

Reactivity Series Displacement

GCSE Chemistry · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Metal X reacts slowly with cold water. Metal Y does not react with water but fizzes with dilute acid. Metal Z does not react with dilute acid. Put them in order of reactivity. (2 marks)

Step 1 · Most reactive

X reacts with cold water.

Step 2 · Then

Y reacts with acid but not water.

Step 3 · Least

Z does not react with acid, so it is below hydrogen.

Answer: $X > Y > Z$

Check: e.g. X = calcium, Y = zinc, Z = copper.

2. Now try one with the steps

Zinc is added to blue copper(II) sulfate solution. Describe and explain what you would see. (3 marks)

Step 1 · Observation 1

Step 2 · Observation 2

Step 3 · Explanation

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. State which is more reactive, magnesium or copper. [1]

2. Name the products when magnesium reacts with hydrochloric acid. [2]

3. Explain why copper does not react with dilute hydrochloric acid. [1]

4. Predict whether copper reacts with zinc sulfate solution. Give a reason. [2]

5. Write a word equation for iron reacting with copper(II) sulfate solution. [1]

6. Explain what makes one metal more reactive than another, in terms of ions. [1]

7. Metal A fizzes slowly with cold water; metal B reacts only with acid; metal C reacts with neither. List the metals from most to least reactive. [2]

8. Write a balanced symbol equation for magnesium reacting with copper(II) sulfate. [1]

9. Describe two observations when iron nails are left in copper(II) sulfate solution. [2]

10. Write the ionic equation for zinc reacting with copper(II) ions. [1]

11. Write the half equation for zinc atoms forming zinc ions. [1]

12. In the reaction $\text{Mg} + \text{Cu}^{2+} \rightarrow \text{Mg}^{2+} + \text{Cu}$, identify the species that is oxidised and explain your answer. [2]

13. Calculate the mass of copper, in g, formed when 5.6 g of iron reacts with excess copper(II) sulfate. [3]
 $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$ (Fe = 56, Cu = 63.5)

14. Explain why the sulfate ions are left out of the ionic equation for a displacement reaction. [1]

4. Before you hand it in

"Copper displaces zinc from zinc sulfate."

Check the order: the solid metal must be ABOVE the metal in the salt.

Writing electrons on the wrong side of a half equation

Oxidation: $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$. Reduction: $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$.

"Copper sulfate turns colourless because the copper is used up."

The blue colour is due to $\text{Cu}^{2+}(\text{aq})$ ions; they become copper atoms.