

8.1 Introduction to Acids and Bases

Name: _____ Class: _____ Date: _____

Total: 10 marks**KEY WORDS** 酸 酸 • base 碱 • weak 弱 • weak acid 弱酸 • strong 强

Objective

Build the skills to answer exam questions on **acids and bases** — the basic definitions.**You must be able to:**

- use the **Brønsted-Lowry** definitions (proton donor / acceptor)
- distinguish **strong** 强 from **weak** 弱 acids and bases
- write the ionization of an acid in water

1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

■ Brønsted-Lowry

An **acid** donates H^+ ; a **base** accepts H^+ . In water an acid produces H_3O^+ (hydronium); a base produces OH^- .

■ Strong vs weak

- A **strong** acid/base ionizes **completely** (HCl , NaOH) — a single arrow.
- A **weak** acid/base ionizes **partially** (CH_3COOH , NH_3) — an equilibrium arrow.

■ A worked ionization

Strong: $\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$ (complete). Weak: $\text{CH}_3\text{COOH} \rightleftharpoons \text{H}^+ + \text{CH}_3\text{COO}^-$ (partial, so a small K_a).

■ Recognising strong acids

The common strong acids are HCl , HBr , HI , HNO_3 , H_2SO_4 , HClO_4 . Assume other acids are weak.

2 Practice

Now apply the methods above.

2.1 Define a Brønsted-Lowry base. [1]**2.2** Write the ionization of the strong acid HNO_3 in water. [1]**2.3** Why is a weak acid written with an equilibrium arrow? [1]

3 Exam-style questions

3.1 A strong acid in water [1]

A	B
C	D

A ionizes completely**B** ionizes partially**C** does not ionize**D** forms OH^- **3.2** Compare HCl and CH_3COOH (acetic acid) at the same concentration.

(a) Which ionizes more? [1]

(b) Which has the higher $[\text{H}^+]$? Explain. [2]
3.3 Write the equilibrium for the weak base ammonia NH_3 reacting with water. [3]