# AQA Chemistry A-level

## Required Practical 11

Carry out simple test-tube reactions to identify transition metal ions in aqueous solution

## Test 1a:

- Place 10 drops of solution in a test tube.
- Add sodium hydroxide solution, shaking gently, dropwise until in excess. Record any observations.
- Do not discard this mixture.

## Test 1b:

- Half fill a 250 $cm^3$ beaker with the freshly boiled water.
- Allow the four test tubes containing the mixtures from Test 1a to stand in the beaker of hot water for about 10 minutes.
- Record any observations.

## Test 2:

- Place about 10 drops of sodium carbonate solution in a test tube.
- Add about 10 drops of solution and shake the mixture gently. Record any observations.

## Test 3:

- Place about 10 drops of solution in a test tube.
- Add about 10 drops of silver nitrate solution and shake the mixture gently.
- Allow the four test tubes to stand for about 10 minutes. Record any observations.

| Metal | Aqueous ion | Action of NaOH | Action of an excess of NaOH(aq) | Action of $NH_3(aq)$ | Action of an excess of $NH_3(aq)$ | Action of $Na_2CO_3(aq)$ |
|---|---|---|---|---|---|---|
| Iron(II) | $[Fe(H_2O)_6]^{2+}(aq)$<br>green solution | $Fe(H_2O)_4(OH)_2(s)$<br>green ppt goes brown on standing in air | No further change | $Fe(H_2O)_4(OH)_2(s)$<br>green ppt goes brown on standing in air | No further change | $FeCO_3(s)$<br>green ppt |
| Copper(II) | $[Cu(H_2O)_6]^{2+}(aq)$<br>blue solution | $Cu(H_2O)_4(OH)_2(s)$<br>blue ppt | No further change | $Cu(H_2O)_4(OH)_2(s)$<br>blue ppt | $[Cu(H_2O)_2(NH_3)_4]^{2+}(aq)$<br>deep blue solution | $CuCO_3(s)$<br>blue-green ppt |
| Iron(III) | $[Fe(H_2O)_6]^{3+}(aq)$<br>purple solution<br>may look yellow-brown due to some $[Fe(H_2O)_5(OH)]^{2+}(aq)$ | $Fe(H_2O)_3(OH)_3(s)$<br>brown ppt<br>(ppt may look orange-brown) | No further change | $Fe(H_2O)_3(OH)_3(s)$<br>brown ppt<br>(ppt may look orange-brown) | No further change | $Fe(H_2O)_3(OH)_3(s)$<br>brown ppt<br>(ppt may look orange-brown)<br>and $CO_2$ gas evolved |
| Aluminium(III) | $[Al(H_2O)_6]^{3+}(aq)$<br>colourless solution | $Al(H_2O)_3(OH)_3(s)$<br>white ppt | $[Al(OH)_4]^-(aq)$<br>colourless solution | $Al(H_2O)_3(OH)_3(s)$<br>white ppt | No further change | $Al(H_2O)_3(OH)_3(s)$<br>white ppt<br>and $CO_2$ gas evolved |