

Exercise walk-through

32.1

Alcohols

A-Level Chemistry

What we will cover

- 1 Alcohols with acyl chlorides
- 2 Phenol & its reactions
- 3 Acidity of phenol
- 4 Milder conditions



phenol oxidises pink in air

Phenol and its reactions



Phenol has —OH joined to a benzene ring:

- $+ \text{NaOH} \rightarrow$ sodium phenoxide (alcohols don't react!)
- $+ \text{Na} \rightarrow \text{H}_2$
- nitration (dilute) & **bromination** at room temp
- $+ \text{diazonium} \rightarrow$ a coloured **azo dye**

Exam tips

- **Phenol** is a stronger acid than alcohols (its anion is stabilised by delocalisation) but weaker than carboxylic acids – it does **not** react with carbonates.
- Phenol decolourises **bromine water** and gives a white precipitate **without a catalyst** (the ring is activated by oxygen).
- **Acyl chlorides** react with alcohols/phenols to give esters readily (better than the reversible acid route); misty HCl fumes are the observation.

Exercises 2.1·3.1

2.1 Name the ester formed from ethanol and ethanoyl chloride.

[1]

2.2 Name the other product (the fumes) given off.

[1]

3.1 Compared with using ethanoic acid, making an ester from ethanoyl chloride is: [1]

☐

A slower and reversible

B faster and more complete

C only possible with a catalyst

D impossible at room temperature

Exercises 2.1·3.1

2.1 Name the ester formed from ethanol and ethanoyl chloride.

[1]

2.1

- ethyl ethanoate
-

2.2 Name the other product (the fumes) given off.

[1]

2.2

- hydrogen chloride, HCl
-

3.1 Compared with using ethanoic acid, making an ester from ethanoyl chloride is:

[1]

☐

A slower and reversible

B faster and more complete

C only possible with a catalyst

D impossible at room temperature

3.1 B

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

Exercise 3.2

3.2 Which product is given off as fumes when an alcohol reacts with an acyl chloride?[1]

☐

A H_2

B CO_2

C HCl

D H_2O

Exercise 3.2

3.2 Which product is given off as fumes when an alcohol reacts with an acyl chloride?[1]

☐

A H_2

B CO_2

C HCl

D H_2O

3.2 C

- HCl fumes are released

Exercise 3.3 (a)

3.3 Propan-1-ol reacts with propanoyl chloride.

(a) Write the equation for the reaction.

[2]

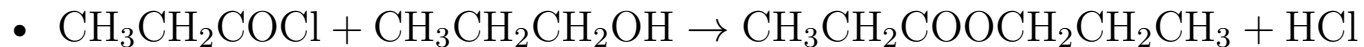
Exercise 3.3 (a)

3.3 Propan-1-ol reacts with propanoyl chloride.

(a) Write the equation for the reaction.

[2]

(a)



Exercise 3.3 (b)

3.3 Propan-1-ol reacts with propanoyl chloride.

(b) Name the ester produced.

[1]

Exercise 3.3 (b)

3.3 Propan-1-ol reacts with propanoyl chloride.

(b) Name the ester produced.

[1]

(b)

- propyl propanoate

Exercise 3.4

3.4 Explain why an acyl chloride is preferred over a carboxylic acid for making an ester in the lab. [2]

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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