
International Standard



6059

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Water quality — Determination of the sum of calcium and magnesium — EDTA titrimetric method

Qualité de l'eau — Dosage de la somme du calcium et du magnésium — Méthode titrimétrique à l'EDTA

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6059 was developed by Technical Committee ISO/TC 147, *Water quality*, and was circulated to the member bodies in January 1983.

It has been approved by the member bodies of the following countries:

Australia	Hungary	Poland
Austria	India	Romania
Belgium	Iran	South Africa, Rep. of
Brazil	Iraq	Spain
Canada	Italy	Sweden
China	Japan	Switzerland
Czechoslovakia	Korea, Dem. P. Rep. of	Thailand
Denmark	Korea, Rep. of	United Kingdom
Finland	Netherlands	USSR
France	New Zealand	
Germany, F. R.	Norway	

No member body expressed disapproval of the document.

Water quality — Determination of the sum of calcium and magnesium — EDTA titrimetric method

1 Scope and field of application

This International Standard specifies a titrimetric method using ethylenediaminetetraacetic acid (EDTA) for the determination of the sum of the calcium and magnesium concentrations in ground waters, surface waters and drinking waters.

The method is not intended for effluents and waters having a high concentration of salts, such as sea waters. The lowest concentration that can be determined is 0,05 mmol/l.

2 References

ISO 385/1, *Laboratory glassware — Burettes — Part 1: General requirements*.¹⁾

ISO 5667, *Water quality — Sampling —*

Part 1: Guidance on the design of sampling programmes.

Part 2: Guidance on sampling techniques.

*Part 3: Guidance on the preservation and handling of samples.*²⁾

3 Principle

Complexometric titration of calcium and magnesium with an aqueous solution of the disodium salt of EDTA at a pH value of 10. Mordant black 11, which forms a claret or violet colour in the presence of calcium and magnesium ions, is used as the indicator.

In the titration, the EDTA, reacts first with the free calcium and magnesium ions in solution, and then, at the equivalence point, with those calcium and magnesium ions which are combined with the indicator, liberating the indicator and causing the colour to change from claret or violet to blue.

The results are given in amount of substance concentration units. If the calcium content has been determined separately, the mass concentration of magnesium can be computed.

4 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

4.1 Buffer solution.

Dissolve 67,5 g of ammonium chloride (NH_4Cl) in 570 ml of ammonia solution [25 % (*m/m*); $\rho_{20} = 0,910 \text{ g/ml}$]. Then add 5,0 g of the disodium magnesium salt of EDTA ($\text{C}_{10}\text{H}_{12}\text{N}_2\text{O}_8\text{Na}_2\text{Mg}$) and dilute to 1 000 ml with water.

Store the solution (shelf-life limited) in a polyethylene bottle. Dilute 10 ml of the solution to 100 ml with water. If this solution fails to give a pH value of $10 \pm 0,1$, discard the original solution.

4.2 EDTA, standard volumetric solution,
 $c(\text{Na}_2\text{EDTA}) \approx 10 \text{ mmol/l}$.

4.2.1 Preparation

Dry a portion of the disodium salt of EDTA dihydrate ($\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_8\text{Na}_2 \cdot 2\text{H}_2\text{O}$) at 80 °C for 2 h, dissolve 3,725 g of the dry salt in water and dilute to 1 000 ml in a volumetric flask.

Store the EDTA solution in a polyethylene bottle and check the concentration at regular intervals.

4.2.2 Standardization

Standardize the solution (4.2.1) against the calcium standard reference solution (4.3) by the procedure described in clause 7.

Use 20,0 ml of the calcium standard reference solution (4.3) and dilute to 50 ml.

4.2.3 Calculation of the concentration

The concentration of the EDTA solution, c_1 , expressed in millimoles per litre, is given by the equation

$$c_1 = \frac{c_2 V_1}{V_2}$$

1) At present at the stage of draft. (Partial revision of ISO/R 385-1964.)

2) At present at the stage of draft.