# DEMONSTRATION 6.5

## IRON(II) SULFATE AND POTASSIUM PERMANGANATE

Green iron(II) sulfate solution is oxidised by a purple potassium permanganate solution, to give a colourless solution of iron(III) and manganese(II).

**EQUIPMENT**

- 100 mL measuring cylinder
- 2 L conical flask
- long glass rod
- light box

**REAGENTS**

- potassium permanganate, $KMnO_4$ (a few crystals)
- iron(II) ammonium sulfate-6-water, $(NH_4)_2Fe(SO_4)_2{\cdot}6H_2O$ or Iron (II) sulfate (50 g)
- sulfuric acid, $H_2SO_4$ (2 M, 100 mL)
- distilled water

**PREPARATION**

- Dissolve 50 g iron (II) ammonium sulfate-6-water or Iron (II) sulfate in 150 mL of 2 M sulfuric acid.
- Set up the light box.
- Fill the conical flask with water and add crystals of potassium permanganate, sufficient to produce a solution which is strongly coloured without being opaque.
- Provide measuring cylinder and stirring rod.

**PROCEDURE**

- Add 150 mL of the iron(II) sulfate solution to the potassium permanganate solution.
- Stir.

**RESULTS**

Permanganate is reduced to Mn(II) and Fe(II) is oxidised to Fe(III).

The reactions are:

$Fe^{2+}(aq) \zeta Fe^{3+}(aq) + e^-$ $\quad E° = -0.77$ V

$MnO^{4-}(aq) + 8H^+(aq) + 5e^- \zeta Mn^{2+}(aq) + 4H_2O(l)$ $\quad E° = +1.51$ V

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$MnO_4^-(aq) + 8H^+(aq) + 5Fe^{2+}(aq) \zeta Mn^{2+}(aq) + 5Fe^{3+}(aq) + 4H_2O(l)$ $\quad E°_{cell} = +0.74$V

**High Risk Demonstration:**

- **Refer to HIRAC**
- **Set up in Red Tray**