

# OCR (B) Chemistry GCSE

## PAG 1: Reactivity Trends (chemistry only)

Notes



## Reactivity of Metals

### Aim

To investigate and confirm the order of reactivity of a series of metals, and the magnetic nature of iron after displacement.

### Equipment list

- Pipette
- Laminated copy of figure 1
- Wooden splint
- Magnet (wrapped in clingfilm)

### Chemicals required

- Iron(II) sulfate solution
- Copper(II) sulfate solution
- Lead nitrate solution
- Magnesium sulfate solution
- Magnesium ribbon
- Lead foil
- Copper foil
- Iron nails

### Method

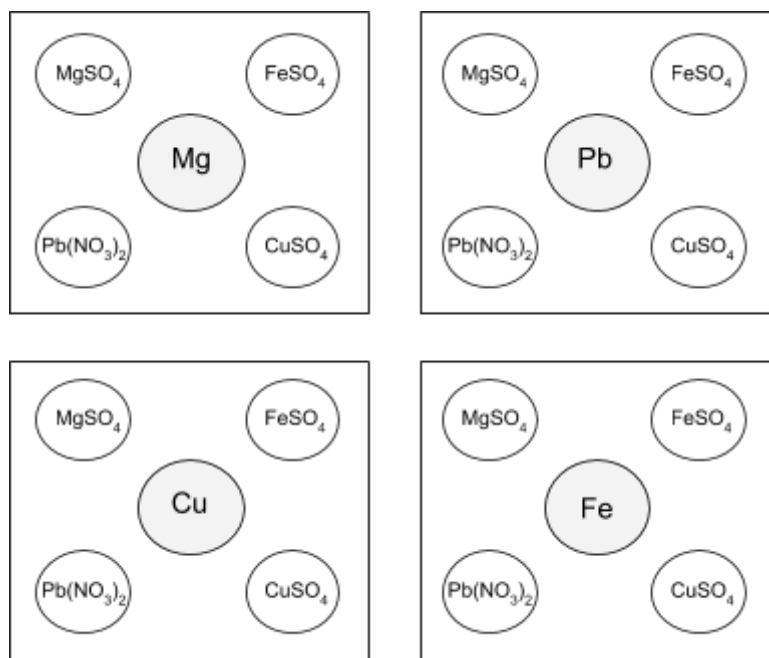
1. Take the laminated copy of figure 1 and place it flat on the workbench. If you do not have a laminated copy, place a paper copy in a plastic wallet.
2. Using a dropping pipette, place 5 drops of the appropriate solution in each of the labelled white circles on the laminated diagram.
3. Start in the top left box on figure 1. Place 4 pieces of magnesium in the grey Mg circle on the laminated diagram.
4. Use a wooden splint to carefully move a piece of magnesium into each of the four solutions. Each solution should contain one piece of magnesium.
5. Observe each drop carefully, and record all observations.
6. Repeat steps 4-5 for iron, lead and copper.
7. Wrap the magnet in cling film. Hold the magnet close to the iron sulfate drops containing the different metals. Record any observations.

### Key points

- If there is no change observed when the metal is added to the solution, then the solid metal is less reactive than the metal in the aqueous ionic compound.
- If the metal formed in the drop of iron sulfate moves when a magnet is held near it, iron has been displaced from the iron sulfate solution.



## Diagram



**Figure 1 Reaction Setup**

## Safety precautions

- Magnesium is very flammable so ensure there are no open flames in the laboratory.
- Eye protection must be worn at all times.
- Wash hands after coming into contact with any of the chemical substances used.
- Wash hands after touching the metal pieces, especially lead foil.
- Dispose of each mixture by passing it through a sieve into a waste beaker.

## Analysis of results

Observations:

	Magnesium (Mg)	Lead (Pb)	Copper (Cu)	Iron (Fe)
MgSO <sub>4</sub>	No change observed	No change observed	No change observed	No change observed
CuSO <sub>4</sub>	Small black solid pieces on metal Fastest rate	Lead pieces got darker	No change observed	Dark grey coating on the nail Fastest rate
FeSO <sub>4</sub>	Black solid coats metal Magnet: Moved Slowest rate	No change observed	No change observed	No change observed
Pb(NO <sub>3</sub> ) <sub>2</sub>	'Furry' black solid formed on metal Medium rate	No change observed	No change observed	Grey coating on the nail Slowest rate



- The observation results show that the order of reactivity is:  
**Cu < Pb < Fe < Mg**
- No reactions took place with copper. This observation shows copper was not able to displace any of the metals.
- Lead displaced copper, but not iron or magnesium.
- Iron displaced copper and lead, but not magnesium.
- Magnesium displaced copper quickly and lead and iron slowly.
- Particles of iron cover the solid magnesium when it is reacted with iron sulfate solution.

