Iron by 1,10-phenanthroline assay

Teacher and technician worksheet

Equipment and materials

Each student or pair of students will require:

- burettes x 3
- 1 cm^3 pipette
- 2 cm^3 pipette
- 100 cm^3 volumetric flask x 7 (or re-use one flask)
- colorimeter and suitable filter (green) – a solution of the complex displays maximum absorption at 510 nm
- iron(II) ammonium sulfate solution containing 0.100 g dm^{-3} Fe^{2+} (100 ppm), (15 cm^3)
- hydroxylamine hydrochloride solution (if used), 1.5 mol dm^{-3} (7 cm^3)
- 1,10-phenanthroline solution, 5 x 10^{-3} mol dm^{-3} (105 cm^3)
- sodium ethanoate solution, 1 mol dm^{-3} (14 cm^3)
- solution of unknown Fe^{2+} concentration,(15 cm^3)

Make sure students wear eye protection. Hydroxylamine hydrochloride solution is harmful.

Solution preparation

- Iron(II) ammonium sulfate solution, 0.100 g dm^{-3} Fe^{2+} (100 ppm)

  Weigh out 0.702 g of iron(II) ammonium sulfate-6-water, $Fe(NH_4)_2(SO_4)_2.6H_2O$, dissolve in deionised water and make up to 1 dm^3.

- 1,10-phenanthroline solution, 5 x 10^{-3} mol dm^{-3}

  Weigh out 0.90 g of 1,10-phenanthroline, dissolve in deionised water, warming if necessary but do not allow the solution to boil. Discard the solution if it darkens. Make up to 1 dm^3.

- Sodium ethanoate solution, 1 mol dm^{-3}

  Weigh out 13.6 g of sodium ethanoate-3-water, dissolve in deionised water and make up to 100 cm^3.

- Hydroxylamine hydrochloride solution, 1.5 mol dm^{-3}

  Weigh out 10.4 g of hydroxylamine hydrochloride, dissolve in deionised water and make up to 100 cm^3.