

# Observing chemical changes

In this experiment you will be observing the changes that occur when you mix solutions of chemicals on the grid shown.

## Instructions

1. Cover the worksheet with a clear plastic sheet.
2. Put two drops of barium nitrate solution into box 1 (at the top of the middle column). Add two drops of sodium sulphate solution to the drops of barium nitrate solution.
3. Put two drops of lead nitrate solution into box 2. Add two drops of potassium iodide solution to the drops of lead nitrate solution.
4. Put two drops of iron(III) nitrate solution into box 3. Add one drop of potassium thiocyanate solution to the iron(III) nitrate solution.
5. Put two drops of copper(II) sulphate solution into box 4. Add two drops of ammonia solution to the copper(II) sulphate solution.
6. Put two drops of ammonium vanadate(V) solution into box 5. Add one drop of hydrochloric acid, then a small piece of zinc metal to the ammonium vanadate(V) solution.
7. Put two drops of iron(II) sulphate solution into box 6. Add two drops of sodium hydroxide solution to the iron(II) sulphate solution.
8. Put two drops of potassium manganate(VII) solution into box 7. Add two drops of iron(II) sulphate solution to the potassium manganate(VII) solution.
9. Put two drops of barium nitrate solution into box 8. Add two drops of sodium hydroxide to the barium nitrate solution. Observe, and record any changes over the next 10 min.
10. Put one drop of silver nitrate solution into box 9. Add one drop of iron(II) sulphate to the silver nitrate solution. Observe closely using a magnifying glass.
11. Put two drops of copper(II) sulphate solution into box 10. Add a small piece of zinc metal to the copper sulphate solution.

Barium nitrate	1	Sodium sulphate
Lead nitrate	2	Potassium iodide
Iron(III) nitrate	3	Potassium thiocyanate
Copper(II) sulphate	4	Ammonia solution

Ammonium vanadate(V)	5	Hydrochloric acid and zinc
Iron(II) sulphate	6	Sodium hydroxide
Potassium manganate(VII)	7	Iron(II) sulphate
Barium nitrate	8	Sodium hydroxide
Silver nitrate	9	Iron(II) sulphate
Copper(II) sulphate	10	Zinc

## Health & Safety

Students must wear suitable eye protection. (Splash proof goggles to BS EN166 3).

Barium nitrate,  $0.2 \text{ mol dm}^{-3} \text{ Ba}(\text{NO}_3)_2 \text{ (aq)}$ , Sodium sulphate,  $0.5 \text{ mol dm}^{-3} \text{ Na}_2\text{SO}_3 \text{ (aq)}$ , **Hydrochloric acid**,  $1 \text{ mol dm}^{-3} \text{ HCl (aq)}$ , Iron(II) sulphate,  $0.2 \text{ mol dm}^{-3} \text{ FeSO}_4 \cdot 7\text{H}_2\text{O (aq)}$ , Iron(III) nitrate,  $0.2 \text{ mol dm}^{-3} \text{ Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O (aq)}$ , potassium manganate(VII)  $0.01 \text{ mol dm}^{-3}$  zinc metal granules and Potassium thiocyanate,  $0.2 \text{ mol dm}^{-3}$ , KSCN (aq) are all of low hazard.

Silver nitrate,  $0.1 \text{ mol dm}^{-3}$ ,  $\text{AgNO}_3 \text{ (aq)}$  is an eye irritant. Keep separate from organic waste containers.

Lead nitrate,  $0.5 \text{ mol dm}^{-3} \text{ Pb}(\text{NO}_3)_2 \text{ (aq)}$  is a reproductive toxin, causes eye damage, causes damage to organs (especially the CNS) and is harmful to the aquatic environment. Avoid inhalation and skin contact.

Ammonia solution,  $3 \text{ mol.dm}^{-3} \text{ NH}_3 \text{ (aq)}$  is CORROSIVE.

Ammonium vanadate(V),  $0.2 \text{ mol dm}^{-3} \text{ NH}_4\text{VO}_3$  (acidified with sulphuric acid) is a mutagen and extremely toxic if inhaled – but not by any other route.



Sodium hydroxide solution,  $1 \text{ mol dm}^{-3} \text{ NaOH (aq)}$ , is corrosive

Copper(II) sulphate solution,  $0.2 \text{ mol dm}^{-3} \text{ CuSO}_4 \text{ (aq)}$  causes eye damage and is HAZARDOUS to the aquatic environment.

## Credits

© Royal Society of Chemistry

*Health & safety checked May 2018*

Page last updated August 2018

