

Determination of manganese in a fertiliser

Teacher and technician sheet

Make sure there is a stated amount of manganese (such as 0.05% soluble Mn) in the sample of fertiliser. 'Trace' amounts of manganese are not detectable by this method.

Equipment and materials

Each student or pair of students will require:

- 250 cm³ conical flask x 2
- Balance (if using solid fertiliser)
- 5 cm³ pipette (if using liquid fertiliser)
- 10 cm³ pipette
- 25 cm³ measuring cylinder
- 100 cm³ volumetric flasks
- 250 cm³ volumetric flask x 6 (or thoroughly wash and re-use)
- Bunsen burner, tripod and gauze
- Burette
- Colorimeter and suitable filter (green) - a solution of manganate(VII) ions displays maximum absorption at 530 nm.
- Fertiliser sample, solid fertiliser (5 g) or 5 cm³ liquid fertiliser (5 cm³)
- Concentrated nitric acid, concentrated (25 cm³)
- Potassium iodate(VII) (potassium periodate) (4 g)
- Potassium manganate(VII) solution, 0.005 mol dm⁻³ (37.5 cm³)

Make sure students wear eye protection and chemical-resistant gloves. Concentrated nitric(V) acid is corrosive. Potassium iodate(VII) (potassium periodate) is an irritant.

The reaction of fertiliser with nitric acid generates nitrogen oxides (NO and NO₂) which are **very toxic** by inhalation. You must work in a fume cupboard when directed to do so.

Solution preparation

- Potassium manganate(VII) solution: 0.005 mol dm⁻³. Weigh out 0.79 g potassium manganate(VII), KMnO₄, and dissolve in deionised water in a beaker. Transfer to a 1 dm³ volumetric flask and make up to the mark with deionised water.