Australian Standard™

Coal and coke—Analysis and testing

Part 10.4: Determination of trace elements—Coal, coke and fly-ash—Determination of fluorine content—Pyrohydrolysis method

Standards Australia

This Australian Standard was prepared by Committee MN-001, Coal and Coke. It was approved on behalf of the Council of Standards Australia on 14 May 2001 and published on 29 June 2001.

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Australasian Institute of Mining and Metallurgy

Australian Coal Association

Australian Coal Preparation Society

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Coalfield Geology Council of N.S.W.

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PREFACE

This Standard was prepared by the Standards Australia Committee MN-001, Coal and Coke, to supersede AS 1038.10.4—1989. This Standard is one of a series of standard methods for the determination of trace elements in coal, coke and fly-ash.

The term 'normative' has been used in this Standard to define the application of the appendix to which it applies. A 'normative' appendix is an integral part of a Standard.

CONTENTS

FOREWORD

The determination of the trace elements in coal, coke and fly-ash is important due to the considerable emphasis being placed on the effect of these elements on the environment. International buyers are becoming increasingly aware of the need for more detailed knowledge of the coals that they are purchasing and may request trace element analysis.

Although fluorine is essential to both plant and animal life at low concentrations, it is toxic at higher concentrations. The element is usually present in only very small amounts in coal, but the increasing world consumption of coal and the volatility of fluorine may result in quantitatively significant emissions.

The procedure detailed in this Standard has been adapted from the work of Mills et al* and Godbeer and Swaine†.

* MILLS, J.C., DOOLAN, K.J. and KNOTT, A.C. (1983) 'Determination of Trace Elements in Coal and Coal Products—Part 4: Methods for the Determination of Fluorine, Boron, Beryllium and Lithium in Coal and Coal Products'. End of Grant Report, National Energy Research, Development and Demonstration Program (Australia), NERDDP/EG/84/358.

† GODBEER, W.C. and SWAINE, D.J. (1986). Fluorine in Australian Coals. Fuel, 66, 794–798.

STANDARDS AUSTRALIA

Australian Standard

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1 SCOPE

This Standard sets out a procedure for the pyrohydrolytic separation of fluorine from coal, coke and fly-ash and for determination of fluorine by gravimetric processing and either ion potentiometry or ion chromatography.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS		
1038	Coal and coke—Analysis and testing	
1038.3	Part 3:	Proximate analysis of higher rank coal
1038.4	Part 4:	Coke—Proximate analysis
1038.16	Part 16:	Assessment and reporting of results
2243	Safety in laboratories (series)	
2508	Safe storage and handling information card	
4264	Coal and coke—Sampling	
4264.1	Part 1:	Higher rank coal—Sampling procedures
4264.2	Part 2:	Coke—Sampling procedures
2706	Numerical values—Rounding and interpretation of limiting values	
2850	Chemical analysis—Interlaboratory test programs—For determining precision of analytical method(s)—Guide to the planning and conduct	

3 PRINCIPLE

The sample of coal, coke or fly-ash is mixed with silica and pyrolysed in a tube furnace at approximately 1200°C in an atmosphere of oxygen and water vapour. The volatilized fluorine compounds are absorbed in a suitable solution and processed for determination by ion selective electrode (ISE) or ion chromatographic (IC) techniques.

4 SAFETY

For information on laboratory safety, reference should be made to relevant parts of AS 2243 and AS 2508.

5 REAGENTS

5.1 General

Unless otherwise specified, all reagents shall be of analytical reagent grade and only distilled water, or water of equivalent purity, shall be used. The particular water used should have been determined to have a low fluoride ion content.

