The reaction between hydrogen peroxide and dichromate ions

Topic

Transition elements – colours of ions, redox reactions, variable oxidation states.

Timing

5 min.

Description

In this experiment dichromate(VI) ions are reduced to chromate(III) ions by hydrogen peroxide which is itself oxidised to oxygen gas. The experiment provides several points for student observation and illustrates an interesting redox reaction.

Apparatus (per group)

- One student worksheet
- One clear plastic sheet (*eg* ohp sheet).

Chemicals (per group)

Solutions contained in plastic pipettes, see 'Apparatus and techniques for microscale chemistry' handout.

- Potassium dichromate 0.2 mol dm^{-3}
- Hydrogen peroxide 5% solution.

Observations

On adding the hydrogen peroxide solution, the reaction mixture immediately turns a deep blue colour. After a while bubbles are seen and the colour gradually fades to a pale blue-green due to hexa-aqua chromium(III) ions.

The reaction is:

$Cr_2O_7^{2-}(aq) + H_2O_2(aq) + 8H^+(aq) \rightarrow 2Cr^{3+}(aq) + 5H_2O(l) + 2O_2(g)$

Health & Safety

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

Potassium dichromate, 0.2 mol dm^{-3} K_2CrO_4 is a carcinogen, mutagen, Reproductive toxin, skin and respiratory sensitiser. It is also toxic if inhaled, corrosive to skin and eyes and toxic to aquatic life. Wear splash-proof eye-protection if transferring large amounts. Avoid skin contact.

Hydrogen peroxide, 5% solution H_2O_2 (aq) is of low hazard.

Credits

Health & safety checked May 2018

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