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MABs

MMS

19/11/201269

1 The IUPAC names of the following compounds

- HCOOH - Methanoic acid
- $\text{HOCH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid
- HOOC-COOH - Ethanedioic acid
- $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
- $(\text{H}_3\text{C})_2\text{CH}-\text{CH}(\text{CH}_3)\text{CH}_2\text{COOH}$

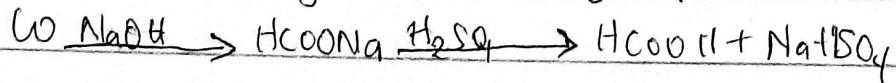
2 Brief discussion of physical properties of carboxylic acids under the following headings.

- Physical Appearance: All simple aliphatic carboxylic acids up to C_4 are liquids at room temp. Most other carboxylic acids are solid at room temp. although anhydrous carboxylic acid also known as glacial ethanoic acid freezes to an ice-like solid below room temp.
- Boiling point: It increases with increasing RMM. Aromatic carboxylic acid 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 RMM increases, because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvent.

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3 Two industrial preparation of carboxylic acids

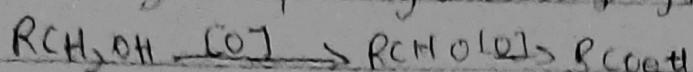
- From CO_2 : methanoic acid is manufactured by adding CO_2 under pressure to hot aqueous solution of NaOH . The free carboxylic acid is liberated by careful reaction with H_2SO_4 .



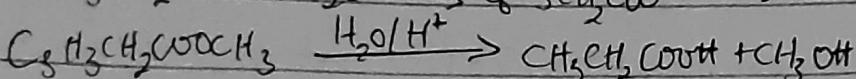
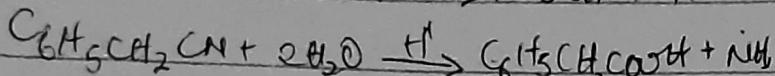
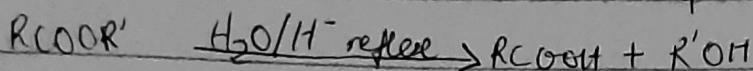
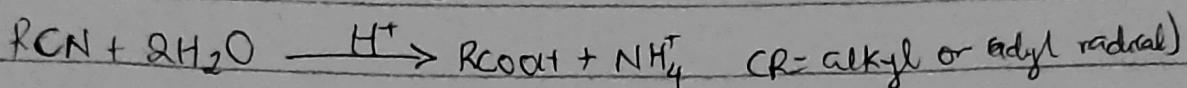
From petroleum: liquid phase air oxidation of C₆-C₈ alkanes, obtainable from petroleum at high temp. and pressure will give C₅-C₇ carboxylic acids with methanol, propanoic acid, butanoic acid, as by-products. C₆-C₈ O₂ (high temp & pressure) → C₅-C₇ carboxylic acids.

4. Synthesis & Preparation of carboxylic acid.

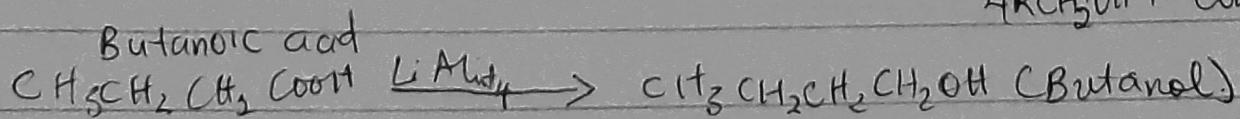
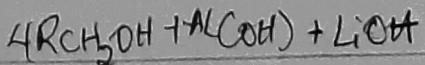
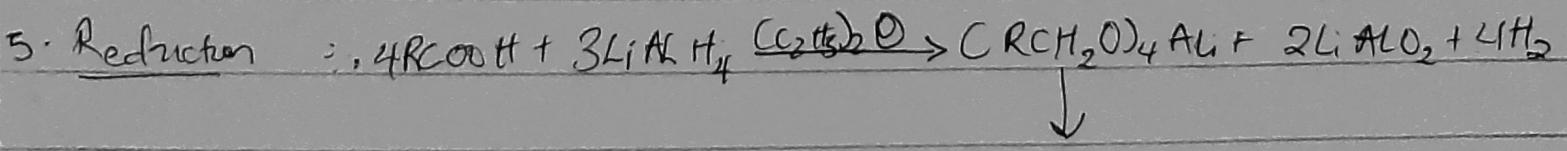
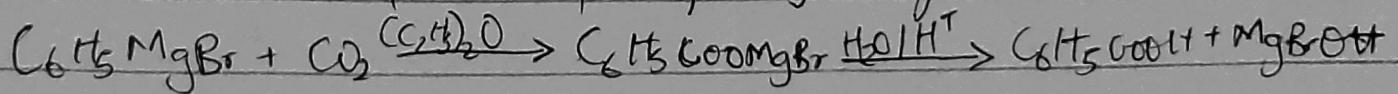
- Oxidation of primary alcohols and aldehydes: Oxidation of primary alcohol is a common method for synthesis of carboxylic acids using the metal oxidizing agents in acidic solution.



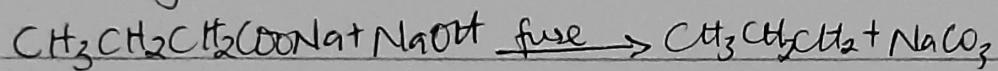
Hydrolysis of Nitriles, Carboxylides or Esters: All acid derivative can be hydrolyzed to yield carboxylic acids, the condition required range from mild to severe, depending on the compound involved. Nitriles undergo hydrolysis to form amides. The amides further undergo reaction in the presence of a catalyst which then to form carboxylic acids. The catalyst for this reaction is Ti⁴⁺ or OC⁻



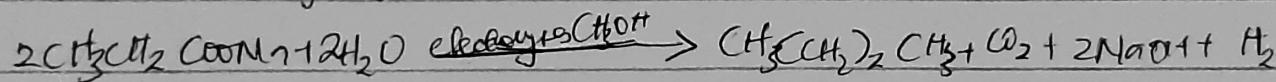
- Carboxylation of Grignard agent: The carboxylic acid formation is possible by Grignard reaction. The reaction of Grignard reagent with crushed dry ice or solid CO₂ leads to the formation of salts of carboxylic acids. Further, the acidification of the salts of a carboxylic acid mineral acids leads to the formation of corresponding carboxylic acids.



• Decarbonylation



Korbe synthesis



Esterification

