Australian Standard®

Coal and coke—Analysis and testing

Part 6.1: Higher rank coal and coke—Ultimate analysis—Carbon and hydrogen

This Australian Standard was prepared by Committee MN/1, Coal and Coke. It was approved on behalf of the Council of Standards Australia on 17 January 1997 and published on 5 April 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 on Coal Evaluation under the direction of the Committee on Coal and Coke as a revision of AS 1038.6.1—1986, *Methods for the analysis and testing of coal and coke*, Part 6.1: *Ultimate analysis of higher rank coal—Determination of carbon and hydrogen*, and (in part) of AS 1038.7—1981, *Methods for the analysis and testing of coal and coke*, Part 7: *Ultimate analysis of coke*.

Major differences from the previous edition are as follows:

(a) The Standard has been modified to incorporate the determination of carbon and hydrogen in coke.

(b) Inclusion of a clause covering safety aspects.

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FOREWORD

The ultimate analysis of coal and coke 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 present in the mineral carbonates and hydrogen includes that present both in the moisture (for which a correction is made in the calculation) and in water of constitution in the mineral matter. All nitrogen is assumed to be present in the coal and coke substance. Sulfur is normally present in three forms: inorganic sulfides such as iron pyrites (FeS_2), inorganic sulfates associated with the mineral matter and organic sulfur in the coal and coke 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 where the ultimate analysis is expressed on a dry, mineral matter-free basis after making all appropriate corrections.

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1 SCOPE This Standard sets out methods for the gravimetric determination of carbon and hydrogen in higher rank coal and coke using the high temperature combustion method.

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
1038.6.3.2	Part 6.3.2: Ultimate analysis of higher rank coal—Determination of total sulfur (high temperature combustion method)
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	
1041	Code for temperature measurement
ISO	
1994	Hard coal—Determination of oxygen content

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

4 PRINCIPLE A known mass of sample is burned at a temperature of 1350°C in a rapid current of oxygen, so that all carbon is converted to carbon dioxide and all hydrogen to water. Chlorine and oxides of sulfur are retained in the combustion tube by silver gauze. Schutze reagent is included in the absorption train to ensure complete oxidation of carbon and sulfur oxides. Manganese dioxide is included to ensure complete removal of residual oxides of sulfur. The water formed is absorbed by magnesium perchlorate and the carbon dioxide by sodium hydroxide on an inert base.

The value for hydrogen is corrected for that present as moisture in the sample.

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