

19.1 Primary amines

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS amine 胺 • primary amines 伯胺 • halogenoalkane 卤代烷
• nucleophilic substitution 亲核取代 • nitrile 腈

Objective

Build the skills to answer exam questions on **primary amines** 伯胺 — making them from a **halogenoalkane** 卤代烷 and ammonia.

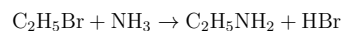
You must be able to:

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

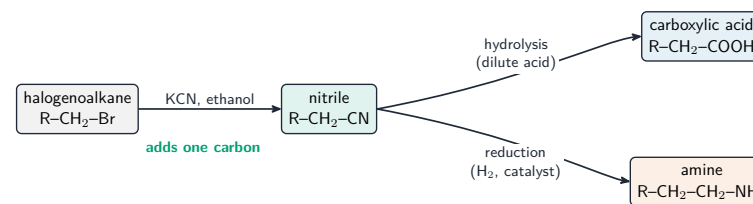
1 Worked examples

■ 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	B
C	D

- 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	B
C	D

- 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]
