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***MEDICINE & SURGERY***

***19/MHS01/307***

CHM102 ASSIGNMENT

QUESTION 1

1. Give the iupac names of the following compounds;

* HCOOH
* HOOCCH2CH2CH2COOH
* CH3CH2CH2COOH
* HO2C-CO2H
* CH3COH2)4COOH
* CH3CH=CHCH2CH2COOOH

ANSWERS

1. HCOOH - METHANIOC ACID
2. HOOCCH2CH2CH2COOH\_ PETAN-1,5,-DIOC ACID
3. BUTANIOC ACID
4. ETHANEDIOC ACID
5. HEXANIOC ACID
6. HEX-4-ENOIC ACID

QUESTION 2

1. Discuss briefly the physical properties of carboxylic acids following headings
2. Physical appearance
3. Boiling points
4. Solubility

ANSWERS

1. PHYSICAL APPEARANCE : all simple aliphatic carboxylic acids up to C10 and liquids at room temperature. Most other carboxylic 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.
2. BOILING POINT: “ boiling point increases with increase in relative molecular mass”. Aromatic carboxylic acids are crystalline solids and have higher melting point than their aliphatic counterparts of comparable relative molecular mass.
3. SOLUBILITY: lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water ; this largerly due to their ability to form hydrogen bonds with water molecules . the water solubility of the 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 water.

QUESTION 3

1. Write two industrial properties of carboxylic acids

ANSWERS

1. FROM PETROLEUM: liquid phase air oxidation of C5-C9 alkanes, obtainable from petroleum at high temperature and pressure will give C5-C7 carboxylic acids with methanoic, propanoic, butanedioc acids as by products.

C5-C7 ----------------------------------------- C5-C7 CARBOXXYLIC ACID

(C6-C7 ALKANES) O2/HIGH TEMP

1. FROM CARBON(II) OXIDE : methanoic acid ( formic 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)

CO--------------- HCOONA -------------------- HCOOH+ NAHSO4

NAOH H2SO4

QUESTION 4

1. With the equations briefly explain, discuss the synthetic preparation of carboxylic acid ANSWERS
2. OXIDATION OF PRIMARY ALCOHOLS AND ALDEHYDES

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acid the usual oxidizing agents E.G K2CR2O7(potassium dichromate (iv) ) or KMNO4(potassium manganate (vii) in acidic .

RCH2OH\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_RCHO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_RCOOH

[O2]excess cid/ KMNO4 [O]

Examples; oxidation of ethanol to ethanioc acid

CH3CH2OH+ [O]\_\_\_\_\_\_\_\_\_\_\_\_CH3CHO + H2O

CH3CHO + [O]\_\_\_\_\_\_\_\_\_\_\_\_\_\_CH3COOH

1. CARBONATION OF GRIDNARD REAGENT

Aliphatic carboxylic acids are obtained by bubbling carbon(iv) oxide into the gridnard reagent and then hydrolysed with dilute acid

RMgBr + CO2 \_\_\_\_\_\_\_\_\_\_\_RCOOMgBr\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_RCOOH+ MgBrOH

(C2H5)2O H2O/DIL.ACID

1. HYDROLYSIS OF NITRILES(CYANIDES) OR ESTERS

Nitriles undergoes hydrolysis to produce amides. This amides further undergoes reaction inthe pressure of thee catalyst which then form carboxylic acids. The catalyst for the reaction is H+ or OH- furthermore application of mild conditionshelps in censing the reactions in the amide rage.

RCN+ 2H2O\_\_\_\_\_\_\_\_\_ RCOOH + ROH + NH4

H+

QUESTION 5

5. with chemical equations only ; outline the reduction , decarboxylation, and esterification of carboxylic acid.

* Reduction to primary alcohol

4RCOOH + 3LiALH4\_\_\_\_\_\_\_\_\_\_\_\_\_(RCH2O)+ AlLi + 2LiALO2¬

(C2H3)2O 4H2O

\_4RCH2OH + AL(OH)3 + LiOH

CH3CH2CH2COOOHNa + NaOH\_\_\_\_\_\_\_\_\_\_\_\_\_\_CH3CH2CH2CH2OH

* DECARBOXYLATION

CH3CH2CH2COONa + NAOH\_\_\_\_\_\_\_\_\_\_\_\_\_CH3CH2CH3+ NA2CO3

SYNTHESIS

2CH3CH2COONA + 2H2O\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_CH3(CH2)2CH3+CO2(ANODE)+(2NAOH+H2 (CATHODE) electrolysis of CH3OH

* ESTERIFICATION

CH3CH2CH2COOH+ CH2CH2CH2OH\_\_\_\_\_\_\_\_\_\_\_\_CH3CH2CH2COOCH2CH2+ H2O