AS 2976—1987
Reconfirmed 2017

Australian Standard®

WATERS—
DETERMINATION OF FILTRABLE MAGNESIUM—
FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

This Australian Standard was prepared by Committee CH/22, Methods for Examination of Waters. It was approved on behalf of the Council of Standards Australia on 15 May 1987 and published on 6 July 1987.

The following interests are represented on Committee CH/22:

Australian Mining Industry Council

Australian Water Resources Council

Confederation of Australian Industry

CSIRO, Division of Energy Chemistry

Department of the Environment, Tas.

Department of Health

Department of Health, N.S.W.

Department of Housing and Construction

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Department of Science

Engineering and Water Supply Department, S.A.

Environment Protection Authority of Victoria

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Melbourne and Metropolitan Board of Works

Metropolitan Water Sewerage and Drainage Board

National Association of Testing Authorities, Australia

National Health and Medical Research Council

Royal Australian Chemical Institute

Rural Water Commission, Vic.

Water Resources Commission, N.S.W.

This Standard was issued in draft form for comment as DR 86089.

STANDARDS AUSTRALIA

RECONFIRMATION

OF
AS 2976—1987
WATERS—DETERMINATION OF FILTRABLE MAGNESIUM—FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

RECONFIRMATION NOTICE

Technical Committee EV-008 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 15 September 2017.

The following are represented on Technical Committee EV-008:

Australasian Land and Groundwater Association
Australian Contaminated Land Consultants Association
Australian Nuclear Science & Technology Organisation
Australian Water Association
Chem Centre
Environmental Laboratory Industry Group
National Association of Testing Authorities Australia
National Measurement Institute
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NOTES

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First published 1987

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 4662 X

PREFACE

This Standard for the determination of filtrable magnesium in waters was prepared by the Association's Committee on Methods for Examination of Waters under the direction of the Chemical Standards Board. This Standard may be used in conjunction with AS 2526 for the determination of contributing factors to water hardness.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

WATERS—DETERMINATION OF FILTRABLE MAGNESIUM—FLAME ATOMIC ABSORPTION SPECTROMETRIC METHOD

1 SCOPE. This Standard sets out a method for the determination of filtrable magnesium in waters using flame atomic absorption spectrometry. A procedure for the determination of non-filtrable magnesium is set out in Appendix A.

2 APPLICATION. This method is applicable to natural and waste waters having a filtrable magnesium concentration in the range 0.02 mg/L to 2.0 mg/L. The upper range of the method can be extended by sample dilution.

NOTES:

1. The limit of detection for direct aspiration of saline waters may be higher than that for fresh waters.
2. Calcium may be determined on the same sample as magnesium in accordance with AS 2526.

3 REFERENCED DOCUMENTS. The following Standards are referred to in this Standard:

AS 2031 Selection of Containers and Preservation of Water Samples for Chemical and Microbiological Analysis
Part 1—Chemical.

AS 2134 Recommended Practice for Chemical Analysis by Atomic Absorption Spectrometry
Part 1—Flame Atomic Absorption Spectrometry.

AS 2162 Code of Practice for the Use of Volumetric Glassware.

AS 2526 Waters—Determination of Calcium—Atomic Absorption Spectrometric Method.

AS 2850 Chemical Analysis—Interlaboratory Test Programs—Guide to the Planning and Conduct—For Determining Precision of Analytical Method(s).

4 PRINCIPLE. Magnesium in the concentration range 0.02 mg/L to 2.0 mg/L is determined by direct aspiration of a sample into an air-acetylene flame of an atomic absorption spectrometer and the measurement of absorbance at 285.2 nm. A releasing agent is added to minimize formation of refractory compounds in the flame.

5 REAGENTS.

5.1 General. Unless otherwise specified, use analytical grade reagents and distilled water or water of equivalent purity.

5.2 Solutions.

5.2.1 *Nitric acid (ϱ_{20} 1.42 g/mL).*

5.2.2 *Hydrochloric acid (1 + 1).* Add 500 mL of hydrochloric acid (ϱ_{20} 1.16 g/mL) to 500 mL of water.

5.2.3 *Releasing agent.* Dissolve 12 g of lanthanum oxide in 500 mL of hydrochloric acid (5.2.2) and dilute to 1 L.

5.3 Standard solutions.

5.3.1 *Stock magnesium solution (1.000 g/L).* Dissolve 1.000 g of freshly cleaned magnesium metal (99.9 percent purity) in 50 mL of hydrochloric acid (5.2.2). Cool and transfer to a 1 L volumetric flask and dilute to volume.

NOTE: An alternatively prepared standard solution may be used provided that for each new batch the concentration has been checked against that of a primary standard solution as prepared in Clause 5.3.1.

5.3.2 *Standard magnesium solution (10.0 mg/L).* Pipette 10.0 mL of stock magnesium solution (5.3.1) into a 1 L volumetric flask, add 20 mL of hydrochloric acid (5.2.2) and dilute to volume. This solution shall be freshly prepared before use.

6 APPARATUS.

6.1 Glassware. Volumetric glassware complying with the relevant Australian Standards and for use in accordance with AS 2162.

6.2 Flame atomic absorption spectrometer. For use in accordance with AS 2134 and manufacturer's instructions.

NOTE: The use of background correction has been found to be unnecessary with this standard method.

6.2.1 *Magnesium hollow-cathode lamp.*

6.2.2 *Support gas-air.* Instrument grade air or air which has been filtered to remove water, oil and other foreign substances.

6.2.3 *Fuel gas-acetylene.* Instrument grade acetylene shall be used.

CAUTION: Acetone (always present in acetylene cylinders) alters the response of the instrument and should be prevented from entering the burner system by replacing the cylinder when the pressure has fallen to 600 kPa. Acetone can also weaken polyvinyl chloride tubing that carries acetylene to the burner causing a potentially hazardous situation.

7 SAMPLES AND SAMPLING. As soon as practicable after collection, the sample shall be filtered through a 0.45 ± 0.05 μm cellulose acetate membrane filter and acidified with nitric acid (5.2.1) to pH < 2. If the non-filtrable magnesium is to be determined, record the volume filtered (V_1) and retain the residue for treatment in accordance with Appendix A. Selection of containers and preservation of samples shall be in accordance with AS 2031.1.

8 PROCEDURE.

8.1 Optimization. Optimize the instrument on the 285.2 nm magnesium line.

8.2 Calibration.

8.2.1 *General.* In preparing a calibration curve, the range of working standards shall be chosen in such a way that it brackets the test solution concentration and the resultant calibration curve does not exceed the linear range.