**OBEGOLU STEPHANIE ADANNIA 19/MHS11/089**

**DEPARTMENT OF PHARMACY CHM102**

**ASSIGNMENT ON CARBOXYLIC ACID**

1. **IUPAC NAMES OF THE FOLLOWING COMPOUNDS.**
2. **HCOOH – Methanoic acid**
3. **HOOCCH2CH2CH2COOH – Petan-1,5-dioic acid**
4. **CH3CH2CH2COOH – Butanoic acid**
5. **HO2C-CO2H – Ethanedoic acid**
6. **CH3CH=CHCH2CH2COOH – Hex-4-eneoic acid**
7. **CH3(CH2)4COOH – Hexanoic acid**
8. **PHYSICAL PROPERTIES OF CARBOXYLIC ACIDS**
9. **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.**
10. **Boiling Points – 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 Smolecular 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 because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.**
12. **INDUSTRIAL PREPARATIONS**
13. **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 + NaOH ----------🡪 HCOONa**

**HCOONa + H2SO4 --------🡪 HCOOH + NaHSO4**

1. **From Ethanal – Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid usimg manganite (II) ethanoate catalyst. Ethanal itself is obtained from ethylene.**

**HC = CH -------------------------🡪 CH3CHO**

 **Dil.H2SO4/HgSO4**

**CH3CHO ---------------------------------------🡪CH3COOH O2 / (CH3COO)2Mn**

1. **SYNTHETIC PREPARATIONS OF CARBOXYLIC ACIDS**
2. **Oxidation of primary alcohols and aldehydes**

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

**RCH2OH [O] -------------------------🡪 RCHO [O] RCOOH**

 **Excess acid/ KMnO4**

1. **Hydrolysis of nitriles (cyanides) or esters**

**RCN + 2H2O ----------🡪 RCOOH +NH4+**

**H+**

**R= alkyl or aryl radical**

**RCOOR’ ------------------------🡪 RCOOH + R’OH**

 **H2O/H+ reflux**

**C6H5CH2CN + 2H2O ------------🡪 C6H5CH2COOH + NH4+**

 **H+**

**CH3CH2COOCH3 -------------------------------🡪 CH3CH2COOH + CH3OH**

 **H2O/H+ reflux**

1. **a) Reduction to primary alcohol**

**Carboxylic acids are very difficult to reduce by catalytic hydrogenation or dissolving metals but lithium tetrahydridoaluminate (III) and diborane form intermediate compounds with the acids which liberate the alcohol on hydrolysis**

 **Decarboxylation**

 **This involves removal of the carboxyl group from the acid to give a hydrocarbon or its derivative.**

 **Esterification**

**In the presence of strong acid catalyst , carboxylic acids react with alcohols to form esters.**