**SALAMI FARID OLAMIDE**

**MBBS**

**19/MHS01/392**

**GENERAL CHEMISTRY II ASSIGNMENT (CARBOXYLIC ACIDS)**

1. Give the IUPAC names of the following compounds
2. HCOOH : METHANOIC ACID
3. HOOCCH2CH2CH2COOH : PETAN-1,5-DIOIC ACID
4. CH3CH2CH2COOH: BUTANOIC ACID
5. HO2C – CO2H : ETHANEDIOC ACID
6. CH3CH = CHCH2CH2COOH : HEX-4-ENEOIC ACID
7. CH3(CH2)4COOH : HEXANOIC ACID
8. Discuss briefly the physical properties of carboxylic acids under the following headings (I) physical appearance (II) boiling point (III) solubility
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.

1. **Boiling points**

Boiling points increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points that their aliphatic counterparts of comparable relative molecular mass.

1. **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. 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.

1. INDUSTRIAL PREPARATIONS
2. From carbon (II)oxide

Methanolic 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).

1. From ethanal
2. Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using manganite (II)ethanoate catalyst. Ethanal itself is obtained from ethylene.
3. SYNTHETIC PREPARATIONS OF CARBOXYLIC ACIDS

There are a lot of ways to prepare the carboxylic acid synthetically, but one will be stated briefly

**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.

1. 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 the removal of carboxyl group from the acid to give a hydrocarbon or its derivative. Thermal decarboxylation

Carboxylic acids with a strong electron attracting group e.g -COOH, -CN, NO2, C=O decarboxylate readily on heating to 100-150 degree Celsius while other decarboxylate when their salts are heated with soda lime.

**Esterification**

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