RS•C
ROYAL SOCIETY OF CHEMISTRY

4. The reaction of metals with acids

In this experiment you will be looking at the reactions between various metals and some acids.

Read the instructions before you start the experiment to make sure you understand the procedure.

	Hydrochloric acid	Nitric acid	Sulphuric acid
Copper			
Magnesium			
Zinc			
Iron			
Tin			

	Concentrated nitric acid
Copper	

Instructions

1. Place the clear plastic sheet over this worksheet.
2. Place a few copper turnings in each box in the copper row.
3. Place one small piece of magnesium ribbon in each box in the magnesium row.
4. Place a few zinc granules in each box in the zinc row.
5. Place some iron filings to each box in the iron row.
6. Finally, place a few tin granules in each box in the tin row.

When all the pieces of metal are in place:-

7. Add two drops of dilute hydrochloric acid to each metal in the hydrochloric acid column.
8. Add two drops of dilute nitric acid to each metal in the nitric acid column.
9. Add two drops of dilute sulphuric acid to each metal in the sulphuric acid column.
10. Finally, put one piece of copper turning in the box at the bottom and add two drops of concentrated nitric acid.

RS•C
ROYAL SOCIETY OF CHEMISTRY

4. Reactions of metals with acids

Topic

Metals – reactions with acids; reactivity series.

Level

Pre-16.

Timing

20 min.

Description

In this experiment, students observe the reactions between metals and acids.

Apparatus (per group)

- One student worksheet
- One transparent plastic sheet (*eg* ohp sheet)
- Magnifying glass
- Tissue paper.

Chemicals (per group)

- Solutions contained in plastic pipettes, see pp xxx
- Hydrochloric acid 1 mol dm^{-3}
- Dilute nitric acid 1 mol dm^{-3}
- Concentrated nitric acid 5 mol dm^{-3}
- Sulphuric acid 1 mol dm^{-3}
- Magnesium ribbon
- Zinc metal – small granules
- Iron filings
- Tin granules
- Copper turnings.

Observations

The magnesium ribbon reacts vigorously with each acid. The zinc and iron also react, but less vigorously. In each case hydrogen gas is produced as well as the metal salt. The reaction between iron and nitric acid eventually produces a red-brown rust colour (iron(III) oxide). Students could link this with corrosion and acid rain. Tin and copper do not react with the hydrochloric and sulphuric acids but a few bubbles may be seen (using the magnifying glass) with the nitric acid.

The copper reacts with the 5 mol dm^{-3} nitric acid to produce a blue solution and bubbles (of brown nitrogen dioxide and oxygen).

Students can be encouraged to write word and symbol equations for these reactions.

Safety

Students must wear eye protection.

It is the responsibility of the teachers to carry out a risk assessment.