GENERAL CHEMISTRY II (CHEM 102) NAME: Giwa Titilayo

MATRIC NO: 19/MHS01/178

DEPARTMENT: MBBS

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 Appearance

All simple aliphatic carboxylic acids up to C10 are liquid at room temperature. Most other carboxylic acids are solid at room temperature. Anhydrous carboxylic acid also known as glacial ethanoic acid freezes to an ice-like solid below room temperature.

Boiling points

Boiling point increases with increasing relative molecular mass.

Solubility

Lower moleculer mass carboxylic acids with up to 4 carbon atoms in their molecules are soluble in water, this is due to their ability to form hydrogen bonds with water molecules. The water solubility of the acid decreases as the relative molecular mass increases. All carboxylic acids are soluble in organic solvents.

1. Carboxylic acid is prepared industrially from carbon (ii) oxide.

NaOH H2SO4

CO HCOONa HCOOH+NaHSO4  ii. Carboxylic acid is prepared industrially from petroleum.

O2/High temperature and pressure

C5-C7 C5-C7 carboxylic acids

1. Synthetic preparations of carboxylic acid.

**i. Oxidation of primary alcohols and aldehydes.**

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acid using oxidizing agents ( K2CrO7 or KMNO4) in acidic solutions.

RCH2OH [O]excess acid/KMnO4 RCHO [O] RCOOH **ii. Carbonation of Gringnard reagent.**

Aliphatic carboxylic acid are obtained by bubbling carbon (IV) oxide reagent and then hydrolyzed with dilute acid.

C6H5MgBr+CO2 (C2H5)2OC6H5COOMgBr H2O/H+

C6H5COOH+MgBrOH

**iii. Hydrolysis of nitriles (cyanides) or esters.** C6H5CH2CN+2H2 H+ C6H5CH2COOH+NH4+

CH3CH2COOCH3 H20/H+ reflux CH3CH2COOH+CH3OH

***5.*** *Reduction of carboxylic acid to primary alcohol*

LiAlH4

CH3CH2CH2COOH CH3CH2CH2CH2OH ii. *Decarboxylation*

CH3CH2CH2COONa+NaOH fuse CH3CH2CH3+Na2CO3

Kolbe synthesis

2CH3CH2COONa+2H2O electrolysis/aq. CH3OH

CH3(CH2)2CH3+CO2(anode)+ 2NaOH+H2(cathode) *iii. Esterification* CH3CH2CH2COOH+CH3CH2CH2OH H+

CH3CH2CH2COOCH2CH2CH3+H2O.