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MATRIC NUMBER: 19/mhs01/377
COLLEGE: MHS
DEPARTMENT: MBBS 100LEVEL
COURSE: CHM 102

1. a. HCOOH - Methanoic acid
b. $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid
c. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ -Butanoic acid d. $\text{HO}_2\text{C}-\text{CO}_2\text{H}$ - Ethanedioic acid
e. $\text{CH}_3[\text{CH}_2]_4\text{COOH}$ - Hexanoic acid
f. $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-eneoic acid

2. a. Physical appearance: All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solids at room temperature although anhydrous carboxylic acid [acetic acids] also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

b. Boiling point: 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 molecular.

c. Solubility: Lower molecular mass carboxylic acid 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 hence covalent. All carboxylic acids are soluble in organic solvents.

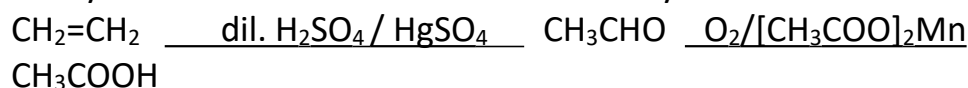
3. a. From Carbon[II]oxide

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 the careful reaction with tetraoxosulphate[VI]acid [H_2SO_4].



b. From ethanal

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.



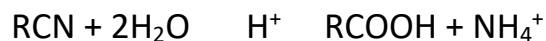
4.

a. Oxidation of primary alcohols and aldehydes:

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acid using the normal oxidizing agents [i.e $K_2Cr_2O_7$ or $KMnO_4$] in acidic solutions.



b. Hydrolysis of nitriles [cyanides] or esters

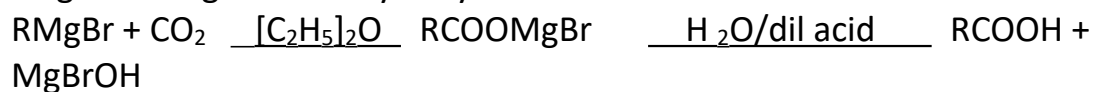


[R= alkyl or aryl radical]



c. Carbonation of Grignard reagent

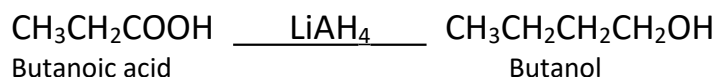
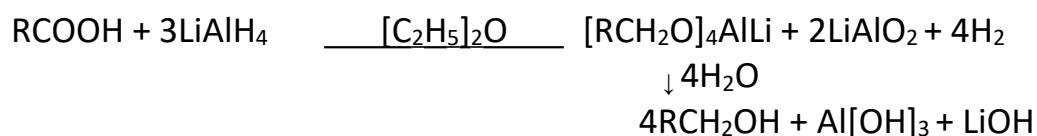
Aliphatic carboxylic acids are obtained by bubbling carbon[iv]oxide into Grignard reagent then hydrolyzed with dilute acid.



R may be 1^0 , 2^0 , 3^0 aliphatic alkyl or aryl radical.

In the preparation of benzoic acid, the reagent is added to solid carbon[iv]oxide [dry ice] which also serves as coolant to the reaction mixture.

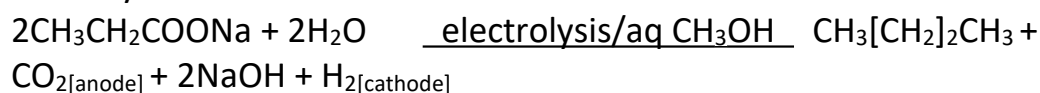
5. Reduction:



DECARBOXYLATION



Kolbe synthesis



ESTERIFICATION

