Name ÷ AGBO HELEN CECILIA DATE
Matric no ÷ 19/MHS02/1007
Dept. ÷ NURSING
COURSE ÷ CHM 102
ASSIGNMENT ON CARBOXYLIC ACID

(1) IUPAC Names

(ii) $HCOOH$ — Methanoic acid

(iii) $HOOCCH_2CH_2CH_2COOH$ — Pentan-1,4-dioic acid

(iii) $CH_3CH_2CH_2COOH$ — Butanoic acid

(2) (i) Physical appearances

All Simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most Other Carboxylic acids are solid at room temperature.

(ii) Boiling Point

It increases with increasing relative molecular mass.

(iii) Solubility

Lower molecular mass carboxylic

Name ÷ AGBO HELEN CECILIA DATE
matric no ÷ 19/MHS02/007
Dept. ÷ NURSING
Course ÷ CHM 102
ASSIGNMENT ON CARBOXYLIC ACID

(1) IUPAC Names

(i) $HCOOH$ — Methanoic acid

(ii) $HOOCCH_2CH_2CH_2COOH$ — Pentan-1,5-dioic acid

(iii) $CH_3CH_2CH_2COOH$ — Butanoic acid

(2) (i) Physical appearances

All Simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most Other Carboxylic acids are solid at room temperature.

(ii) Boiling Point

It increases with increasing relative molecular mass.

(iii) 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.

(3) Industrial Preparations
(i) From Carbon (II) oxide
(ii) From Petroleum

(4) Synthetic Preparation
(i) Oxidation of Primary alcohols and aldehydes :- can be used to prepare carboxylic acids using the usual oxiding agent [$K_2Cr_2O_7$] in acidic solution

$RCH_2OH \xrightarrow{[O],\ \text{excess acid/KMnO}_4} RCHO \xrightarrow{[O]} RCOOH$

(ii) Carbonation of Grignard reagent
Aliphatic Carboxylic acid are obtained by bubbling Carbon (IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.

DATE

$RMgBr + CO_2 \xrightarrow{(C_2H_5)_2O} RCOOMgBr \xrightarrow{H_2O/dil.acid}$

$RCOOH + MgBrOH$

R maybe 1°, 2°, 3° aliphatic alkyl

(iii) Hydrolysis of nitriles

$RCN + 2H_2O \xrightarrow{H^+} RCOOH + NH_4^+$

[R = alkyl or aryl radical]

(5) Chemical reactions

(i) Reduction to Primary alcohol

$4RCOOH + 3LiAlH_4 \longrightarrow [RCH_2O]_4Al + 2LiAlO_2 + 4H_2$

$\downarrow 4H_2O$

$4RCH_2OH + Al(OH)_3 + LiOH$

$CH_3CH_2CH_2COOH \xrightarrow{LiAlH_4} CH_3CH_2CH_2CH_2OH$

Butanoic acid — Butanol

(ii) Decarboxylation

$CH_3CH_2CH_2COONa + NaOH \xrightarrow{\text{fuse}} CH_3CH_2CH_3 + Na_2CO_3$

Kolbe Synthesis

$2CH_3CH_2COONa + 2H_2O \xrightarrow[\text{aq. } CH_3OH]{\text{electrolysis}} CH_3[CH_2]_2CH_3 + CO_2$ (Anode)

$+ 2NaOH + H_2$ (Cathode)

(iii) Esterification

$CH_3CH_2CH_2COOH + CH_3CH_2CH_2OH \longleftrightarrow CH_3CH_2$

$CH_2COOCH_2CH_2CH_3 + H_2O$