Australian Standard®

REFRACTORIES AND REFRACTORY MATERIALS—CHEMICAL ANALYSIS

Part 4—DOLOMITES AND MAGNESITES

This Australian Standard was prepared by Committee MN/7, Refractories and Refractory Materials. It was approved on behalf of the Council of the Standards Association of Australia on 27 February 1987 and published on 4 May 1987.

The following interests are represented on Committee MN/7:

Australian Institute of Mining and Metallurgy

Bureau of Steel Manufacturers of Australia

CSIRO, Division of Materials Science

Electricity Supply Association of Australia

Refractory Manufacturers Association of Australia

University of New South Wales

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PREFACE

This edition of this Standard was prepared by a subcommittee of the Association's Committee on Refractories and Refractory Materials, as the fourth part of a Standard to supersede AS R28—1965, Methods for the Sampling and Chemical Analysis of Refractories and Refractory Materials. Other parts of the Standard dealing with the essentially classical analysis of other refractory materials are as follows:

Part 1 Silica Refractory Materials

Part 2 Aluminosilicate Refractory Materials

Part 3 High Alumina Materials

Part 5 Chrome-bearing Materials*.

This edition incorporates a complete revision of format to bring it into line with the requirements of AS 2929* Chemical Testing—Guide to the Format, Style and Content of Standard Methods of Analysis, as well as other modifications illustrated in the already published parts of this Standard.

In preparing this Standard, the Committee drew extensively upon the corresponding work of ISO/TC 33, Refractories, and the methods specified in BS 1902, Methods of Testing Refractory Materials. The committee also took into consideration the present practices of Australian industry and testing laboratories, details being established or verified, where necessary, by reference to the staff of laboratories who routinely conduct refractory analysis.

This Standard utilizes titrimetric, UV-Visible spectrophotometric and flame photometric methods of analysis and, like its companion parts, includes flow sheets depicting the scheme of analysis. Another parallel series of Standards is currently being prepared for the analysis of refractory materials by atomic absorption methods.

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* In course of preparation.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out methods for the sampling, preparation of samples and analysis of dolomite and magnesite refractories and refractory materials. Procedures are described for determining—

(a) the loss on ignition*;

(b) the chemical composition*, i.e. the amount of silicon, iron, titanium, manganese, chromium, aluminium, magnesium, calcium, sodium, potassium and lithium present in magnesites and dolomites, expressed as the oxides of these elements; and

(c) the boron content of magnesites expressed as boron(III) oxide†.

1.2 APPLICATION. This Standard applies to dolomites and magnesites whose composition is typified by Table 1. It may be applicable to materials which fall outside these ranges subject to agreement between interested parties.

TABLE 1

APPLICABILITY OF TEST METHODS AND TYPICAL COMPOSITION OF DOLOMITES AND MAGNESITES

Elemental constituent	Expressed as	Concentration limit for test method (percent, m/m)	Typical composition (percent, m/m)	
			Magnesites	Dolomites
Magnesium	MgO	0.1	40 to 98	15 to 45
Calcium	CaO	0.05	≤ 5	25 to 60
Silicon	SiO_2	0.02	≤ 5	≤ 5
Iron	Fe_2O_3	0.2	≤ 5	≤ 5
Chromium	Cr_2O_3	0.005	≤ 2	≤ 2
Aluminium	AL_2O_3	0.05	≤ 2.5	≤ 2.5
Titanium	TiO_2	0.02	≤ 0.5	≤ 0.5
Manganese	MnO	0.01	≤ 0.5	≤ 0.5
Sodium	Na_2O	0.05	≤ 0.5	≤ 0.5
Potassium	K_2O	0.05	≤ 0.5	≤ 0.5
Lithium	Li_2O	0.05	≤ 0.5	≤ 0.5
Boron	B_2O_3	0.001	≤ 0.3	not applicable

NOTE: The values given in column 3 represent the lowest concentration of constituent for which the test methods described in this Standard are considered to produce accurate results.

1.3 PRINCIPLE. The material to be analysed is treated as follows:

NOTE: A schematic presentation of the analytical procedure is given in Appendix B.

(a) *Loss on ignition.* A sample is heated to constant mass at 1100°C.

(b) *Determination of silicon, iron, titanium, manganese, chromium, aluminium, calcium and magnesium oxides.* A sample is decomposed with hydrochloric acid. The silicon dioxide is separated by filtration, is ignited, and weighed before and after treatment with hydrofluoric and sulphuric acids. The residue is fused with sodium carbonate and boric acid, and the product is dissolved in the original filtrate. It is then diluted to a standard volume. Aliquots are used for the spectrophotometric determination of residual silicon, iron, titanium, manganese and chromium oxides using respectively ammonium molybdate, 1,10-phenanthroline, hydrogen peroxide, potassium periodate and diphenylcarbazide. If the chromium oxide content is greater than 0.1 percent, the chromium(III)-EDTA method is used. Aluminium oxide is determined volumetrically with EDTA after extraction of interfering elements with cupferron in chloroform. Calcium and magnesium oxides are determined titrimetrically with EGTA and CDTA respectively.

* The original paper on which the methods are based was written by Bennett, H. and Reed, R.A., The ANALYST, *96* (1971), pp 640-655.

† The method described is based on an article by Skelton, N.F.C. and Reed, R.A., The ANALYST, *101* (1976), pp 396-403.