

ELEMSON BOMA JESSE

CHM 102

CARBOXYLIC ACID ASSIGNMENT

HUMAN ANATOMY

19/MHS03/003

1. Give the IUPAC names of the following compounds

- HCOOH - Methanoic acid
- $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid
- $\text{CH}_3\text{CH}_2\text{CHCOOH}$ - Butanoic acid
- $\text{HO}_2\text{C}-\text{CO}_2\text{H}$ - Ethanedioic acid
- $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ -Hexanoic acid
- $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-eneoic acid

2. Write two industrial preparations of carboxylic acids.

- From carbon(ii) oxide: Methanoic 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)

NaOH

H_2SO_4

$\text{CO} \xrightarrow{\text{NaOH}} \text{HCOONa} \xrightarrow{\text{H}_2\text{SO}_4} \text{HCOOH} + \text{NaHSO}_4$

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

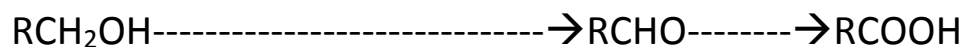
— $\text{Dil. H}_2\text{SO}_4/\text{HgSO}_4$

$\text{O}_2/(\text{CH}_3\text{COO})_2\text{Mn}$

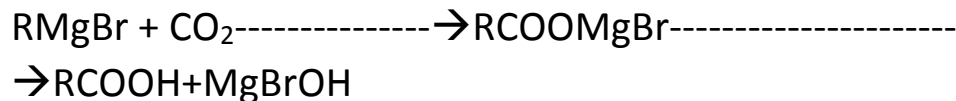


3. With equations and brief explanations discuss the synthetic preparation of carboxylic acid

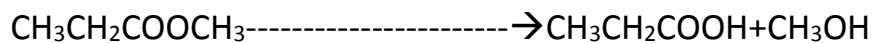
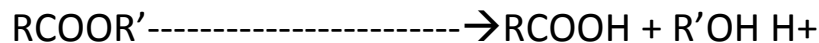
- Oxidation of primary alcohols and aldehydes: oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4) in acidic solution



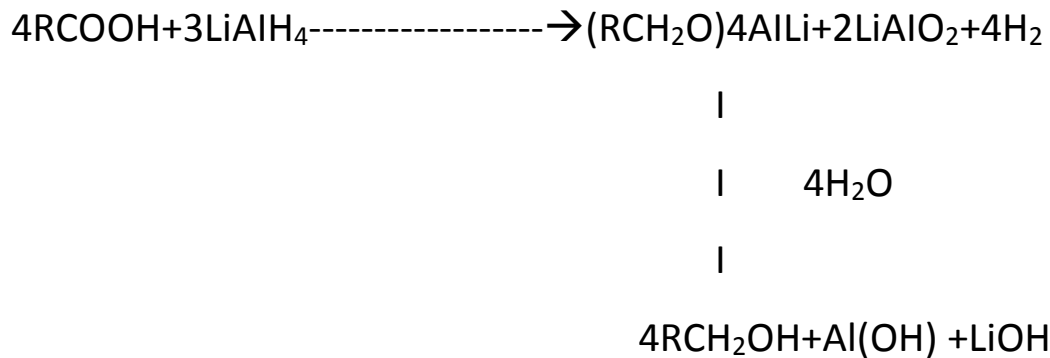
- Carbonation of Grignard reagent: Aliphatic carboxylic acids are obtained by bubbling carbon(IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.



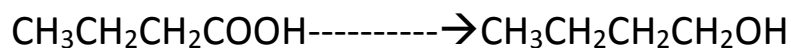
- Hydrolysis of nitriles(cyanides) or esters



4. With chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid.



LiAlH₄

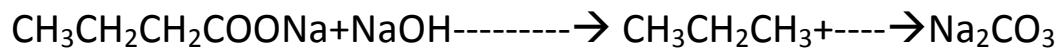


Butanoic acid

butanol

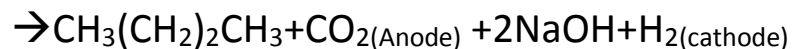
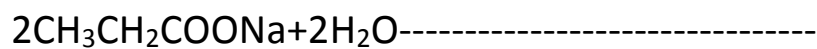
- Decarboxylation

fuse



Kolbe synthesis

Electrolysis/aq. CH₃OH



- Esterification

