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Coal and coke — Proximate analysis

Charbon et coke — Analyse immédiate

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Foreword

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This document was prepared by Technical Committee ISO/TC 27, *Coal and coke*, Subcommittee SC 5, *Methods of analysis*.

This third edition cancels and replaces the second edition (ISO 17246:2010), which has been technically revised.

The main change is as follows:

— the scope has been widened to include coke.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Coal and coke — Proximate analysis

1 Scope

This document establishes a practice for the proximate analysis of coal and coke. It is intended for general utilization by the coal industry to provide a basis for comparison of coals and coke and for the determination of fixed carbon.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 562, *Hard coal and coke — Determination of volatile matter*

ISO 579, *Coke — Determination of total moisture*

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

ISO 687, *Coke — Determination of moisture in the general analysis test sample*

ISO 1171, *Coal and coke — Determination of ash*

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

ISO 5068-1, *Brown coals and lignites — Determination of moisture content — Part 1: Indirect gravimetric method for total moisture*

ISO 5068-2, *Brown coals and lignites — Determination of moisture content — Part 2: Indirect gravimetric method for moisture in the analysis sample*

ISO 5071-1, *Brown coals and lignites — Determination of the volatile matter in the analysis sample — Part 1: Two-furnace method*

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

ISO 20360, *Brown coals and lignites — Determination of the volatile matter in the analysis sample: one furnace method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1213-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

Coal or coke is analysed for its mass fraction of moisture, ash and volatile matter. The fixed carbon is calculated and the results are reported, to the preferred basis, as a proximate analysis.

5 Preparation of sample

Prepare the sample in accordance with the requirements of the various test methods specified in Table 1.

6 Test methods

Carry out the determination in accordance with the test methods specified in Table 1.

Table 1 — Standard test methods for proximate analysis

Parameter	Test method		
	Coke	Hard coal	Brown coal and lignites
Total moisture (if an "as received" reporting basis is required)	ISO 579	ISO 589	ISO 5068-1
Moisture in air-dried sample	ISO 687	ISO 11722	ISO 5068-2
Volatile matter	ISO 562		ISO 5071-1 or ISO 20360
Ash	ISO 1171		

7 Expression of results

The fixed carbon mass fraction $C_{\text{fix,ad}}$, calculated to air-dried basis and expressed as per cent, is given by Formula (1):

$$C_{\text{fix,ad}} = 100 - \left(w_{H_2O.ad} + w_{A.ad} + w_{V.ad}\right) \quad (1)$$

where

$w_{H_2O.ad}$ is the moisture mass fraction in the air-dried sample, expressed as per cent;

$w_{A.ad}$ is the ash mass fraction, calculated to an air-dried basis and expressed as per cent;

$w_{V.ad}$ is the volatile matter mass fraction, calculated to an air-dried basis and expressed as per cent;

100 is the conversion factor from mass fraction in units of dimension one, to per cent.

The result is reported to the nearest 0,1 % mass fraction.

The fixed carbon may also be calculated to other bases using the formulae in Table 2.

Table 2 — Formulae for calculating the results to different bases

Basis of value given	Basis of value wanted		
	As received[a] (ar)	Air-dried (ad)	Dry[a] (d)
Parameter, P (moisture, ash or volatiles)	$P_{ar} = P_{ad} \times \frac{100 - w_{H_2O.ar}}{100 - w_{H_2O.ad}}$	—	$P_d = P_{ad} \times \frac{100}{100 - w_{H_2O.ad}}$

[a] Where w_{H_2O} is the moisture mass fraction.

For further calculations, see ISO 1170.

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

8 Test report

The test report shall include the following information:

a) a reference to this document, i.e. ISO 17246:2024;

b) the identification of the sample tested;

c) the results and basis of reporting.

Annex A
(informative)

Example of a proximate analysis

Parameter	As received (ar) % mass fraction	Air-dried (ad) % mass fraction	Dry (d) % mass fraction
Total moisture, $w_{H_2O.ar}$	8,0	—	—
Moisture in air-dried sample, $w_{H_2O.ad}$	—	3,0	—
Ash, w_A	9,5	10,0	10,3
Volatile matter, w_V	19,0	20,0	20,6
Fixed carbon, C_{fix}	63,5	67,0	69,1
Total	100,0	100,0	100,0