Australian Standard®

Methods for the analysis and testing of coal and coke

Part 3: Proximate analysis of higher rank coal

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The following interests are represented on Committee MN/1:

Australasian Institute of Mining and Metallurgy
Australian Coal Association
Australian Coal Industry Research Laboratories
Australian Institute of Energy
Bureau of Steel Manufacturers of Australia
Coal Preparation Society of N.S.W.
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Part 3: Proximate analysis of higher rank coal

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PREFACE

This Standard was prepared by the Standards Australia Subcommittee on Coal Evaluation under the supervision of the Committee on Coal and Coke and the direction of the Minerals Standards Board to supersede AS 1038.3–1979, *Methods for the analysis and testing of coal and coke, Part 3: Proximate analysis of hard coal.*

The differences from the previous edition are as follows:

(a) The vacuum–drying method for moisture determination has been excluded.

(b) The direct gravimetric method for moisture determination has been modified to use a flow–through tube for heating the sample.

(c) The two methods for ash determination (single–furnace and two–furnace) have been combined to give a single method, with the option of using either one or two furnaces.

The differing temperature regimes, previously used, have been eliminated.

(d) This Standard has been subdivided into the following sections:

Section 1 Scope and general requirements

Section 2 Determination of moisture in the analysis sample
Clause 2.2—Direct gravimetric method
Clause 2.3—Indirect gravimetric method

Section 3 Determination of ash

Section 4 Determination of volatile matter.

These subdivisions will allow easier future revision of Part 3 and enable reference to be made to specific procedures used, e.g. the determination of moisture. However, this Standard is to be considered as a total document and each section should be read in conjunction with the other sections.

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STANDARDS AUSTRALIA

Australian Standard

Methods for the analysis and testing of coal and coke

Part 3: Proximate analysis of higher rank coal

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard sets out methods for the determination of moisture, ash and volatile matter on the analysis sample of higher rank coal in order to obtain its proximate analysis. Fixed carbon is calculated by difference.

1.2 REFERENCED DOCUMENTS. The fol-lowing documents are referred to in this Standard:

AS
1038 Methods for the analysis and testing of coal and coke
1038.16 Part 16: Acceptance and reporting of results
2096 Classification and coding systems for Australian coals
2243 Safety in laboratories
2418 Glossary of terms relating to solid mineral fuels
2508 Safe storage and handling information cards for hazardous materials
2646 Sampling of solid mineral fuels
2646.6 Part 6: Hard coal—Preparation of samples
2706 Numerical values—Rounding and interpretation of limiting values

1.3 DEFINITIONS. For the purpose of this Standard, the definitions in AS 2418, and those below, apply.

1.3.1 Higher rank coal (as defined in AS 2096)—coal having a gross specific energy of 21 MJ/kg or greater on an ash-free moist basis *and* a gross specific energy of 27 MJ/kg or greater on a dry, ash-free basis.

1.3.2 Proximate analysis—the analysis of coal expressed in terms of moisture, ash, volatile matter and fixed carbon in the analysis sample.

1.3.3 Moisture in the analysis sample—the moisture in the analysis sample of coal after it has attained equilibrium with the laboratory atmosphere to which it has been exposed.

1.3.4 Ash—the inorganic matter remaining after the coal has been incinerated to constant mass under standard conditions.

1.3.5 Volatile matter—the loss in mass, less that due to moisture, that occurs when the coal is heated out of contact with air under standard conditions.

1.3.6 Fixed carbon—a calculated figure obtained by subtracting the sum of the percentages of moisture, ash and volatile matter in the analysis sample, from 100.

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

1.5 SAMPLE.

1.5.1 General. The sample shall be the analysis sample prepared to a nominal top size of 212 μm. Sample preparation procedures are described in AS 2646.6.

1.5.2 Equilibration of the sample. The moisture content of the analysis sample shall be equilibrated with the laboratory atmosphere by exposure in thin layer on a tray. Exposure time shall be kept to a minimum. The sample shall be thoroughly mixed immediately before analysis.

1.6 REPORTING OF RESULTS. The results, the means of duplicate determinations for moisture, ash and volatile matter, shall be reported to the nearest 0.1 percent, rounded in accordance with AS 2706. The difference between 100 and the sum of the three results shall be reported as 'fixed carbon'.

For the calculation of results to bases other than 'air-dry', refer to AS 1038.16.

1.7 PRECISION. The values for repeatability and reproducibility should not exceed those given in Table 1.1. Otherwise, reference shall be made to AS 1038.16.

TABLE 1.1

PRECISION FOR MOISTURE, ASH AND VOLATILE MATTER

Property	Repeatability % absolute	Reproducibility, % absolute
Moisture (air-dry):		
< 5%	0.1	See Note
≥ 5%	2.5% of mean	
Ash (dry):		
< 10%	0.10	0.15
≥ 10% ≤ 20%	0.15	0.25
> 20%	0.20	0.30
Volatile matter (dry):		
< 10%	0.2	0.5
≥ 10%	0.2	1.0

NOTE: For the moisture determinations, the results obtained will depend on the humidity conditions in the different laboratories. Since these conditions will vary, it is not practical to quote limiting values for reproducibility.

1.8 TEST REPORT. The test report shall contain the following information:

(a) Complete identification of the sample tested.
(b) Reference to this Australian Standard, i.e. AS 1038.3, and the particular method(s) used (e.g. Clause 2.2).
(c) Results of the determinations carried out for moisture, ash, volatile matter and fixed carbon, together with the relevant analysis basis (e.g. air-dry; dry, ash-free), as appropriate.