

19.1 Primary amines

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS amine • primary amines • halogenoalkane
 • nucleophilic substitution • nitrile

Objective

Build the skills to answer exam questions on **primary amines** – making them from a **halogenoalkane** and ammonia.

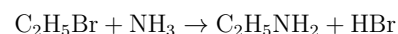
You must be able to:

- recall the reaction of a halogenoalkane with ammonia to make a primary amine
- describe it as a nucleophilic substitution

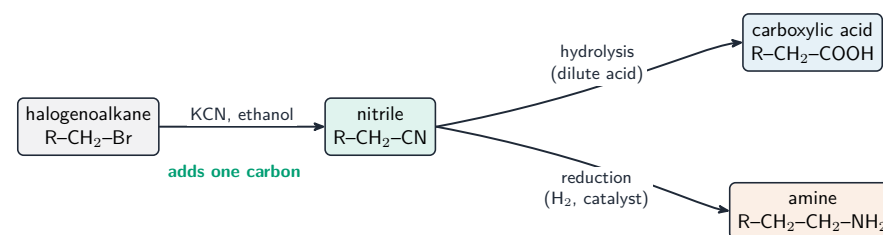
1 Key knowledge and worked examples

■ Making a primary amine

An **amine** has an -NH_2 group. Heat a halogenoalkane with **ammonia** in ethanol, under pressure:



A nucleophilic substitution: ammonia's lone pair attacks the $\delta +$ carbon, displacing the halogen



Amines via the nitrile route

Use an **excess** of ammonia, or the amine made reacts again with more halogenoalkane.

2 Practice

2.1 State the reagents and conditions to make ethylamine from bromoethane. [2]

2.2 Name the type of mechanism of this reaction. [1]

3 Exam-style questions

3.1 Why is an excess of ammonia used when making a primary amine? [1]

- ☐ **A** to speed up the reaction
☐ **B** to stop the amine reacting further with the halogenoalkane
☐ **C** to lower the temperature
☐ **D** to act as a catalyst

3.2 The species that attacks the halogenoalkane is: [1]

- ☐ **A** the lone pair on nitrogen of ammonia
☐ **B** the H^+ ion
☐ **C** a free radical
☐ **D** the bromide ion

3.3 (a) Write the equation for the reaction of bromoethane with ammonia. [1]

(b) Explain why this reaction is classed as nucleophilic substitution. [2]
