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Dept: **Nursing science**

Course code:**chemistry 102**

**ASSIGNMENT ANSWERS.**

1.

* HCOOH------- Methanoic acid
* HOOCCH2CH2COOH------ Pentan-1,5-dioic acid
* CH3CH2CH2COOH-------- Butanoic acid
* HO2C-CO2H----- Ethanedioic acid
* CH3(CH2)4COOH----- Hexanoic acid

CH3CH=CHCH2CH2COOH----- Hex-4-eneoic acid

2.

* **Physical appearance:** All simple aliphatic carboxylic acids up to C10 are liquids at room temperature while most other carboxylic acids are solid at room temperature although anhydrous carboxylic acids( acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.
* **Boiling point:** Boiling point increases with increasing relative molecular Mass. Aromatic carboxylic acids are crystalline solids and have higher melting point than their aliphatic counterparts of comparable relative molecular Mass.

**Solubility:** Lower molecular Mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water;this is 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 solvent.

3.

* **From carbon(II)oxide**
* **From ethanol**

4.

**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.eK2Cr2O7) in acidic solution.

RCH2OH [O], excess acid/KMnO4. RCHO. [O]. RCOOH

* **Carbonation of Grinard reagent**

 Aliphatic carboxylic acids are obtained by bubbling carbon (IV)oxide into Grinard reagent and then hydrolyzed with dilute acid

RMgBr + CO2. (C2H5)2O. RCOOMgBr. H2O/dil.acid. RCOOH + MgBrOH

R may be 10, 20, 30 aliphatic alkyl or aryl radical

In the preparation of benzoic acid, the reagent is added to solid carbona(IV) oxide (dry ice) which also serves as coolant to the reaction mixture.

C6H5MgBr + CO2. (C2H3)2O. C6H5COOMgBr. H2O/H+. C6H5COOH + MgBrOH

* **Hydrolysis of nitrites (cyanides) or esters**

 RCN + 2H2O. H+. RCOOH + NH4

(R=Alkyl or aryl radical)

 RCOOR,. H2O/H+ reflux. RCOOH + NH4+

 C6H2CH2CN + 2H2O. H+. C6H5CH2COOH + NH4+

 CH3CH2COOCH3. H2O/H+. CH3CH2COOH + CH2OH

5.

* **Reduction to primary alcohol**

4RCOOH + 3LiAlH4. (C2H5)2O. (RCH2O)4AlLi + 2LiAlO2 + 4H2. 4H2O. 4RCH2OH + Al(OH)3 + LiOH

CH3CH2CH2COOH. LiAlH4.  CH3CH2CH2CH2OH

 Butanoic acid. Butanol

* **Decarboxylation**
* Thermal decarboxylation

CH3CH2CH2COONa + NaOH. Fuse. CH3CH2CH3 + NaCO3

* Kolbe synthesis

2CH3CH2COONa + 2H2O. Electrolysis/aq. CH3OH. CH3(CH2)2CH3 + CO2(anode) + 2NaOH + H2(cathode)

* Estherification

CH 3CH2CH2COOH + CH3CH2CH2OH. . H+.  CH3CH2CH2COOCH2CH2CH3 + H2O.