IGCSE CHEMISTRY • EXERCISE SHEET

9.4 Reactivity series

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

Objective

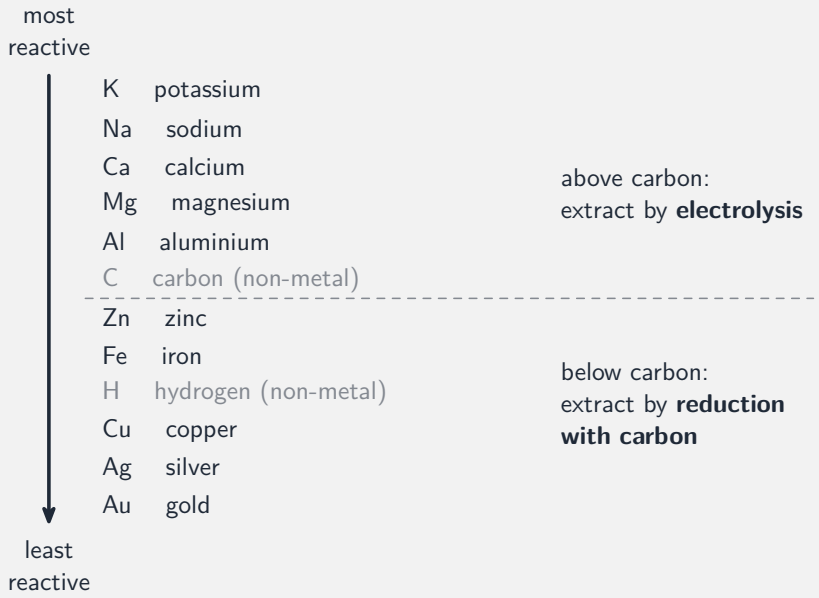
Build the skills to answer exam questions on the **reactivity series** 金属活动性顺序—the order, reactions with water/acid, **displacement** 置换, and the special case of aluminium.

You must be able to:

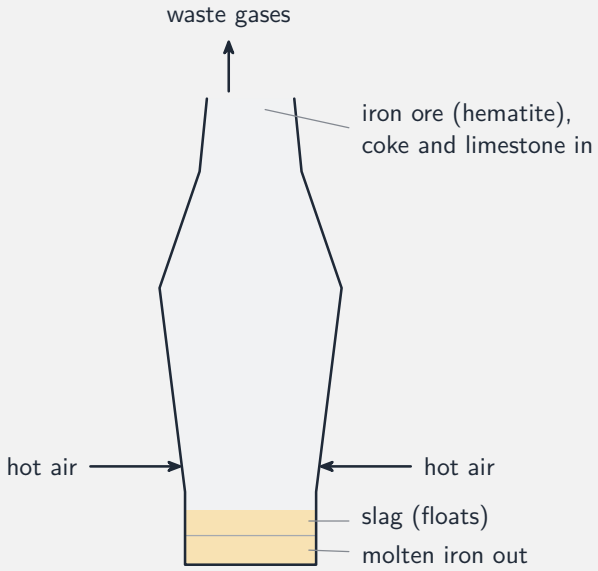
- recall the reactivity series and use it to predict reactions
- predict displacement reactions of metals
- explain why aluminium seems less reactive than expected

1 Worked examples

Using the series



A more reactive metal displaces a less reactive one from solution



$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
(carbon monoxide reduces the ore)

Reactivity decides how a metal is extracted

- K, Na, Ca react with cold water; Mg with steam; Mg/Zn/Fe with dilute acid; Cu/Ag/Au do not.
- **displacement:** zinc displaces copper from copper(II) sulfate (zinc is more reactive).
- **aluminium:** a strong oxide layer makes it seem less reactive.

2 Practice

2.1 State which is more reactive: zinc or copper. [1]

2.2 Name a metal that reacts with cold water. [1]

3 Exam-style questions

3.1 Which metal will **not** react with dilute hydrochloric acid? [1]

- **A** magnesium
- **B** zinc
- **C** iron

- **D** copper

3.2 A piece of iron is placed in copper(II) sulfate solution.

(a) State what you would observe. [2]

(b) Explain why this reaction happens. [1]

3.3 Aluminium is high in the reactivity series but appears unreactive. Explain why. [2]

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4 Go further

You are now ready for the real exam questions on this subtopic. Open the **9.4 Reactivity series** past-paper sheet in the Library, or try these in **Practice mode**:

- 0620/21 N25 —Q26 (reactivity series)
- 0620/21 N25 —Q27 (displacement)

Solutions

2.1 zinc.

2.2 potassium, sodium or calcium.

3.1 D. Copper is below hydrogen, so it does not react with dilute acid.

3.2 (a) the iron becomes coated with (pink/brown) copper; the blue solution fades.
(b) iron is more reactive than copper, so it displaces copper from the solution.

3.3 aluminium is covered by a thin, strong oxide layer; this stops other substances reaching the metal underneath, so it seems unreactive.