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DEPARTMENT: DENTISTRY

COURSE: CHM 102

MATRIC NO: 19/MHS09/006

 **ASSIGNMENT**

HCOOH Methanoic acid

HOOCCH2CH2COOH Pentan-1,5-dioic acid

CH3CH2CH2COOH Butanoic acid

HO2C-CO2H Ethanedioic acid

CH3(CH2)4COOH Hexanoic acid

CH3CH=CHCH2CH2COOH Hex-4-eneoic acid

2) i) Physical appearance: Most of the carboxylic acid are solid at room temperature but all simple aliphatic carboxylic acids up to C10 are liquids at room temperature. A nhydrouss carboxylic acud (acetic acid) freezes o an ice-like solid below room temperature.

ii) Boiling point: The boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids have higher melting points than their aliphatic counterparts of comparable R.M.M.

iii) Solubility: All carboxylic acids are soluble in organic solvents. Molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water.

3) TWO INDUSTRIAL PREPARATIONS 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 catalysts

HCΞCH dil. H2SO4/HgSO4  CH3CHO O2/(CH3COO)2Mn CH3COOH

ii) From petroleum: Liquid phase air-oxidation of C5-C7 alkanes obtainablefrom petroleum at high temperature and pressure will give C5-C7 carboxylic acids with methanoic, propanoic and butanedioic acids as by-products.

 C5-C7 O2/High temperature and pressure C5-C7 carboxylic acids

4) SYNTHETIC PREPARATION OF CARBOXYLIC ACIDS:

i) Oxidation of primary alcohols and aldehydes: it can be used to prepare carboxylic acids using the usual oxidizing agents in acidic solution (i.e K2Cr2O7 or KMnO4)

 RCH2 O. excess acid/KMnO4 RCHO O RCOOH

ii) Carbonation of Grignard reagent:Aliphatic carboxylic acids are obtained by bubbling carbon(iv) oxide into the Grignard reagent then hydrolysed with dilute acid

RMgBr + CO2 ( C2H5)2O RCOOMgBR H2o/dil. acid RCOOH + MgBrOH

iii) Hydrolysis of nitrites (cyanides) and esters:

RCN + 2H2O H+ RCOOH +NH4+

 C6H5CH2CN +2H2O H+  C6H5CH2COOH +NH4+

5) i)REDUCTION OF CARBOXYLIC ACIDS

4RCOOH +3LiAlH4 (C2H5)2O (RCH2O)4AlLi + 2LiAlO2+ 4H2

 4H2O

 4RCH2OH +Al(OH)3 + LiOH

CH3CH2CH2COOH LiAlH4 CH3CH2CH2CH2OH

Butanoic acid Butanol

ii) Decarboxylation:

CH3CH2CH2COONa + NaOH fuse CH3CH2CH3 + Na2 CO3

Kolbe synthesis

2CH3CH2COONa + 2H2O electrolysis/aq.CH3OH CH3(CH2)2CH3 +CO2(anode)+ 2NaOH+H2(cathode)

iii) Esterification:

CH3CH2CH2COOH + CH3CH2CH2OH H+ CH3CH2CH2COOCH2CH2CH3 + H2O