

Exercise walk-through

2.2

Reactivity, rusting and metals

Pearson Edexcel · International GCSE · Chemistry

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The method

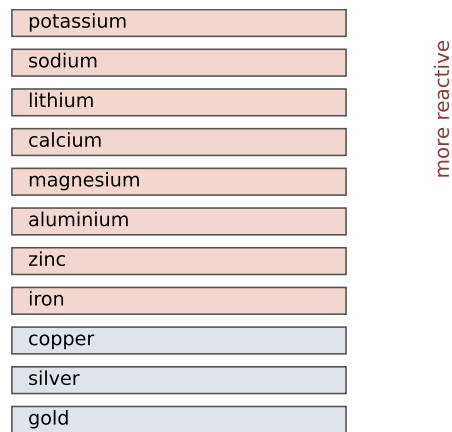
Method — The ladder

$K > Na > Li > Ca > Mg > Al > \textbf{(C)} > Zn > Fe > \textbf{(H)} > Cu > Ag > Au.$

Metals above hydrogen – down to iron – fizz with dilute acids giving H_2 . A metal displaces a less reactive metal's ions from solution or its oxide.

Method — The ladder

K Na Li Ca Mg Al (C) Zn Fe (H) Cu Ag Au.



carbon sits between aluminium and zinc; hydrogen between iron and copper

The reactivity series ladder with carbon and hydrogen between the metals.

Exercises 2.1·2.3

2.1 State the order of reactivity of potassium, zinc, copper and gold. [2]

2.2 Name the two substances iron needs to rust, and one barrier prevention. [3]

2.3 Zinc is added to copper(II) sulfate solution. Write the ionic equation and state which ion is reduced. [3]

Exercises 2.1·2.3

2.1 State the order of reactivity of potassium, zinc, copper and gold. [2]

2.1 potassium > zinc > copper > gold.

2.2 Name the two substances iron needs to rust, and one barrier prevention. [3]

2.2 Oxygen and water; any barrier: paint, oil/grease, plastic coating, galvanising.

2.3 Zinc is added to copper(II) sulfate solution. Write the ionic equation and state which ion is reduced. [3]

2.3 $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$; Cu^{2+} is reduced – it gains two electrons.

Exercises 2.4·3.1

2.4 (C) Why is sacrificial zinc bolted to a ship's steel hull? [2]

2.5 (C) State why stainless steel resists rusting, and one use. [2]

3.1 Explain, using the reactivity series, why magnesium reacts with dilute hydrochloric acid but copper does not, and name the gas formed. [3]

Exercises 2.4·3.1

2.4 (C) Why is sacrificial zinc bolted to a ship's steel hull? [2]

2.4 (C) Zinc is more reactive than iron, so it corrodes preferentially, protecting the steel even where the coat is scratched.

2.5 (C) State why stainless steel resists rusting, and one use. [2]

2.5 (C) It contains chromium which forms an oxide layer resisting corrosion; cutlery/surgical instruments/sinks.

3.1 Explain, using the reactivity series, why magnesium reacts with dilute hydrochloric acid but copper does not, and name the gas formed. [3]

3.1 Magnesium lies above hydrogen in the series, so it displaces hydrogen from the acid; copper lies below hydrogen and cannot. The gas formed is hydrogen.

Exercises 3.2·3.3

3.2 (C) Aluminium is above carbon in the reactivity series. Explain why this decides its extraction method, naming the process and the molten substance electrolysed. [3]

3.3 (C) Explain why a pure metal is soft and malleable but an alloy is harder, in terms of particle arrangement. [3]

Exercises 3.2·3.3

3.2 (C) Aluminium is above carbon in the reactivity series. Explain why this decides its extraction method, naming the process and the molten substance electrolysed. [3]

3.2 (C) Carbon cannot reduce aluminium's oxide because aluminium is more reactive than carbon; so the oxide must be split by electrolysis ; molten aluminium oxide/alumina (often in molten cryolite) is electrolysed.

3.3 (C) Explain why a pure metal is soft and malleable but an alloy is harder, in terms of particle arrangement. [3]

3.3 (C) In a pure metal the identical ions sit in regular layers that slide over each other when a force is applied – soft and malleable; in an alloy the different-sized atoms distort the layers, so they cannot slide – harder.