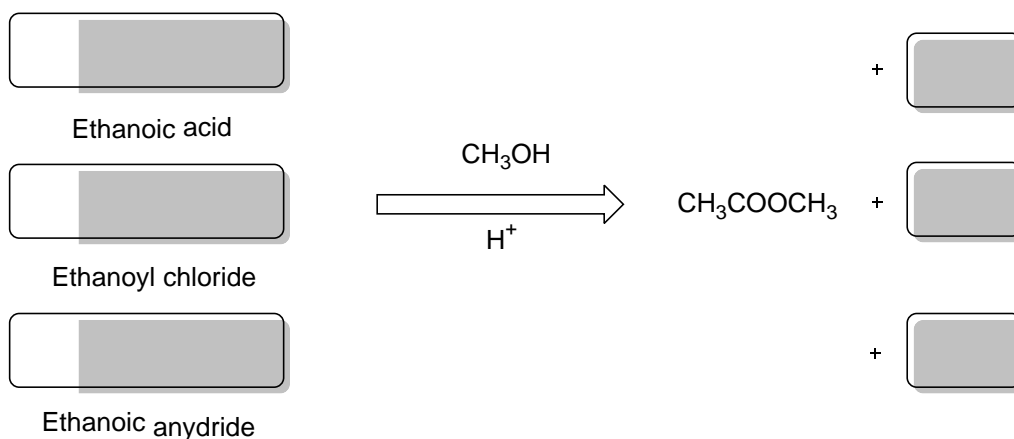




# STARTER FOR 10!!!

## 4.9 Acids, acid chlorides and acid anhydrides

Carboxylic acids, acid chlorides and acid anhydrides all carry out the same reactions. They are used by chemists under different circumstances depending in the desired yield, plant conditions and potential by products.



1. Complete the diagram to show the reactions of ethanoic acids, ethanoyl chloride and ethanoic anhydride with methanol and an acid catalyst.

Ethanoic anhydride is a colourless liquid (boiling point  $140^\circ\text{C}$ ) that smells strongly of vinegar. It is impossible to make an aqueous solution of ethanoic anhydride. In terms of reactivity in acylation it is more reactive than ethanoic acid but less reactive than ethanoyl chloride.

2. Explain why ethanoic anhydride smells strongly of vinegar. (1 mark)
3. Explain why it is impossible to prepare an aqueous solution of ethanoic anhydride? (1 mark)
4. Discuss why ethanoic anhydride may be used as a compromise reagent in an acylation reaction (2 marks)



# STARTER FOR 10!!!

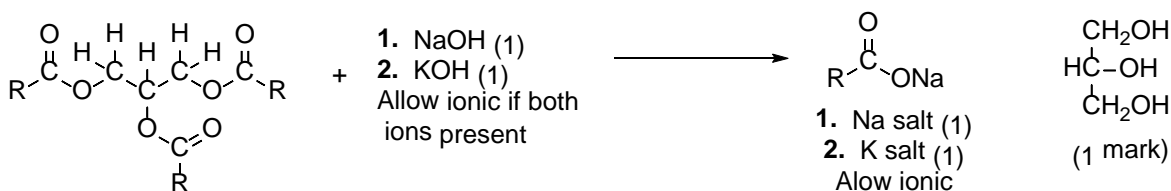
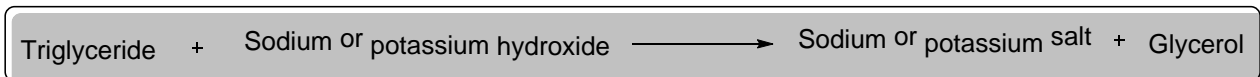
## Chapter 4: Answers

4. No hot water bath (1 mark)

The reaction would be more vigorous/the acid chloride is more reactive than the carboxylic acid (1 mark)

### 4.8 Saponification

1 and 2



(1 mark, generic triglyceride)

3 No excess alkali (1 mark)

Metal hydroxides/names hydroxide corrosive (1 mark)

4 The reaction with potassium hydroxide produces liquid soap (1 mark)

The potassium salt/potassium carboxylate is more soluble than the sodium salt/sodium carboxylate (comparison needed 1 mark)

### 4.9 Acids, acid chlorides and acid anhydrides

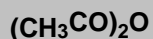
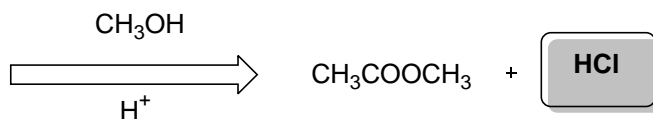
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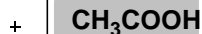
Ethanoic acid



Ethanoyl chloride



Ethanoic anhydride



(1 mark each box)

2 Ethanoic anhydride reacts with moisture in the air/in the nostrils to produce ethanoic acid (vinegar) (1 mark)

3 Ethanoic anhydride is hydrolysed by water (1 mark, QoL)



# STARTER FOR 10!!!

## Chapter 4: Answers

4 Reactivity is higher than ethanoic acid (1 mark) but by product is less toxic/corrosive than acetylation with ethanoyl chloride (1 mark)