# OCR (A) 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

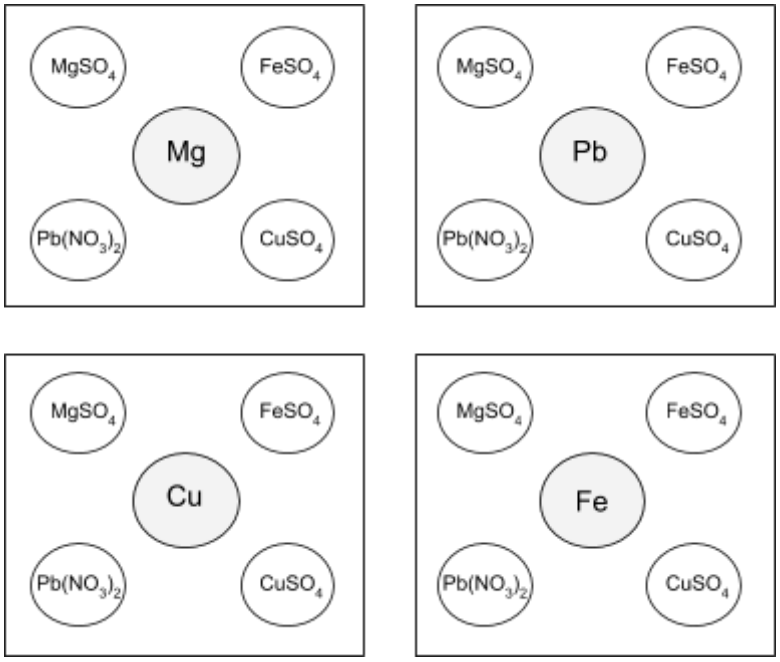


***Figure 1 Reaction Setup***

## 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)** |
|---|---|---|---|---|
| **$MgSO_4$** | No change observed | No change observed | No change observed | No change observed |
| **$CuSO_4$** | Small black solid pieces on metal<br>Fastest rate | Lead pieces got darker | No change observed | Dark grey coating on the nail<br>Fastest rate |
| **$FeSO_4$** | Black solid coats metal<br>Magnet: Moved<br>Slowest rate | No change observed | No change observed | No change observed |
| **$Pb(NO_3)_2$** | 'Furry' black solid formed on metal<br>Medium rate | No change observed | No change observed | Grey coating on the nail<br>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.