

# WJEC (Wales) Chemistry GCSE

## Specified Practical 2.3a

Determination of relative reactivities of metals  
through displacement reactions

[Methods are adapted from the [Royal Society of Chemistry](#)]

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## Displacement Reactions

Some metals are **more reactive** than others. Strips of metal can be added to a solution of a metal compound to analyse reactivity. More reactive metals **displace** (remove and replace) **less reactive** metals from a compound.

### Aim

To investigate **metallic displacement** reactions in order to derive the **relative reactivities** of the metals.

### Equipment

- 16-hole spotting tile
- Dropping pipette
- Beaker
- Marker pens
- 1 cm strip lengths of:
  - Copper foil
  - Lead foil
  - Magnesium ribbon
  - Zinc foil
- 0.1 M solutions of:
  - Copper(II) sulfate
  - Lead(II) nitrate
  - Magnesium sulfate
  - Zinc sulfate

### Method

1. Using a dropping pipette, put a few drops of zinc sulfate solution in four of the depressions in the **spotting tile**. Ensure you label this row with the solution name.
2. **Repeat** for each metal solution, rinsing the pipette between each one.
3. Place each **strip of metal** into the depressions until the spotting tile appears as in the diagram.
4. Observe for **5 minutes** and write down any observations of reactions.

### Safety Precautions

- **Lead(II) nitrate** is **toxic** and dangerous for the environment. It is harmful if ingested so any skin which comes into contact with it should be washed immediately.
- **Copper(II) sulfate**, **zinc sulfate** and **magnesium sulfate** are all **irritants**. Safety goggles must be worn at all times and any skin which comes into contact with them must be washed immediately. Clean up any spillages immediately.



## Results

- **Displacement** will take place if the metal added to the metal salt solution is more reactive than the metal in the metal salt solution.
- **Magnesium** will displace copper(II) sulfate, lead(II) sulfate and zinc sulfate.
- **Zinc** will displace lead(II) sulfate and copper(II) sulfate.
- **Lead** will displace copper(II) sulfate.
- **Copper** will not displace any of the metal salts.

## Diagram

	Zn	Mg	Cu	Pb
Zinc sulfate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Magnesium sulfate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Copper(II) sulfate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lead(II) Nitrate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

