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DEPARTMENT: PHYSIOLOGY

COURSE CODE: CHEM 102

MATRIC NO: 19/MHS05/001

1. Give the IUPAC names of the following compounds.
2. HCOOH- Methanoic acid
3. HOOCCH2CH2CH2COOH- Pentan-1,5-dioic acid
4. CH3CH2CH2COOH: Butanoic acid
5. HO2C-CO2H- Ethanoic acid
6. CH3(CH2)4COOH- Hexanoic acid
7. CH3CH=CHCH2CH2COOH-Hex-4-eneoic acid.
8. Discuss briefly the physical properties of carboxylic acids under thhe following headings
9. Physical appearance: all simple carboxylic acids up to C10 are liquid at room temperature. Most other carboxylic acids are solid at room temperature although acetic acid freezes to an ice-like solid below the room temperature.
10. Boiling point: it increases with increase in relative molecular mass. Aromatic carboxylic acids are crystalline solids and have a higher melting points than their aliphatic counterparts of comparable relative molecular mass.
11. Solubility: lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this is largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecular mass increases. All carboxylic acids are soluble in organic solvents.

3) State two industrial preparations of carboxylic acids

i) From Carbon ( II) oxide

Methanoic acid Is manufactured by adding carbon (ii) oxide under pressure to hot acqeous

Sodium hydroxide. The free carboxylic acid is liberated by careful reaction with

Tetraoxosulphate (vi) acid.

CO NaOH HCOONa H2SO4 HCOOH + NaHSO4

II) FROM PETROLEUM: liquid phase air oxidation of C5-C7 alkanes, obtainable from

Petroleum at high temperature and pressure will give C5-C7 carboxylic acids with methanoic propanoic and butanedioic acids as by products.

C5-C7 O2/High temperature and pressure 5-C7 carboxylic acids

4) With equations and brief explanation discuss the synthetic preparations of carboxylic acids.

OXIDATION OF PRIMARY ALCOHOLS AND ALDEHYDES: This can be used to prepare

carboxylic acids by using the usual oxidizing agents( i.e K2Cr2O7 or KMnO4).

RCH2OH [O], excessacid/KMnO4 RCHO [O] RCOOH

5) With chemical equation only, outline the reduction, decarboxylation, and esterification of

carboxylic acid.

REDUCTION TO PRIMARY ALCOHOL:

CH3CH2CH2COOH LiAlH4 CH3CH2CH2CH2OH

Butanoic acid butanol

DECARBOXYLATION:

1. THERMAL DECARBOXYLATION:

CH3CH2CH2COONa + NaOH FUSE CH3CH2CH3 + Na2CO3

1. KOLBE SYNTHESIS:

2CH3CH2COONa + 2H2O electrolysis/Aq CH3OH CH3( CH2)2CH3 + CO2 + 2NaOH +

H2( Anode)

ESTERIFICATION:

CH3CH2CH2COOH + CH3CH2CH2OH H+ CH3CH2CH2COOCH2CH2CH3 + H2O