

How acids, bases and salts behave

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test answers (mark scheme)

Model answers and mark schemes for the test. Credit equivalent wording, apply error carried forward in calculations, and award marks for each distinct chemical idea.

Level: Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** GCSE C4, IGCSE 7

Question 1 Acid, base or alkali (2 marks)

- a. An alkali is a **base that dissolves in water**, forming OH^- ions.
- b. **pH 7**; the **H^+ (hydrogen) ion**.

Marking: 1 mark for each part; both pieces of information are needed in part b.

Question 2 Carbonate and acid (3 marks)

- a. Sodium carbonate + nitric acid → sodium nitrate + water + carbon dioxide.
- b. **$\text{Na}_2\text{CO}_3 + 2\text{HNO}_3 \rightarrow 2\text{NaNO}_3 + \text{H}_2\text{O} + \text{CO}_2$** .

Marking: 1 mark for the word equation; 1 mark for correct formulae; 1 mark for balancing.

Question 3 Neutralisation ions (2 marks)

- a. **$\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$** .
- b. **K^+ and NO_3^-** .

Marking: 1 mark each; state symbols are not required for the mark.

Question 4 Copper chloride crystals (3 marks)

- a. The fizzing **stops** and some solid carbonate remains undissolved.
- b. To remove the **excess copper carbonate** that did not react.
- c. Heating to dryness would destroy the crystals and may decompose the salt; heating only until crystals appear on a glass rod and then cooling gives **pure crystals**.

Marking: 1 mark each.

Question 5 Strong and weak acids (3 marks)

- a. Hydrochloric acid is a **strong acid** that ionises completely, whereas ethanoic acid ionises only partly, so hydrochloric acid has a higher H^+ concentration and therefore a lower pH.
- b. The reaction is **reversible**.

Marking: 1 mark for complete versus partial ionisation; 1 mark linking H^+ concentration to pH; 1 mark for reversible.

Question 6 pH and hydrogen ions (2 marks)

- a. Two units apart, so $10 \times 10 =$ **100 times**.
- b. **pH 3**.

Marking: 1 mark each.

Question 7 Reading the pH scale (2 marks)

- a. An ant sting is acidic, so a mild alkali is best: **soap (pH 10)** or seawater at pH 8.1. Oven cleaner (pH 13) is too corrosive.
- b. $6.5 - 2.5 = 4$ units, so **$10^4 = 10\ 000$ times**.

Marking: Accept seawater or soap with a reason; 1 mark for the factor.

Question 8 Antacid tablet (3 marks)

- a. $M = 58$; $n = 2.9 \div 58 =$ **0.050 mol**.
- b. Ratio 1 : 2, so $n(HCl) =$ **0.10 mol**.
- c. $M(MgCl_2) = 95$; $m = 0.050 \times 95 =$ **4.75 g**.

Marking: 1 mark each; allow error carried forward.