

Metals by reactivity and how we extract them

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, allow 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

Question 1 Order of reactivity (2 marks)

Sodium, magnesium, iron, copper.

Marking: 2 marks for all four correct; 1 mark if only one pair is swapped.

Question 2 Zinc and copper sulfate (3 marks)

- The blue colour **fades** and a brown solid forms on the zinc.
- $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$** .
- Copper is **less reactive** than zinc, so it cannot displace it.

Marking: 1 mark each; allow state symbols.

Question 3 Redox in the furnace (3 marks)

- Fe_2O_3** is reduced because it loses oxygen.
- CO** is oxidised because it gains oxygen.
- The reducing agent is **carbon monoxide**.

Marking: 1 mark each.

Question 4 Methods of extraction (2 marks)

- Aluminium is **more reactive than carbon**, so carbon cannot remove its oxygen.
- Gold is **very unreactive**, so it does not form compounds easily.

Marking: 1 mark each.

Question 5 Iron from iron oxide (3 marks)

- $2 \times 56 + 3 \times 16 = \mathbf{160 \text{ g/mol}}$.
- $4800 \div 160 = \mathbf{30.0 \text{ mol}}$.
- $n(\text{Fe}) = 60.0 \text{ mol}$; $m = 60.0 \times 56 = 3360 \text{ g} = \mathbf{3.36 \text{ kg}}$.

Marking: 1 mark each; allow error carried forward.

Question 6 Interpreting temperature rises (3 marks)

- a. **Metal A** (largest rise).
- b. **Metal D** (no reaction).
- c. E lies **between C (20 °C) and B (14 °C)**: $A > C > E > B > D$.

Marking: 1 mark each.

Question 7 Galvanising (2 marks)

- a. Zinc is **more reactive than iron**, so it loses electrons and corrodes in preference to the iron. This is called sacrificial protection and it works even where the iron is exposed.

Marking: 1 mark for zinc more reactive; 1 mark for corroding instead of iron.

Question 8 Recycling aluminium (2 marks)

It uses far less energy (no electrolysis of molten oxide) and **it saves ore and reduces mining waste** and landfill.

Marking: 1 mark for each valid advantage.