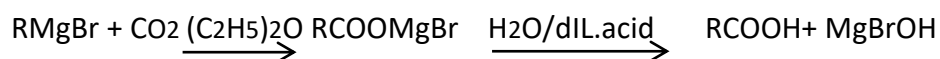
- i. **Oxidation of primary alcohol and aldehydes :** These can be used to prepare carboxylic acids using the usual oxidizing agent (i.e. K₂Cr₂O₇ or KMnO₄) in acidic solution.



- ii. **Hydrolysis of nitriles (cyanides) or esters**



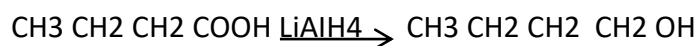
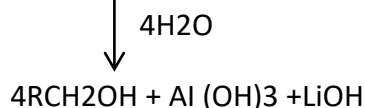
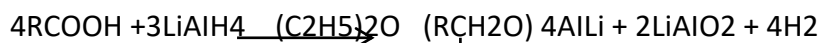
- iii) **Carbonylation of Grignard reagent:** Aliphatic carboxylic acids are obtained by bubbling carbon (IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.



R may be 1, 2, 3 aliphatic alkyl or aryl radical

5)

❖ Reduction to primary alcohol



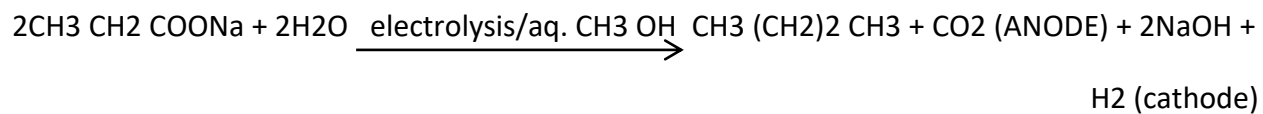
Butanoic acid

butanol

❖ **Decarboxylation**



Kolbe synthesis



❖ **Esterification**

