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DEPARTMENT: MBBS

MATRIC NO: 19/MHS01/106

1. HCOOH- Methanoic acid

HOOCCH2CH2CH2COOH- Pentan-1,5-dioic acid

CH3CH2CH2COOH- Butanoic acid

HO2C-CO2H- Ethanedioic acid

CH3(CH2)4COOH- Hexanoic acid

CH3CH=CHCH2CH2COOH- Hex-4-eneoic acid

1. Physical appearances:

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

Boiling point:

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 acids with up to 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 acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

1. From Carbon(II) oxide

Methanoic acid (Formica 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)

From ethanal

Ethanoic acid is obtained commercially by liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using Maganite (II) ethanoate catalyst. Ethanal itself is obtained from ethylene.

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

Excess acid/KMnO4

RCH2OH [O] ——————————RCHOR [O]

RCOOH

Aliphatic carboxylic acids are obtained by bubbling carbon(iv) oxide into Grignard reagent and then hydrolyzed with dilute acid

RMgBr + CO2 —— RCOO MgBr + HCl —— RCOOH

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

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

C6H5MgBr + CO2 ————— C6H5COOMgBr H2O/H+ C6H5COOH + MgBrOH

Hydrolysis of nitrites ( cyanides) or esters

RCN + 2H2O ———— RCOOH + NH4

(R=alkyl or aryl radical )

RCOOR—————————-RCOOH +R’OH

C6H5CH2CN + 2H2O ————- C6H5CH2COOH + NH4

CH3CH2COOCH3 ———————CH3CH2COOH + CH3OH

1. Decarboxylation

CH3CH2CH2COONa + NaOH ————— CH3CH2CH3 + Na2CO3

Esterification

CH3CH2CH2COOH + CH3CH2CH2OH ———————CH3CH2CH3 + H2O