

Assignment on Carboxylic Acids

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Assignment

1. Give the IUPAC name of the following
 - a. HCOOH - Methanoic acid
 - b. $\text{HOOCCH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid
 - c. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid
 - d. $\text{HO}_2\text{C}-\text{CO}_2\text{H}$ - Ethanedioic acid
 - e. $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
 - f. $\text{CH}_3\text{CH}=\text{CHCH}_2\text{COOH}$ - Hex-4-enoic acid.

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

Answers

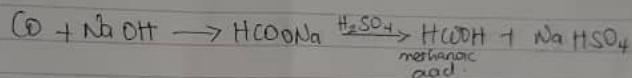
1. Physical appearance: All aliphatic carboxylic acids up to C_{10} are liquids at room temperature; most other carboxylic acids are solid at room temperature although anhydrous carboxylic liquid acid freezes to an ice-like solid below the room temperature.
- ii) Boiling point: It increases with relative 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 acids with up to four carbon atoms in their molecules are soluble in water. Their water solubility decreases as their relative molecular mass increases. All carboxylic acids are soluble in organic solvents.

3 Write two industrial preparations of carboxylic acids

a. From carbon (I) oxide

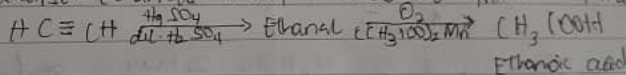
Methanoic acid is manufactured by adding CO under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reactions with H_2SO_4 .



b 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. Ethanol itself is obtained from ethyne.



4.

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

a Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. $H_2Cr_2O_7$ or $KMnO_4$) in acidic solution.

