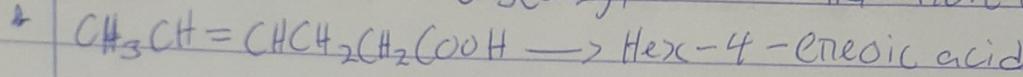
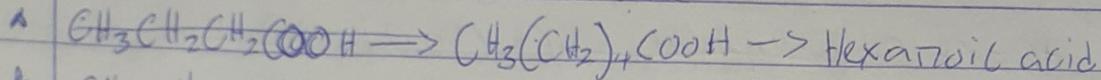
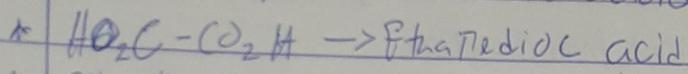
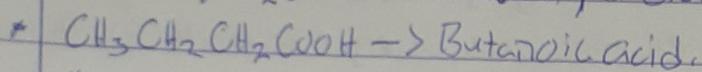
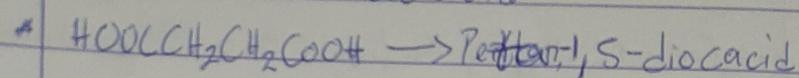
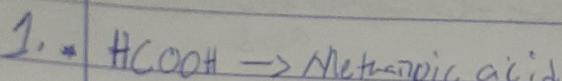


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Course: Chem 102

Matric Number: 19/Mthsu1/081



2. i) 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 acids (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

ii) Boiling Point

This increases with increasing relative molecular mass - Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counter parts of comparable relative molecular mass.

iii) Solubility

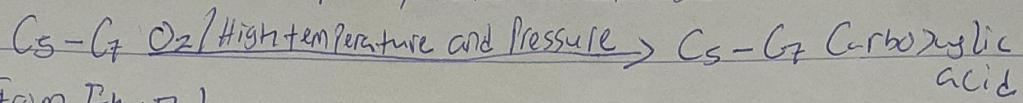
Lower molecular mass. Carboxylic acids with up to four carbon in their molecules are soluble in water; this is largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

3a From Petroleum

Liquid Phase air oxidation of C_5-C_7 alkanes, obtainable from Petroleum at right temperature and pressure will give C_5-C_7 carboxylic

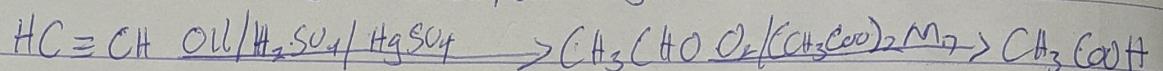
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acids with metaformic, propionic and butanoic acids as by products.



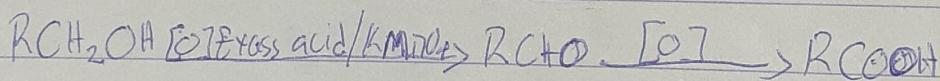
b. From Ethanol

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



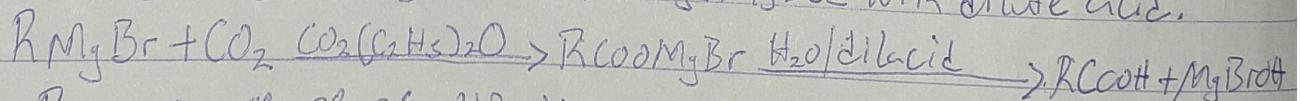
4a. Oxidation of Primary alcohols and aldehydes

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. $\text{U}_2\text{Cr}_2\text{O}_7$ or KMnO_4), in acidic solution.

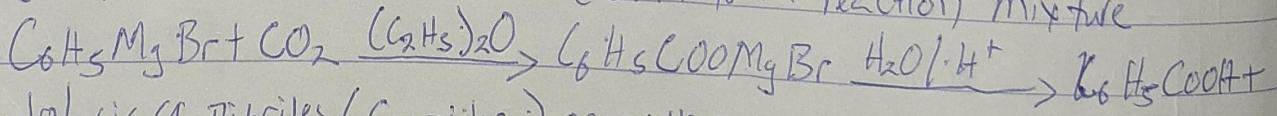


b. Carbonylation of Grignard reagent

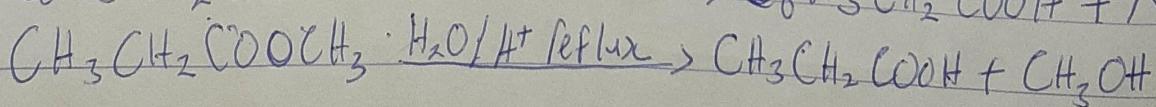
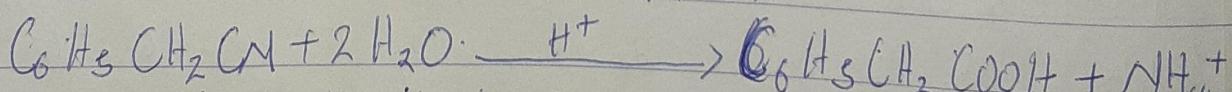
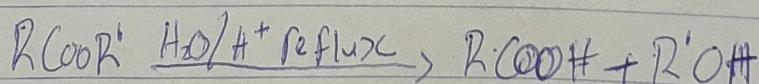
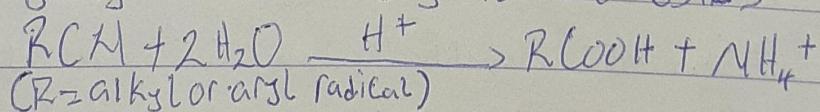
Aliphatic carboxylic acids are obtained by bubbling carbon (iv) oxide into the Grignard reagent and then hydrolyzed with dilute acid.



R may be 1° , 2° , 3° aliphatic alkyl or aryl radicals. In the preparation of benzoic acid, the reagent is added to solid carbon (iv) oxide (dry ice) which also serves as a coolant to the reaction mixture.

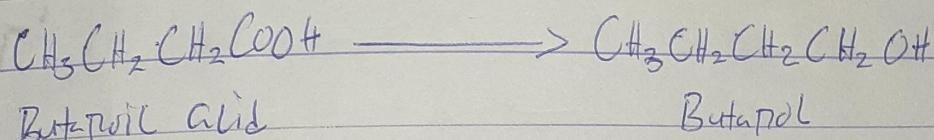
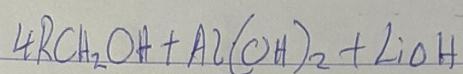
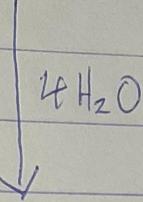
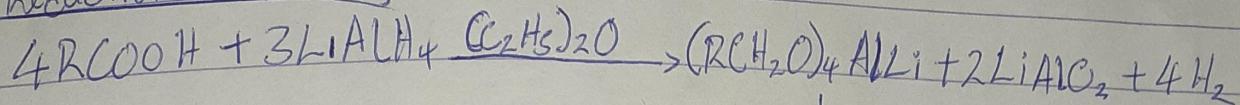


c. Hydrolysis of nitriles (cyanides) or esters



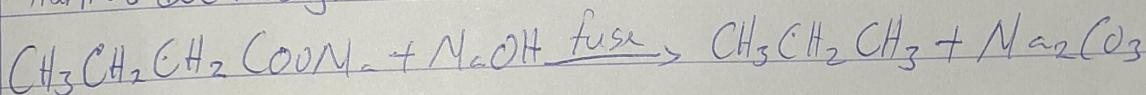
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5n Reduction to primary alcohols

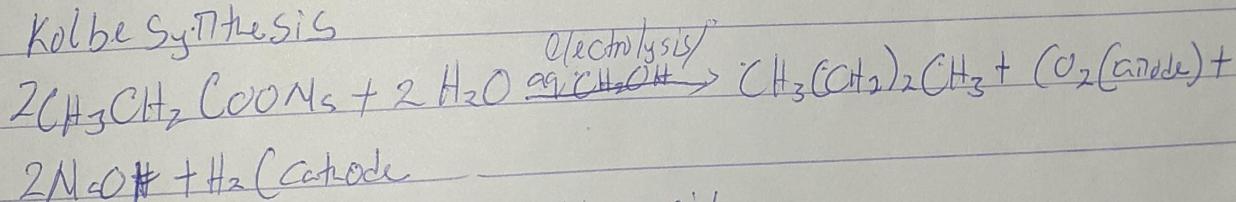


b) Decarbonylation of (Carbo)yllic acid

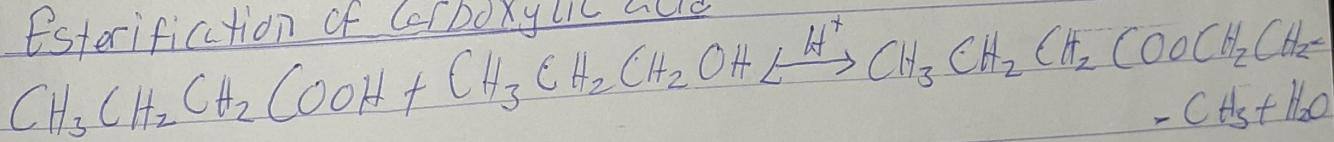
Thermal decarboxylation



Kolbe Synthesis



Esterification of Carboxylic acid



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