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CHEM 102 CHEMISTRY
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Give the IUPAC names of the following Compounds

- $\text{HCOOH} \rightarrow$ Methanoic Acid
 $\text{HOOC(CH}_2\text{)}_4\text{COOH} \rightarrow$ Pentan-1,5-dioic acid
 $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$ Butanoic Acid
 $\text{HO}_2\text{C}-\text{C}_6\text{H}_4-\text{CO}_2\text{H} \rightarrow$ Ethanedioic Acid
 $\text{CH}_3(\text{CH}_2)_4\text{COOH} \rightarrow$ Hex-5-enoic Acid
 $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH} \rightarrow$ Hex-4-enoic Acid

2. Discuss briefly the physical properties of carboxylic acids under the following headings.

(i) PHYSICAL APPEARANCES

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solid at room temperature although acetylene carboxylic acid (acetylenic acid) also known as glacial acetic acid, freezes to an ice-like solid below the room temperature.

(ii) Boiling POINT

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

(iii) Solubility

Lower molecular mass carboxylic acids with up to four carbon atoms are more soluble in water. Solubility decreases as the length of the hydrocarbon chain increases.

due to their ability to form hydrogen bonds with water molecules. The water solubility of the acid decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence insoluble. All carboxylic acids are soluble in organic solvents.

3 Write two industrial Preparations of Carboxylic acid

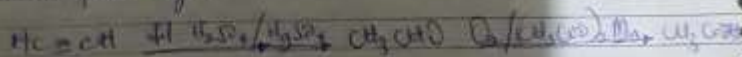
(i) from Petroleum.

Liquid phase air Oxidation of C₅-C₇ alkanes obtainable from petroleum at high temperature and pressure will give C₅-C₇ carboxylic acids with methanone, propanone and butanone for acids as by-products.



(ii) from Ethanol

Ethanoic acid is obtained commercially by the liquid phase air-oxidation of ethanol using Mn²⁺ solution of ethanol as a catalyst. Ethanoic acid is obtained from ethane.

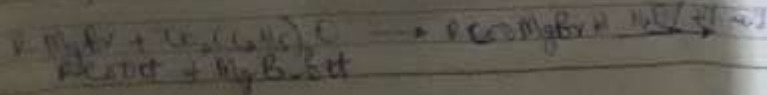


4 With equations and brief explanation discuss the synthetic preparation of Carboxylic Acid

Carboxylation of Compound Ring

Aliphatic carboxylic acids are obtained by bubbling carbon dioxide into the compound ring and then hydrolyzed with dilute acid.

May be 1°, 2°, 3° aliphatic ring compound.

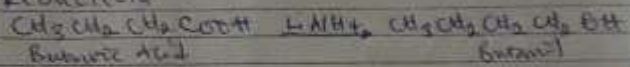


In the preparation of benzoic acid, the reagent is added a solid carbon (iv) oxide (dry ice) which also serve as a coolant to the reaction mixture

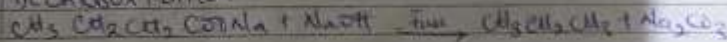


5. Write chemical equation which outline the reduction, decarboxylation and esterification of carboxylic acid

(i) REDUCTION



(ii) DECARBOXYLATION



(iii) ESTERIFICATION

