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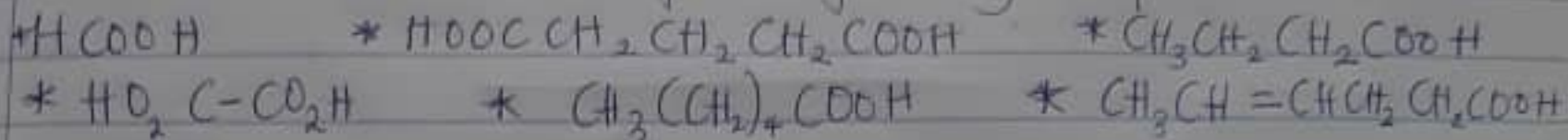
MATRIC NO: 19/MHS 01/226

COLLEGE: MEDICINE & HEALTH SCIENCES

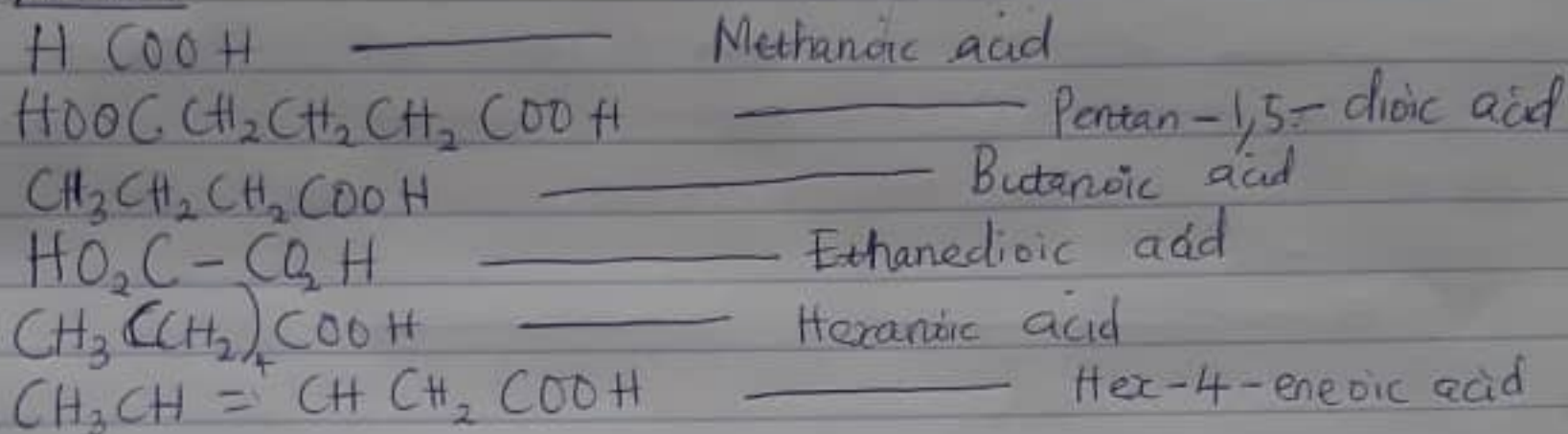
DEPARTMENT: MEDICINE AND SURGERY

CHM 102 ASSIGNMENT

1. Give the IUPAC names of the following compounds



ANSWER



2. Discuss briefly the physical properties of carboxylic acids under the following headings: (i) Physical appearance (ii) Boiling point (iii) Solubility

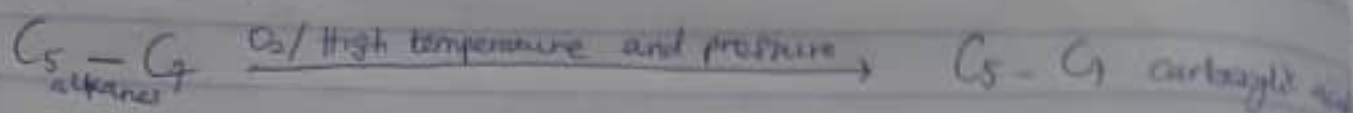
ANSWER:

- 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 acid (glacial ethanoic acid) freezes to an ice-like solid below the room temperature.
- ii. Boiling Point: Their boiling points increase with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have their melting points higher than their aliphatic counterparts of comparable relative molecular mass.
- iii. Solubility: Largely due to their inability to form hydrogen bonds with water molecules, lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water. The water solubility of the acids decreases as the relative molecular mass increases.

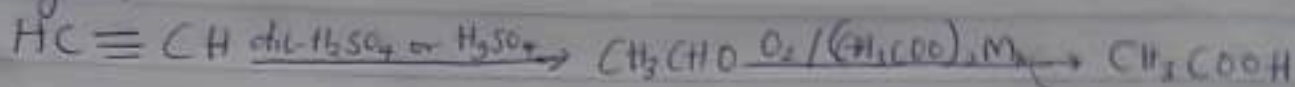
3. Write the industrial preparation of carboxylic acids.

ANSWER:

(i) From Petroleum: Liquid phase air oxidation of C₅-C₇ alkanes obtainable from petroleum at high temperature and pressure will give C₅-C₇ carboxylic acids with methanoic, propanoic and butanoic acids as by products



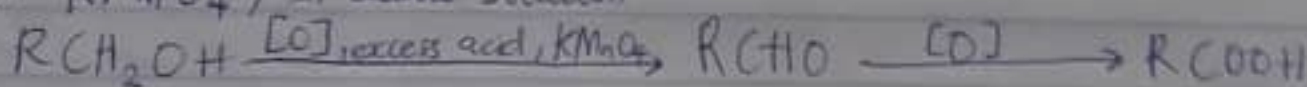
(ii) From ethanol: Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using manganese (II) ethanoate catalyst. Ethanal itself is obtained from ethylene



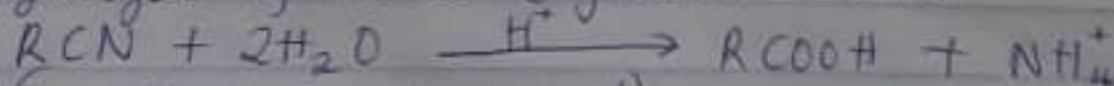
4. With equation and brief explanation, discuss the synthetic preparation of carboxylic acids

ANSWER:

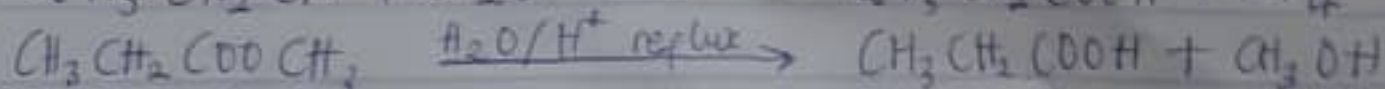
* Oxidation of primary alcohols and aldehydes: This method can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. K₂Cr₂O₇ or KMnO₄) in acidic solution



* Hydrolysis of nitriles (cyanides) or esters



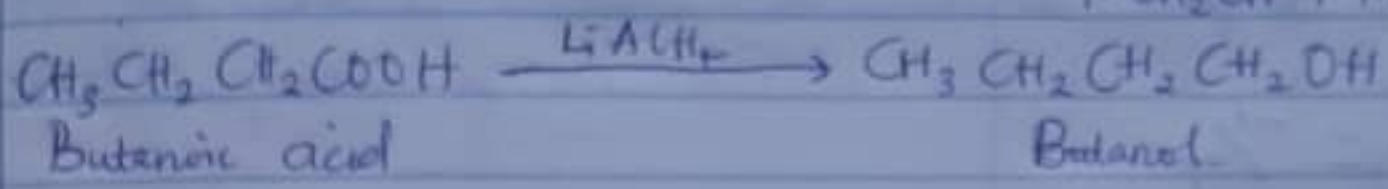
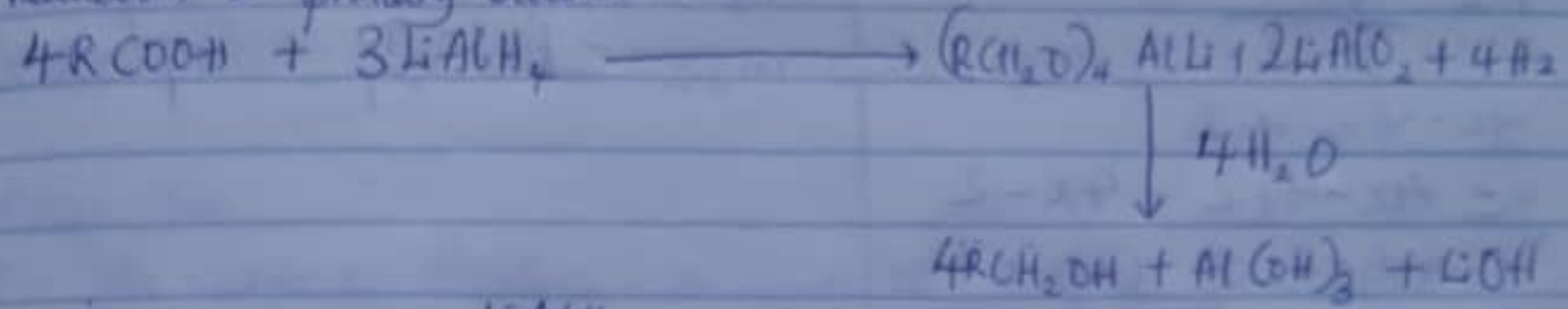
(R = Alkyl or aryl radical)



5 Write chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid.

ANSWER:

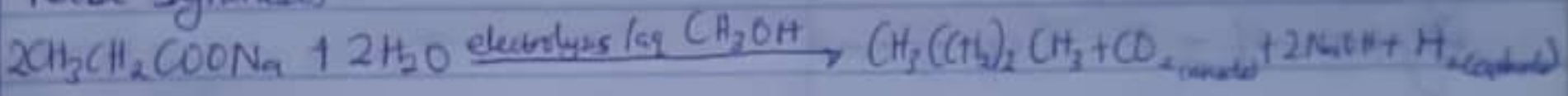
(i) Reduction to primary alcohol:



(ii) Decarboxylation:



Kolbe Synthesis



(iii) Esterification

