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MATRIC NO. 191MHS01133

DEPARTMENT: MEDICINE AND SURGERY

COURSE: GAM 102

ASSIGNMENT ON CARBOXYLIC ACIDS

- i) HCOOH - Methanoic acid
- ii) $\text{HOOC(CH}_2)_3\text{COOH}$ - Pentan-1,5-dioic acid
- iii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid
- iv) $\text{HO}_2\text{C} - \text{CO}_2\text{H}$ - Ethanedioic acid
- v) $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
- vi) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-enoic acid

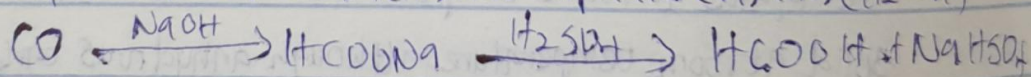
2. - Physical Appearance: All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

- 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 molecular mass.

- 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.

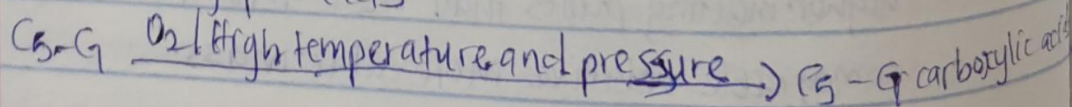
3.1, From carbon(II)oxide

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 (H_2SO_4)

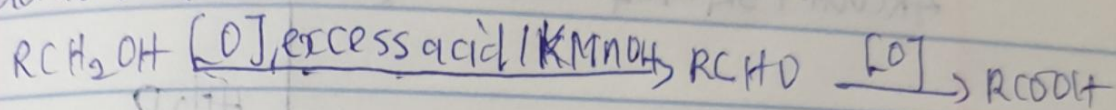


ii, From petroleum:

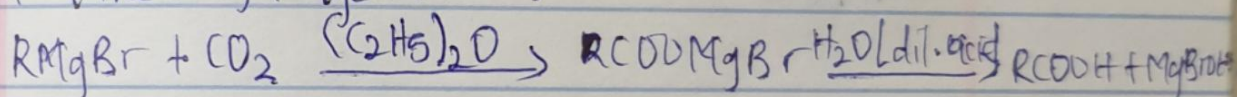
Liquid phase air oxidation of C_5-C_9 alkanes, obtainable from petroleum at high temperature and pressure will give C_5-C_9 carboxylic acids with methanoic, propanoic and butenedioic acids as by-products



i. 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. $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4) in acidic solution:

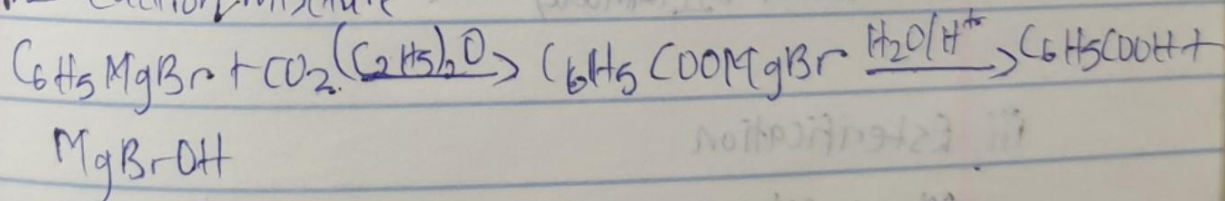


ii. Carbonation of Grignard reagent: Aliphatic carboxylic acids are obtained by bubbling carbon(IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid

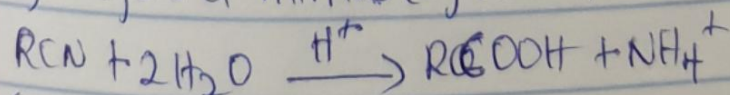


R may be 1° , 2° , 3° aliphatic alkyl or aryl radical

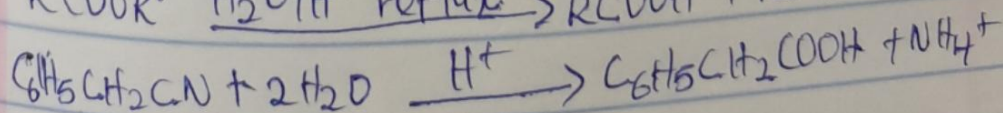
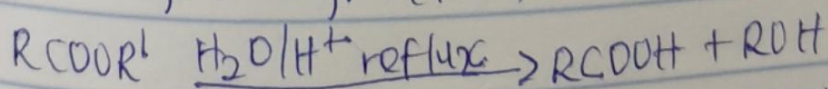
In the preparation of benzoic acid, the reagent is added to solid carbon(IV) oxide (dry ice) which also serves as coolant to the reaction mixture.

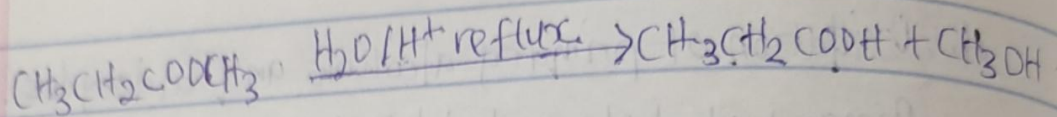


iii. Hydrolysis of nitriles (cyanides) or esters

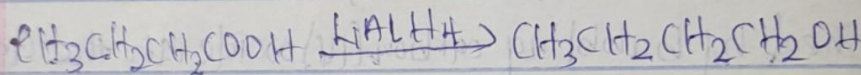
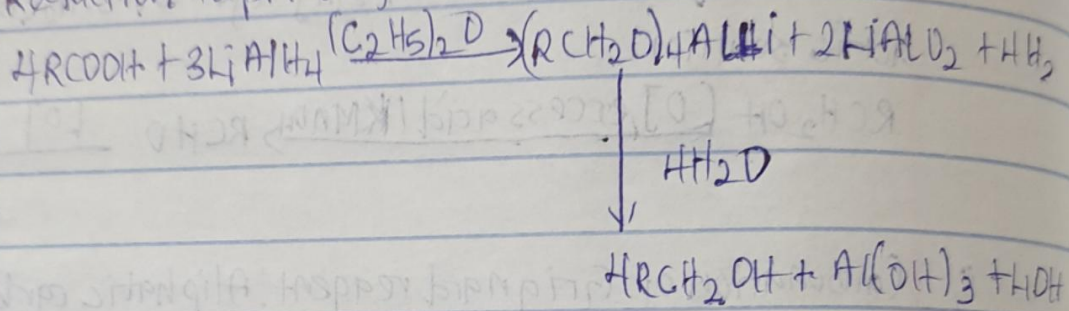


(R = alkyl or aryl radical)



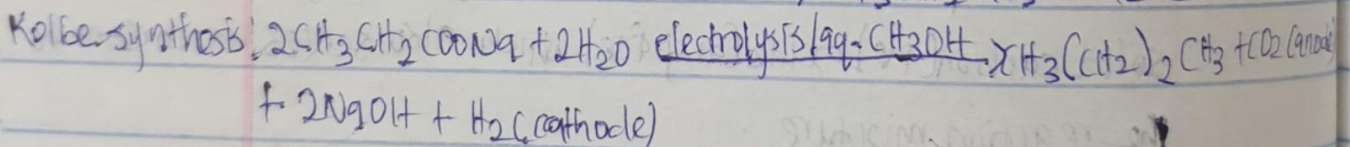
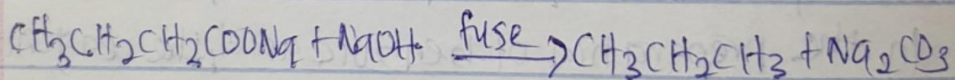


5. Reduction to primary alcohol



Butanoic acid → Butanol

ii. Decarboxylation



iii. Esterification

