

Zinc by zincon assay

Teacher and technician worksheet

This practical is based on a method described in *Zinc biosorption by seaweed Illustrated by the zincon colorimetric method and the Langmuir isotherm*, M. M. Areco, M. dos Santos Afonso, E. Valdman, *J. Chem. Educ.*, **2007**, *84*, 302.

(Original method: *Analytical Chemistry* **1959**, *31*, 1226-1228)

Equipment and materials

Each student or pair of students will require:

- boiling tube x 6
- 5 cm³ volumetric flask x 7 (or use one, thoroughly washing it between samples)
- 1 cm³ graduated pipettes x 3
- colorimeter and suitable filter (red) A solution of the complex displays maximum absorption at 620 nm.
- buffer solution, pH 9 (3.5 cm³)
- Zincon solution (2.1 cm³)
- zinc sulfate solution containing 0.01 g dm⁻³ Zn²⁺ (10 ppm) (24 cm³)
- solution of unknown Zn²⁺ concentration (10 cm³)

Make sure students wear eye protection.

Solution preparations

- Zinc sulfate solution containing 0.01 g dm⁻³ Zn²⁺ (10 ppm): Weigh out 0.0439 g zinc sulfate-7-water, ZnSO₄·7H₂O, dissolve in deionised water and make up to 1 dm³. Zinc sulfate-7-water must be fresh to ensure that water of crystallisation has not been lost.

The solution may be made up by the serial dilution of a more concentrated solution. A 1000 ppm zinc ion solution is made by adding 1 g of zinc granules to 20 cm³ of 2 mol dm⁻³ sulfuric acid and leaving for 24 hours to react. The solution is then made up to 1 dm³ in a volumetric flask.

- Buffer solution, pH 9: Dissolve 2.4 g of sodium hydroxide in 60 cm³ of deionised water. Transfer solution to a 100 cm³ volumetric flask, add 3.73 g of potassium chloride and 3.1 g of boric acid. Swirl the flask to dissolve the solids make up to volume with deionised water. Check the pH.
- Zincon solution: Dissolve 0.065 g of zincon in 1 cm³ of 1 mol dm⁻³ sodium hydroxide solution and dilute to 50 cm³. Keep the deep red zincon solution in a fridge. It is stable to decomposition for about one week.