Australian Standard®

Coal and coke—Analysis and testing

Part 6.3.3: Higher rank coal—Ultimate analysis—Total sulfur—Infrared method

This Australian Standard was prepared by Committee MN/1, Coal and Coke. It was approved on behalf of the Council of Standards Australia on 12 September 1997 and published on 5 December 1997.

The following interests are represented on Committee MN/1:

ACIRL

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 New South Wales

CSIRO, Division of Coal and Energy Technology

Department of Mines and Energy, Queensland

Electricity Supply Association of Australia

Institution of Engineers, Australia

Minerals Council of Australia

Queensland Coal Board

Royal Australian Chemical Institute

University of Newcastle

University of New South Wales

University of Queensland

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PREFACE

This Standard was prepared by the Standards Australia Subcommittee MN/1/1 on Coal Evaluation under the supervision of the Committee on Coal and Coke, as a revision of AS 1038.6.3.3—1986, *Methods for the analysis and testing of coal and coke*, Part 6.3.3: *Ultimate analysis of higher rank coal—Determination of total sulfur (Infrared method)*.

The method was developed in accordance with new technology to afford a procedure with a shorter analysis time than that of either the Eschka or high temperature methods (see AS 1038.6.3.1 and AS 1038.6.3.2 respectively).

Major differences from the previous edition are as follows:

(a) To make the Standard consistent with the others in the same series.

(b) Inclusion of clauses covering definitions and safety.

The objective of this revision is to bring the Standard into alignment with current practice.

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FOREWORD

The ultimate analysis of coal comprises the determination of the elements carbon, hydrogen, nitrogen and sulfur. Determination of the total amounts of these elements, regardless of their origin, is described. Carbon includes that which is present in the mineral carbonates and hydrogen includes that which is present both in moisture (for which a correction is made in the calculation) and in water of constitution of the argillaceous constituents of the mineral matter. All nitrogen is assumed to be present in the carbonaceous substance. Sulfur is normally present in three forms: inorganic sulfides such as pyrite (FeS_2), inorganic sulfates associated with the mineral matter and organic sulfur in the carbonaceous substance.

An estimate of the percentage of oxygen on an air-dry basis can be obtained by subtracting the sum of the determined percentages of moisture, ash, carbon, hydrogen, nitrogen and sulfur from 100. The value thus obtained should be termed ‘oxygen by difference’ (see AS 1038.16). A more satisfactory value for oxygen by difference is obtained when the ultimate analysis is expressed on a dry, mineral matter-free basis after making all appropriate corrections.

STANDARDS AUSTRALIA

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1 SCOPE This Standard sets out a method for the determination of total sulfur in the analysis sample of higher rank coal by the infrared method.

This method has been shown to be applicable to samples having ash values less than 40% and sulfur levels up to 6%. Samples having ash levels greater than approximately 40% may give low results.

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
1038.6 Part 6: Ultimate analysis of higher rank coals
1038.16 Part 16: Assessment and reporting of results

2243 Safety in laboratories

2418 Coal and coke—Glossary of terms

2508 Safe storage and handling information cards for hazardous materials

2706 Numerical values—Rounding and interpretation of limiting values

4264 Coal and coke—Sampling
4264.1 Part 1: Higher rank coal—Sampling procedures
4264.2 Part 2: Coke—Sampling procedures

BS
4237 Report on reproducibility of methods of chemical analysis used in the iron and steel industry

3 DEFINITIONS For the purpose of this Standard, the definitions given in AS 2418 and that below apply.

3.1 Repeatability (*r*)—the value at or below which the absolute difference between two single test results obtained with the same method on identical test material under the same conditions (same operator, same apparatus, same laboratory and the minimum practical time consistent with separate tests) may be expected to lie with the specified probability. In the absence of other specifications the probability is 95%.

4 PRINCIPLE A known mass of the sample is combusted at a high temperature in an oxygen atmosphere. All of the sulfur present in the sample is oxidized essentially to sulfur dioxide. Moisture and dust are removed and the sulfur dioxide gas is then measured by a solid state infrared detector. The microprocessor formulates the analysis result, which is displayed and printed on a control console. The instrument requires prior calibration, using samples of known sulfur content.