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COAL—
MACERAL ANALYSIS

STANDARDS ASSOCIATION OF AUSTRALIA
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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 Ltd

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Coal Preparation Societies of New South Wales and Queensland

Confederation of Australian Industry

CSIRO, Division of Fossil Fuels

Department of Mineral Resources, N.S.W.

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AUSTRALIAN STANDARD

COAL—
MACERAL ANALYSIS

AS 2856—1986

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PREFACE

This standard was prepared by the Association's Committee on Coal and Coke and its Subcommittee on Coal Mining and Geology under the direction of the Minerals Standards Board. It sets out procedures for the maceral analysis of coal and classifies the different coal macerals.

Whereas AS 2515 sets out the method for determining the proportions of the maceral groups in bituminous coal and anthracite, this standard provides a breakdown of those groups into subgroups and individual macerals which are then classified by various properties.

The inertinite and liptinite (exinite) maceral groups include the commonly occurring macerals as set out historically. However the vitrinite maceral group has been completely revised to specify a series of macerals which are applicable to both higher rank and lower rank coals. This is a significant departure from the commonly accepted maceral classification but it provides a more cohesive description of the coal macerals than previous systems.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for COAL—MACERAL ANALYSIS

1 SCOPE. This standard sets out a procedure for the complete maceral analysis of coal, aimed at obtaining the proportion of each maceral occurring within a coal, expressed as a volume percentage. It covers coals of all ranks.

NOTE: The classification of coal macerals is set out in Appendix A, and a glossary of other terms likely to be encountered is given in Appendix B.

2 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 2061 Code of Practice for the Preparation of Hard Coal Samples for Microscopical Examination by Reflected Light

AS 2418 Glossary of Terms Relating to Solid Mineral Fuels

Part 5—Terms Relating to the Petrographic Analysis of Bituminous Coal and Anthracite (Hard Coal)

AS 2486 Methods for Microscopical Determination of the Reflectance of Coal Macerals

AS 2515 Determination of the Maceral Group Composition of Bituminous Coal and Anthracite (Hard Coal)

DIN 58884 Glass Slides, Glass Cover Slips and Immersion Oil for Microscopy

3 PRINCIPLE. A sample of coal is prepared either as a polished particulate block or a polished block in accordance with AS 2061. This is examined using a reflected light microscope and the macerals are identified under an immersion medium by their relative reflectance, colour, morphology and fluorescence characteristics. The proportion of each maceral is determined by a point-count procedure.

4 MATERIALS.

Immersion medium—a low-fluorescing immersion medium, with suitable refractive index, which is compatible with the microscope objective is necessary. If the reflectance of the macerals is to be measured, an immersion oil as specified in AS 2486 should be used. The oil commonly used conforms to that specified in DIN 58884.

5 APPARATUS. The following apparatus is required:

(a) *Reflected light microscope*, as described in AS 2486, having an immersion objective of magnification between 25× and 63× and eyepiece of magnification between 5× and 12.5×. It is desirable that the total magnification, including the tube magnification factor, is nominally between 400× and 600×. The eyepiece shall incorporate a suitable graticule.

The recommended optical system is shown in Fig. 1. Descriptions of the light source, light-controlling apertures and vertical illuminator are given in AS 2486.

(b) *Fluorescence microscope*, having recommended optical system for fluorescence mode as shown in Fig. 1.

Fluorescence colours described in this standard are based on the use of the following:

(i) High pressure mercury lamp (100 W).

(ii) Red suppression and excitation filters BG38 and BG3.

(iii) Dichroic mirror TK 400 (chromatic beam splitter).

(iv) Barrier filter K490.

Other filter combinations are equally acceptable but will result in slightly different fluorescence colours.

CAUTION: The polarizer *must be removed* from the vertical illuminator and the barrier filter *inserted* into the light path *before* irradiating the sample with ultra-violet light. *Failure to do so will cause damage to the polarizer and irreparable damage to the eyes.*

(c) *Point-counting stage*, capable of advancing the specimen by equal steps of such length that only a negligibly small proportion of the particles examined receive more than one count on the same particle. The step-length shall be equal to approximately half the maximum particle diameter and thus shall be 0.5 mm to 0.7 mm for samples with a nominal top size of 1 mm. The stage shall also permit a similar stepped advance in the perpendicular direction. The former movement is preferably actuated by the counter mechanism whereas the perpendicular movement is satisfactorily performed manually.

(d) *Counter*, capable of registering the counts in each category, and preferably the grand total of petrographic components.

(e) *Sample mounting equipment*, comprising carrier slides, modelling clay and levelling press.

6 PROCEDURE. The procedure shall be as follows:

(a) Adjust the microscope for Köhler illumination (see Fig. 1).

(b) Set up the levelled particulate block on the stage, place the immersion medium on the surface of the block, focus and observe the image in the microscope.

NOTE: Initial scanning using an air lens may be helpful in identifying components with refractive indices close to that of the immersion medium (e.g. quartz grains).