



Test method T1009

Quantitative determination of calcium hardness of water

NOVEMBER 2012



Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	June 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	November 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T1009 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T1009

Quantitative determination of calcium hardness of water

1. Scope

This test method sets out the procedure for determination of the calcium hardness of water by titration with EDTA.

2. Apparatus

- (a) Laboratory glassware including burettes, pipettes, flasks, etc.
- (b) Narrow range indicator paper of pH 0.5 - 5.5.
- (c) Universal indicator paper.
- (d) A balance of 200 g capacity, accurate and readable to 0.0001 g.

3. Reagents

- (a) 0.01 M EDTA Solution.
Dissolve 3.722 g of pure, dry disodium ethylene diamine tetra-acetate dehydrate in distilled water and dilute to 1 litre with distilled water. Standardise this solution against a known mass of CaCO_3 dissolved in a minimum amount of HCl.
- (b) Triethanolamine Solution.
Mix triethanolamine with distilled water in the ratio of 1:1 by volume.
- (c) 5% Potassium Hydroxide Solution.
Dissolve 5 g of potassium hydroxide in 100 mL of distilled water.
- (d) Murexide Indicator.
Grind together 0.2 g of murexide, 0.5 g of naphthol green and 100 g of sodium chloride until finely divided and thoroughly mixed.
- (e) 10% Sulphuric Acid Solution.
Carefully add 1 volume of concentrated sulphuric acid (1.85 g/mL) with constant stirring to 9 volumes of distilled water.

CAUTION: Sulphuric acid can cause severe burns. Avoid contact with eyes, skin and clothing. Always dilute by carefully adding acid to water - NEVER THE REVERSE. Always wear safety glasses when handling acid.

- (f) Glycerol.

4. Procedure

- (a) Pipette out a 100 mL sample into a 250 mL conical flask.
- (b) Adjust pH to 1 with a 10% sulphuric acid solution using a narrow range indicator paper to check the pH.
- (c) Add 2 mL of 1:1 triethanolamine solution and shake until thoroughly mixed.
- (d) adjust pH to 10 - 11 with 5% potassium hydroxide solution using Universal indicator paper to check the pH. Then add 1-2 mL extra potassium hydroxide solution.
- (e) add 1 mL of glycerol.
- (f) Add 0.2 g of murexide indicator (as prepared) and titrate with 0.01 M EDTA solution. The end point is from an olive green through grey to a sudden blue. In the presence of chromates, the initial colour may be orange - pink.

5. Calculations and Reporting

Calculate Hardness (ppm) = Titre in mL x M x 1000.9 in terms of CaCO₃.

Where M = Molarity of EDTA.