

Displacement reactions of metals

Aims

A metal can displace a less reactive metal from solutions of its salts.

You see the less reactive metal coating the more reactive metal when this happens.

You are going to investigate the reactions of magnesium, zinc, iron and copper with solutions of their salts. You will then use your results to work out a reactivity series.



Apparatus

Eye protection

Spotting tile

Dropping pipette

Pieces of magnesium, zinc, iron, copper

Magnesium sulfate solution

Zinc sulfate solution ⚠

Iron(II) sulfate solution ⚠

Copper(II) sulfate solution ⚠

Method

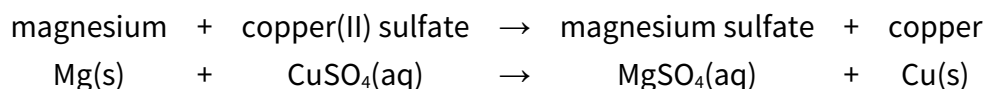
- Put a few drops of copper(II) sulfate solution into four wells in the spotting tile.
- Put a strip of magnesium under the surface of the liquid.
Record your observations over a minute. If you cannot see a change, write **No visible change**.
- Repeat step 2 for each of the other three metals.
- Repeat steps 1 to 3, but replace the copper(II) sulfate solution with each of the other three solutions in turn.

Results

Metal	Aqueous solution				Number of reactions
	Magnesium sulfate	Zinc sulfate	Iron(II) sulfate	Copper(II) sulfate	
Magnesium					
Zinc					
Iron					
Copper					

Analysis

- For each metal, count and record the number of times it was coated by a metal from a solution.
- Put the metals in order from the most reactive to the least reactive. This is a **reactivity series**.
Explain why you put the metals in this order.
- Write word equations and symbol equations for each of the reactions seen. For example:



Evaluation

Describe how you could you improve or extend your investigation. Explain your answer.

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Technician's notes

Per pair of students

4 × pieces (about 40 mm × 5 mm) of:

- copper
- iron (or small steel nails instead)
- magnesium
- zinc

1 × spotting tile (spot plate)

4 × dropping pipettes

1 × plastic tweezers (optional)

Access to:

- 0.1 mol/dm³ copper(II) sulfate ⚠
- 0.1 mol/dm³ zinc sulfate ⚠
- 0.2 mol/dm³ acidified iron(II) sulfate(VI) ⚠
- 0.2 mol/dm³ magnesium sulfate

Allow about 20 cm³ per pair of students.