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ADKOGT: Please forgive me for the delay in submission and kindly accept it. I don't mean to make excuses but due to the lockdown, I was unable to fix my phone which got spoilt and had just repaired it.

Ans

1. \rightarrow HCOOH - methanoic acid
2. \rightarrow $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - pentah-1,5-dioic acid
 \rightarrow $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid
 \rightarrow $\text{HO}_2\text{C}-\text{CO}_2\text{H}$ - Ethanedioic acid
 \rightarrow $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
 \rightarrow $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hexan-4-enoic acid.

2. Physical appearance: All simple aliphatic carboxylic acids up to C_6 are liquids in room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

\rightarrow Boiling point: Boiling point increases with increasing molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

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

3. Industrial preparation of carboxylic acids

\Rightarrow From carbon (I) oxide: Methanoic acid (formic acid) is manufactured by adding carbon (I) 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)

The C_2 units are formed by the reaction of CO_2 with H_2 in the presence of a catalyst. The reaction is exothermic and the catalyst is Co . The reaction is:

$$\text{CO}_2 + \text{H}_2 \rightarrow \text{C}_2\text{H}_4 + \text{O}_2$$

The C_2 units are used in the synthesis of many polymers. The reaction is:

$$n \text{C}_2\text{H}_4 \rightarrow \text{C}_n\text{H}_{2n}$$

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