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Dept: MBBS

College: MHS

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 ASSIGNMENT ON CARBOXYLIC ACID

1. Give the IUPAC names of the following compounds.

(a)HCOOH----Methanoic acid

(b)HOOCCH 2CH2CH2COOH --- pentanol,5-dioic acid

(c)HO2C-CO2H-----Ethanedioic acid

(d)CH3(CH2)4COOH-----Hexanoic acid

(e)CH3CH=CHCH2CH2COOH----Hex-4-eneoic acid

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

(i) physical appearance: all simple aliphatic carboxylic acids up to C10 are liquid at room temperature. Most other carboxylic acids are solid at room temperature

 Although anhydrous carboxylic acids eg. Acetic acids freezes to an ice-like solid below the room temperature.

(ii) Boiling point: boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting point than their aliphatic counter parts of comparable relative molecular mass

iii) Solubility: Lower molecular mass carboxylic acids with up to the four carbon atoms in their molecules are soluble in water; this largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecules mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

1. Write two industrial preparation of carboxylic acids.
2. From carbon(ii) oxide

CO+NaOH. HCooNa + H2SO4 HCOOH +NaHSO4

(b)from ethanol.

HC=CH + dil H2so4/Hgso4 CH3CHO O/(CH 3COO)Mn CH3COOH (Ethanoic acid)

1. With Equation and brief explanation, discuss the synthetic preparation of carboxylic acid.
2. Oxidation of primary alcohols and aldehydes. Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acid using K2cr2O7 or kMno4 as oxidizing agent.

RCH2OH (O)/Kmno4 RCHO (O) RCOOH.

CH3CH2OH (O)/KMNO CH3CHO (O) CH3COOH (Ethanoic acid)

1. Carbonation of Grignard reaction.

Aliphatic carboxylic acids are obtained by bubbling carbon (iv) oxide into the Grignard reagent and then hydrolysed with dilute acids.

RMgBr + Co2 (C2H5)2O RCOOMgBr (H2O/dil acid) RCOOH +MgBrOH

C6H5MgBr +CO2 (C2H5)2O C6H5COOMgBr (H2O/H+) C6H5COOH +MgBrOH

1. Hydrolysis of cynides or esters.

Cyanides: RCN+2H2O (H+) RCOOH +NH4+

 C6H5CH2CN +2H2O (H+) C6H5CH2COOH + NH4+

Esters: RCooR**|**(H2O/H+reflux) RCOOH + R**|**OH

CH3CH2COOH (H2O/H+) CH3CH2COOH +CH3OH

5) With chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid. a)reduction. 4RCooH + 3LiALH4 (C2H5)2O (RCH2O)4AlLi + 2LiAlO2 + 4H2O

 CH3CH2CH2COOH (LiAlH4) CH3CH2CH2CH2OH

 Butanoic acid butanol

 b)Decarboxylation. CH3CH2CH2CooNa +NaOH fuse CH3CH2CH3 + Na2co3

c) esterification.

 CH3COOH + CH3CH2OH CH3CH2COOCH2CH3 + H2O