Colorimetric analysis of 2-hydroxybenzoic acid

Teacher and technician sheet

Health and safety note

Make sure that students wear eye protection.

Equipment and materials

Each student or pair of students will require:

- Colorimeter and suitable filter (green/yellow) - A solution of the complex displays maximum absorption at 530 nm
- Cuvette
- 100 cm^3 volumetric flask (x 4 or reuse same flask washing thoroughly between solution preparations)
- 10 cm^3 graduated pipette and pipette filler
- 2-hydroxybenzoic acid stock solution
- 0.025 mol dm^{-3} iron(III) nitrate solution
- Deionised/distilled water

Preparation of solutions

To make up the required solutions you will need:

- 100 cm^3 volumetric flask
- 250 cm^3 volumetric flask
- 1 dm^3 measuring cylinder
- Ethanol (95%) − Highly flammable, Harmful
- 2-hydroxybenzoic acid − Harmful
- Iron(III) nitrate-9-water − Oxidising, Irritant

2-hydroxybenzoic acid solution (stock solution) Weigh 0.200 g of 2-hydroxybenzoic acid into a 250 cm^3 beaker. Add 10 cm^3 of 95% ethanol and swirl the contents of the beaker to dissolve the solid. Add 50 cm^3 deionised water and swirl the beaker again to mix the contents. Transfer quantitatively to a 250 cm^3 volumetric flask and make up to volume with deionised water. The concentration of this solution is 0.80 g dm^{-3}.

0.025 mol dm^{-3} iron(III) nitrate solution Weigh 10 g iron(III) nitrate-9-water into a 250 cm^3 beaker. Add about 50 cm^3 of deionised water and swirl the flask until the solid dissolves. Transfer quantitatively to a 1 dm^3 measuring cylinder and make up to volume with deionised water. Mix thoroughly.

Unknown solution for analysis Dilute 50 cm^3 of the stock solution of 2-hydroxybenzoic acid with an equal volume of deionised water. The concentration of this solution is 0.400 g dm^{-3}.