Solutions

Each answer shows the steps, then the **result**.

2.1

- ethyl ethanoate

2.2

- hydrogen chloride, HCl

2.3

- methyl ethanoate, CH_3COOCH_3

2.4

- the lone pair on the phenol oxygen is delocalised into the ring, so phenol is a weak nucleophile; it needs the more reactive acyl chloride

3.1 B

- The reaction is fast and goes essentially to completion (not reversible)

3.2 C

- HCl fumes are released

3.3

(a)

- $CH_3CH_2COCl + CH_3CH_2CH_2OH \rightarrow CH_3CH_2COOCH_2CH_2CH_3 + HCl$

(b)

- propyl propanoate

3.4

- the acyl chloride reaction is fast and goes to completion; whereas esterification with a carboxylic acid is slow, reversible and needs an acid catalyst and heat

3.5

(a)

- $C_6H_5OH + CH_3COCl \rightarrow CH_3COOC_6H_5 + HCl$

(b)

- the base neutralises the HCl formed (or turns phenol into the more reactive phenoxide ion)

3.6

(a)

- steamy white fumes (of HCl) are given off, and the mixture warms up

(b)

- water would react with (hydrolyse) the ethanoyl chloride, giving ethanoic acid and HCl instead of the ester