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DEPARTMENT: PHARMACY

MATRIC NO: 19/MHS11/045

COURSE CODE: CHM102

ASSIGNMENT ON CARBONXYLIC ACIDS

1. Iupac names for the following compounds
2. HOOCCH2CH2COOH Pentan-1,5-dioic acid
3. CH3CH2CH2COOH Butanoic acid
4. CH3[ CH2]4COOH Hexanoic acid
5. HCOOH Methanoic acid
6. HO2C-CO2H Ethanedioic acid
7. CH3CH=CHCH2CH2COOH Hex-4-eneoic acid
8. Physical properties of carbonxylic acids
9. Boiling points

The boiling points increases with increasing relative molecular mass. Aromatic carbonxylic acid acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

1. Physical appearances

All simple aliphatic carbonxylic acids up to C10 are liquids at room temperature. Most other carbonxylic acids are solid at room temperature although anhydrous carbonxylic acid also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

1. Solubility

The water solubility of this acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carbonxylic acids are soluble in organic solvents.

1. Industrial preparations
2. From petroleum

Liquid phase air oxidation of C5-C7 alkanes, obtainable from petroleum at high temperature and pressure will give C5-C7 carbonxylic acids with methanoic, propanoic and butanedioic acids as by-products.

1. From carbon( II) oxide

Methanoic acid is manufactured by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carbonxylic acid is liberated by careful reaction with tetraoxosulphate(iv) acid (H2SO4).

1. Synthetic preparation of carbonxylic acid

There are different methods in the synthetic preparations of carbonxylic acid, but I will discuss only one of them.

1. Hydrolysis of nitrites or esters

RCN + 2H2O …H+….> RCOOH + NH4+

C6H5CH2CN + 2H2O …H+……> C6H5CH2COOH + NH4+

RCOOR’ …H2O/H+ reflux….> RCOOH + R’OH

CH3CH2COOCH3 ……H2O/H+ reflux ……> CH3CH2COOH + CH3OH

2. Reduction to primary alcohol

4RCOOH + 3LiAlH4 …(C2H5)2O….> (RCH2O)4AlLi +2LiAlO2+4H2….4H2O…> 4RCH2OH+Al(OH)3+LiOH

CH3CH2CH2COOH ..LiAlH4...> CH3CH2CH2CH2OH

Butanoic acid Butanol

1. Decarboxylation

This involves removal of the carboxyl group from the acid give a hydrocarbon or its derivative.

Thermal decarboxylation:

CH3CH2CH2COOHNa+NaOH …fuse…> CH3CH2CH3+Na2CO3

Kolbe synthetic:

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

1. Esterification:

CH3CH2CH2COOH + CH3CH2CH2OH<….H+…> CH3CH2CH2COO CH2CH2CH3 + H2O