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 Course: CHM 102
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 Matric number: 19/MHS01/085

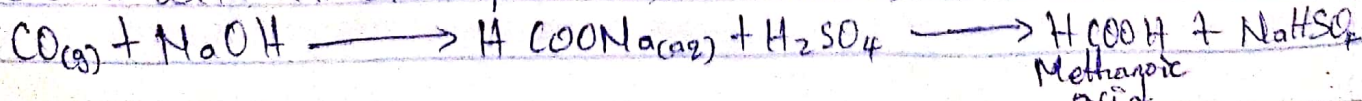
1. HCOOH	Methanoic acid
HOOCC ₄ H ₉ COOH	Pentan-1,5-dioic acid
CH ₃ CH ₂ CH ₂ COOH	Butanoic acid
HO ₂ C-CO ₂ H	Ethanedioic acid
CH ₃ (CH ₂) ₄ COOH	Hexanoic acid
CH ₃ CH=CHCH ₂ CH ₂ COOH	Hex-4-eneoic acid

2i Physical properties: All simple aliphatic carboxylic acids up to C₁₀ are liquids at room temperature. Most other carboxylic acids are solids at room temperature, anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below room temperature.

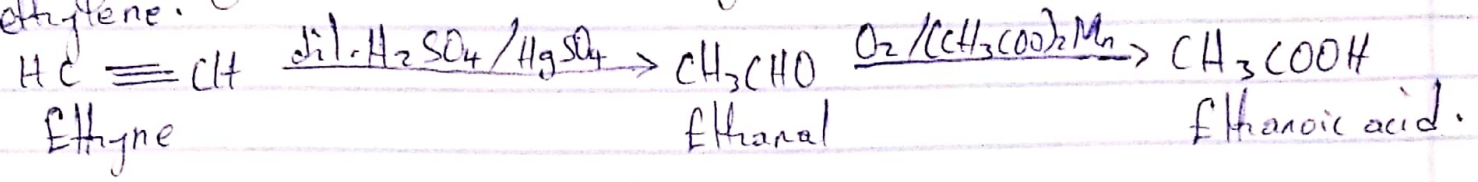
ii Boiling points: This increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

iii 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 and hence covalent. All carboxylic acids are soluble in organic solvents.

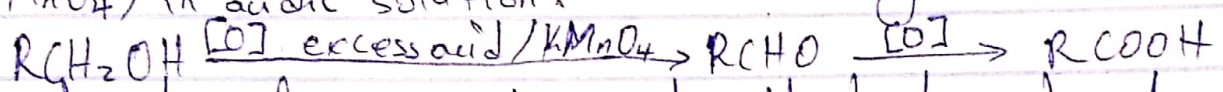
3i From Carbon (II) oxide: Methanoic acid (formic acid) is manufactured by adding carbon (II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate (VI) acid (H₂SO₄)



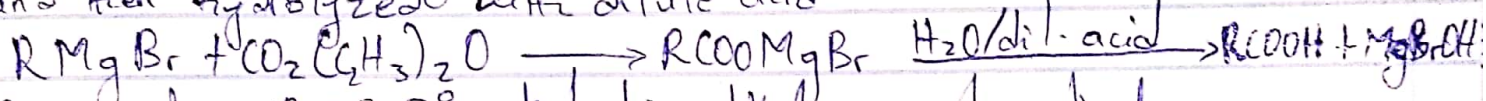
ii From ethanol: Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using manganite (II) ethanoate catalyst. Ethanal itself is obtained from ethylene.



4: 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.

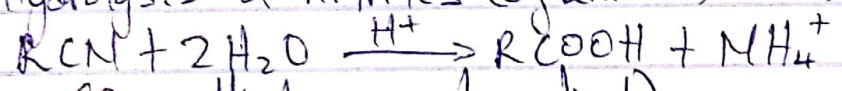


ii Carbonation of Grignard reagent: Aliphatic carboxylic acids are obtained by bubbling carbon(IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.

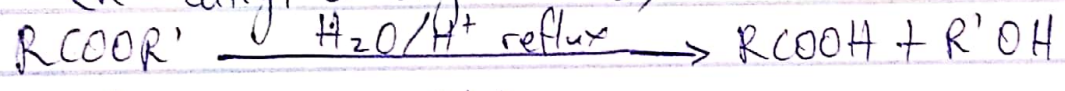


R may be 1°, 2°, 3° aliphatic alkyl or aryl radical.

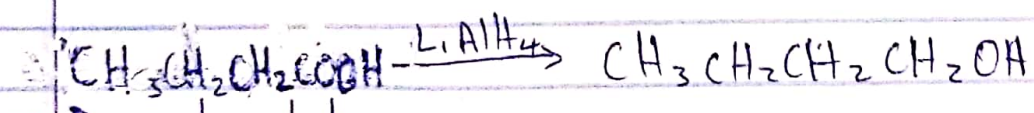
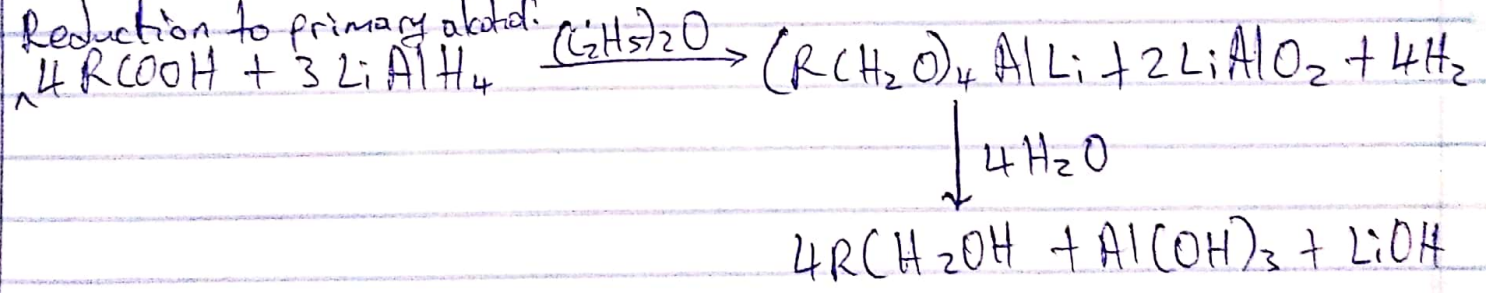
ii Hydrolysis of nitriles (cyanides) or esters.



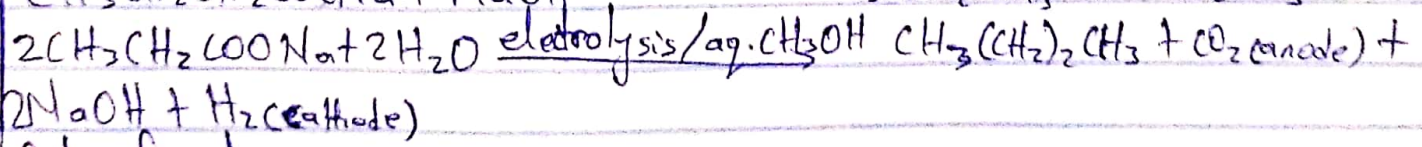
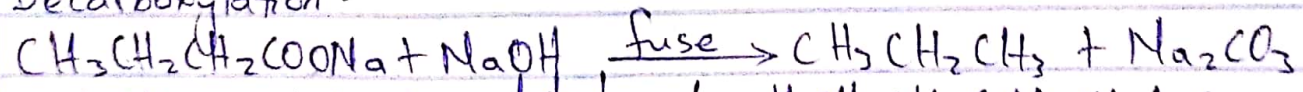
(R = alkyl or aryl radical)



5: Reduction to primary alcohol:



ii Decarboxylation.



iii Esterification

