INTERNATIONAL STANDARD

ISO
17247

First edition
2005-05-01

Coal — Ultimate analysis

Charbon — Analyse élémentaire

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 17247:2005
https://standards.iteh.ai/catalog/standards/sist/cd902ba6-d40e-412f-8b97-
02126e13646d/iso-17247-2005

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17247 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 5, *Methods of analysis*.

iTeh STANDARD PREVIEW

(standards.iteh.ai)

ISO 17247:2005
https://standards.iteh.ai/catalog/standards/sist/cd902ba6-d40e-412f-8b97-
02126e13646d/iso-17247-2005

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Coal — Ultimate analysis

1 Scope

This International Standard establishes a practice for the ultimate analysis of coal and is intended for general utilization by the coal industry to provide a basis for comparison of coals.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 333, *Coal — Determination of nitrogen — Semi-micro Kjeldahl method*

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

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

ISO 589, *Hard coal — Determination of total moisture*

ISO 609, *Solid mineral fuels — Determination of carbon and hydrogen — High temperature combustion method*

ISO 625, *Solid mineral fuels — Determination of carbon and hydrogen — Liebig method*

ISO 1171, *Solid mineral fuels — Determination of ash*

ISO 1213-2, *Solid mineral fuels — Vocabulary — Part 2: Terms relating to sampling, testing and analysis*

ISO 11722, *Solid mineral fuels — Hard coal — Determination of moisture in the general analysis test sample by drying in nitrogen*

3 Terms and definitions

For the purposes of this document, the terms and definitions and those given in ISO 1213-2 apply with one exception: the definition of "ultimate analysis" applicable is that specified below.

3.1
ultimate analysis
analysis of a solid mineral fuel reported in terms of its ash, carbon, hydrogen, nitrogen and sulfur contents and oxygen by difference

NOTE   This definition includes hydrogen and oxygen present in the water of constitution of the mineral matter associated with the coal substance and carbon and oxygen present in mineral carbonates.

3.2
oxygen by difference
sum of ash, carbon, hydrogen, nitrogen, moisture and sulfur contents of a solid mineral fuel, expressed as a mass percent, subtracted from 100

4 Principle

Coal is analysed for sulfur, carbon, hydrogen and nitrogen contents moisture, ash. The oxygen by difference is calculated and the results are reported, to the preferred basis, as an *ultimate analysis*.

5 Preparation of sample

Prepare the sample so that it satisfies the requirements of the various test methods (see Table 1).

6 Test methods

Carry out the determination in accordance with Table 1.

Table 1 — Standard test methods used for ultimate analysis

Component	Test method
Carbon and hydrogen	ISO 609 or ISO 625
Nitrogen	ISO 333
Total sulfur	ISO 334 or ISO 351
Ash	ISO 1171
Moisture in the air-dried sample	ISO 11722
Total moisture (if an "as received" reporting basis is required)	ISO 589

7 Expression of results

The parameters as analysed in the sample or calculated by difference, expressed as percentages by mass, may be calculated to different bases using the formulae in Table 2.

See Annex A for an example of ultimate data reported to different bases.

8 Test report

The test report shall include the following information:

a) reference to this International Standard, i.e. ISO 17247:2005;

b) identification of the coal sample tested and the date and time of sampling;

c) method or methods used;

d) results and basis of reporting.

Table 2 — Formulae for calculation of results to different bases

Parameter	As analysed	Excluding hydrogen and oxygen from moisture — Air dried (ad)	Excluding hydrogen and oxygen from moisture — As received (ar)	Reporting basis — Dry (d)	Including hydrogen and oxygen from moisture — As received (ar,m)
Parameter (ash, carbon, nitrogen or sulfur)	P	$P_{ad} = P$	$P_{ar} = P_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right)$	$P_d = P_{ad} \times \left(\dfrac{100}{100 - M_{ad}}\right)$	$P_{ar,m} = P_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right)$
Hydrogen	H	$H_{ad} = H - 0{,}1119 M_{ad}$	$H_{ar} = H_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right)$	$H_d = H_{ad} \times \left(\dfrac{100}{100 - M_{ad}}\right)$	$H_{ar,m} = H_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right) + 0{,}1119 M_{ar}$
Oxygen	$O = 100 - A - C - H - S$	$O_{ad} = O - 0{,}8881 M_{ad}$ or $O_{ad} = 100 - A_{ad} - C_{ad} - H_{ad} - N_{ad} - S_{ad} - M_{ad}$	$O_{ar} = O_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right)$ or $O_a = 100 - A_{ar} - C_{ar} - H_{ar} - N_{ar} - S_{ar} - M_{ar}$	$O_d = O_{ad} \times \left(\dfrac{100}{100 - M_{ad}}\right)$ or $O_d = 100 - A_d - C_d - H_d - N_d - S_d$	$O_{ar,m} = O_{ad} \times \left(\dfrac{100 - M_{ar}}{100 - M_{ad}}\right) + 0{,}888 1 M_{ar}$ or $O_{ar,m} = 100 - A_{ar} - C_{ar} - H_{ar} - N_{ar} - S_{ar}$

Where

C, H, N, S, A	are the percentages by weight of carbon, hydrogen, nitrogen, sulfur and ash, respectively, expressed on the sample as analysed (i.e. no corrections);
M	is the moisture content;
O	is the oxygen by difference.

Annex A
(informative)

Ultimate analysis example

Parameter % m/m	As analysed	Excluding hydrogen and oxygen from moisture		Dry	Including hydrogen and oxygen from moisture
		Air dried (ad)	As received (ar)	(d)	As received (ar,m)
Carbon	70,0	70,0	66,4	72,2	66,4
Hydrogen	4,34	4,00	3,79	4,12	4,69
Nitrogen	1,50	1,50	1,42	1,55	1,42
Sulfur	0,50	0,50	0,47	0,52	0,47
Ash	10,0	10,0	9,5	10,3	9,5
Oxygen by difference	13,7	11,0	10,4	11,3	17,5
Moisture in air-dried sample	—	3,0	—	—	—
Total moisture	—	8,0	—	—	—
Total	100,0	100,0	100,0	100,0	100,0

iTeh STANDARD PREVIEW
(standards.iteh.ai)