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METHODS FOR THE ANALYSIS AND TESTING OF BROWN COAL AND BROWN COAL CHAR

Part 1—DETERMINATION OF THE MOISTURE CONTENT OF BROWN COAL

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Australian Coal Association
Australian Institute of Energy
Australasian Institute of Mining and Metallurgy
Bureau of Steel Manufacturers of Australia
Coal Preparation Societies of N.S.W. and Queensland
Confederation of Australian Industry
Department of Minerals and Energy, Victoria
Department of Mineral Resources, N.S.W.
Department of National Development
Electricity Supply Association of Australia
Institution of Engineers, Australia
Joint Coal Board
Queensland Coal Board
Royal Australian Chemical Institute
Universities

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PREFACE

This standard was prepared by the Association's Committee on Coal and Coke under the direction of the Minerals Standards Committee. It is the first standard in a series of standards for the analysis and testing of brown coal and brown coal char.

Procedures for the determination of the moisture in coal and coke as set out in AS 1038, Methods for the Analysis and Testing of Coal and Coke, are not applicable to brown coal because of its high moisture content. It has therefore been necessary to develop a suitable method for the determination of moisture in brown coal. This standard is not equivalent to ISO 1015—Brown Coals and Lignites—Determination of Moisture Content—Direct Volumetric Method.

This standard requires reference to the following standard:

AS 1038 Methods for the Analysis and Testing of Coal and Coke
Part 1—Total Moisture in Hard Coal

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS FOR THE ANALYSIS AND TESTING OF BROWN COAL AND BROWN COAL CHAR

PART 1—DETERMINATION OF THE MOISTURE CONTENT OF BROWN COAL

1 SCOPE. This standard sets out a method for the determination of the total moisture content of brown coal using a two stage procedure, viz air drying followed by drying in nitrogen.

2 DEFINITIONS. For the purpose of this standard, the following definitions apply:

2.1 Total moisture—the moisture in the laboratory sample.

2.2 'Free' moisture—the moisture which is lost by the coal sample in attaining equilibrium with the air to which it is exposed.

2.3 'Air dry' moisture—the moisture in the coal sample after it has attained equilibrium with the air to which it is exposed.

2.4 High purity nitrogen—dry nitrogen gas containing not more than 10 μL of oxygen per litre of nitrogen. A suitable purification train is described in Appendix A.

3 PRINCIPLE. The 'free' moisture in brown coal is determined by spreading a known mass of sample on a tray. The tray plus coal are allowed to attain equilibrium as determined by constancy of mass. The loss in mass during this period is determined, related to the sample taken, and expressed as a percentage which is the 'free' moisture (M_f).

The coal is then crushed to −3.35 mm and mixed. A 10 g sample is taken, weighed and dried in a nitrogen oven for 3 h at 105°C to 110°C in a suitable dish.

The loss in mass during this period is determined, related to the sample taken, and expressed as a percentage which is the 'air dry' moisture (M_{ad}).

The total moisture in the coal is calculated according to the appropriate formulas in Clause 7.

4 APPARATUS. The following apparatus is required:

(a) *Drying oven.* A minimum-free-space oven capable of maintaining a temperature within the range 105°C to 110°C and with provision for passing high purity nitrogen through it at a rate sufficient to change the atmosphere 30 times per hour. A description of such an oven can be found in AS 1038, Part 1.

(b) *Drying cabinet.* An electric drying cabinet, capable of maintaining a temperature range of 38 ± 2°C, with fan-assisted venting.

(c) *Non-corrodible tray.* A tray of such dimensions (approx 0.1 m² in area) that the total sample may be dried on the tray in a layer not exceeding 11.2 mm.

(d) *Weighing vessel.* A shallow vessel of silica or glass with ground edges and fitted with a ground-on cover, or of an inert and heat resistant material with a well-fitting lid.

The diameter of the vessel should be such that the mass of coal layer does not exceed 0.2 g/cm² for a 10 g sample of −3.35 mm coal.

5 LABORATORY SAMPLE. The laboratory sample shall consist of 500 g of −11.2 mm brown coal.

6 PROCEDURE. The procedure, carried out in duplicate, shall be as follows:

(a) Determine the mass (m_1) of a tray to the nearest 0.1 g.

(b) Rapidly spread the laboratory sample evenly over the tray.

NOTE: The loading density should be such that the depth of coal on the tray is not greater than 11.2 mm.

(c) Determine the mass (m_2) of the tray plus coal, to the nearest 0.1 g.

(d) Place the tray and coal in the drying cabinet at 38 ± 2°C for 5 h.

(e) Remove the tray and contents from the cabinet and allow to stand at room temperature for a further 2 days, or until the tray and contents are constant in mass. Re-weigh the tray plus contents to the nearest 0.1 g (m_3).

NOTES:

1. Constancy in mass is assumed when the same values are obtained for 3 consecutive weighings at 1-hour intervals.
2. As an alternative to steps (d) and (e), the tray and coal may be allowed to stand at room temperature until constancy in the mass of the coal is obtained.