

Methods for

Analysis and testing of coal and coke —

Part 106: Ultimate analysis of coal and
coke —

Section 106.5 Determination of forms of
sulfur in coal

ICS 75.160.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee SFI/3, Analysis and testing of coal and coke, upon which the following bodies were represented:

- British Cement Association
- British Coal Corporation
- British Iron and Steel Producers' Association
- Electricity Association
- GAMBICA (BEAMA Ltd.)
- Power Generation Contractors' Association (PGCA (BEAMA Ltd.))

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National foreword

This British Standard has been prepared by SFI/3 and is identical to ISO 157:1996 *Coal — Determination of forms of sulfur*, published by the International Organization for Standardization (ISO) and in the preparation of which the UK played a full part.

BS 1016-106 will form a revision of Parts 6 to 11 of BS 1016. This Section supersedes BS 1016-11:1977 which is withdrawn.

The three principal differences are the use of only one test portion and one treatment regime which determines sulfate sulfur and pyritic iron, the allowance of an additional procedure (atomic absorption) for the determination of iron and modification of the precision requirements for the method for pyritic sulfur with respect to higher sulfur content coals.

BS 1016-106 is part of a rationalized and restructured BS 1016. The Parts numbered from 1 to 21 are gradually being withdrawn and replaced by Parts in the new series. The full list of Parts in the new series, together with corresponding numbering of the old series and related international standards is given in BS 1016 *Analysis and testing of coal and coke* Part 100:1994 *General introduction and methods for reporting results*.

Cross-reference

International standard	Corresponding British Standard
ISO 351:1995	BS 1016 <i>Methods for analysis and testing of coal and coke</i> Part 106: <i>Ultimate analysis of coal and coke</i> Section 106.4: <i>Determination of sulfur content</i> Subsection 106.4.1:1996 <i>High temperature combustion method</i> (Identical)

The technical committee has reviewed the provisions of ISO 1015:1992, ISO 5068:1983 and ISO 5069-2:1983 to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

British Standards related to ISO 331:1983, ISO 334:1992, ISO 1170:1977, ISO 1988:1975 and ISO 2309:1980 are BS 1016 *Methods for analysis and testing of coal and coke* — Section 104.1:1991 *Determination of the moisture content of the general analysis sample of coal*, Subsection 106.4.1:1993 *Eschka method*, Part 100:1994 *General introduction and methods for reporting results*, BS 1017 *Sampling of coal and coke* — Part 1:1989 *Methods for sampling of coal* and — Part 2:1994 *Methods for sampling of coke* respectively.

ISO 1988 and ISO 2309 are being revised and will be published in eight Parts, and it is intended to implement these Parts as identical British Standards, superseding BS 1017.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

Introduction

For many purposes, a knowledge of the total sulfur content of a coal is sufficient, but for certain work it is also necessary to know how the sulfur is distributed between the coal substance and the mineral matter. In particular, such information may be required in connection with coal classification and cleaning.

Sulfur is usually present in coal in three forms, viz:

- a) sulfate sulfur, i.e. the sulfur present in the form of inorganic sulfates;
- b) pyritic sulfur, i.e. the sulfur present in the form of pyrites and marcasite;
- c) organic sulfur, i.e. the sulfur present in the form of organic sulfur compounds.

1.1 Scope

This International Standard specifies methods of determining the sulfate and pyritic sulfur contents of coals, including brown coals and lignites, and of calculating the amount of organic sulfur present.

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 331:1983, *Coal — Determination of moisture in the analysis sample — Direct gravimetric method.*

ISO 334:1993, *Solid mineral fuels — Determination of total sulfur — Eschka method.*

ISO 351:1995, *Solid mineral fuels — Determination of total sulfur — High temperature combustion method.*

ISO 1015:1992, *Brown coals and lignites — Determination of moisture content — Direct volumetric method.*

ISO 1170:1977, *Coal and coke — Calculation of analyses to different bases.*

ISO 1988:1975, *Hard coal — Sampling.*

ISO 5068:1983, *Brown coals and lignites — Determination of moisture content — Indirect gravimetric method.*

ISO 5069-2:1983, *Brown coals and lignites — Principles of sampling — Part 2: Sample preparation for determination of moisture content and for general analysis.*

1.3 Principle

The procedure described in this International Standard utilizes the differential solubilities of sulfates and pyrites in dilute hydrochloric and nitric acids under reflux conditions, such that each can be taken in solution successively and determined directly.

A general schematic representation of the procedure is given in Figure 1.

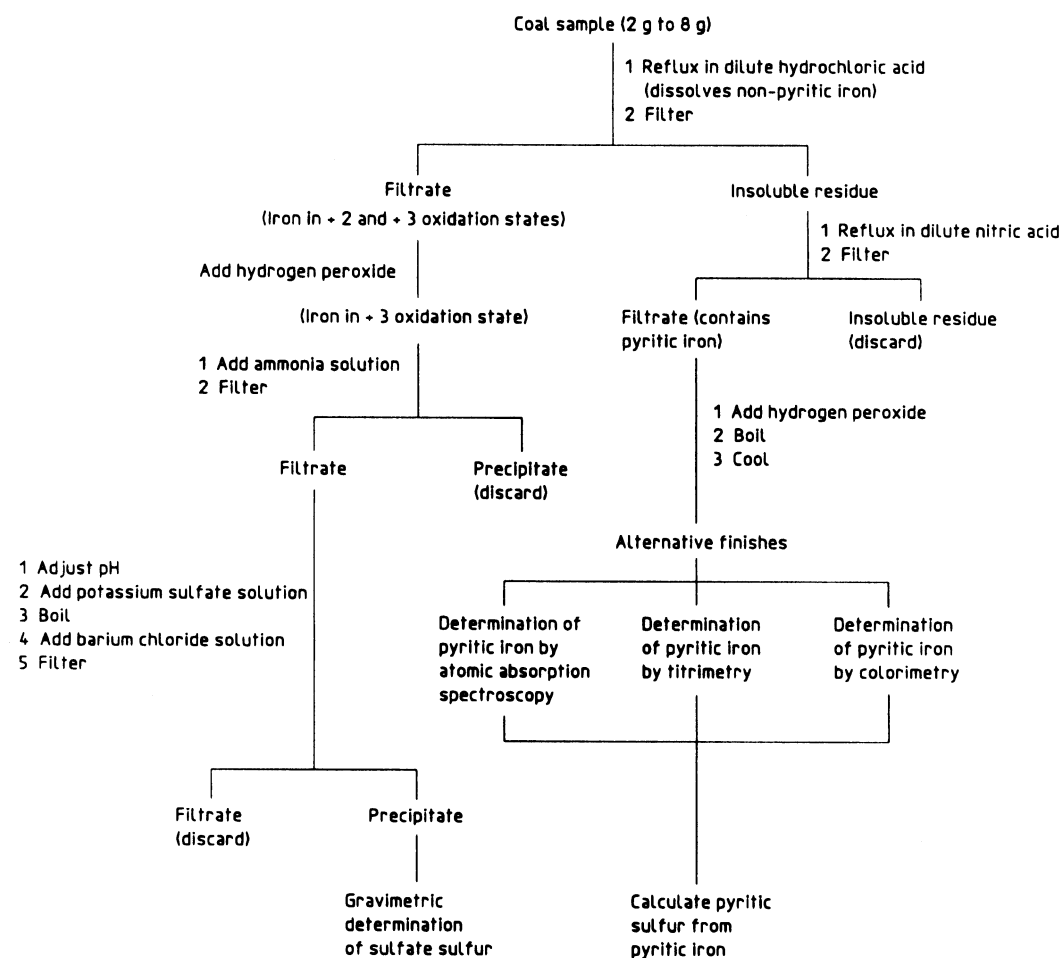
1.4 Preparation of the test sample

The test sample is the general analysis test sample prepared in accordance with ISO 1988 or ISO 5069-2, as appropriate.

Grind about 25 g of the sample to pass a sieve of aperture 75 μm and ensure that its moisture content is in equilibrium with the laboratory atmosphere, exposing it if necessary in a thin layer for the minimum time required to achieve equilibrium.

Before commencing the determination, thoroughly mix the test sample for at least 1 min, preferably by mechanical means.

If the results are to be calculated other than on an air-dried basis (see 6.1) then, after weighing the test portion (see 2.4), determine the moisture content using a further portion of the test sample by the method described in ISO 331, ISO 1015 or ISO 5068, as appropriate.



NOTE — Organic sulfur = Total sulfur – (sulfate sulfur + pyritic sulfur)

Figure 1 — General schematic representation of the procedure