Question 22 (6 marks)

A student prepared the compound methyl propanoate in a school laboratory.

(a) Give a common use for the class of compounds to which methyl propanoate belongs.

Esters are commonly used as artificial flavours and additives in food.

(b) In the preparation of this compound a few drops of concentrated sulfuric acid were added to the starting materials. The mixture was then refluxed for a period of time.

Why was it necessary to reflux the mixture?

Esterification sometimes occurs at low temperatures to stop the reactants escaping from high temperatures. However, this takes a very long time. Refluxing allows the reaction to occur at an increased temperature without the loss of reactants.

(c) Name the TWO reactants used in preparing the methyl propanoate and draw their structural formulae.

Methanol

\[ \text{CH}_3\text{OH} \]

Propanoic acid

\[ \text{CH}_3\text{CH}_2\text{COOH} \]

\[ \text{CH}_3\text{CH}_2\text{COOH} \]