INTERNATIONAL STANDARD

ISO 1170

Fourth edition
2020-09

Coal and coke — Calculation of analyses to different bases

Charbon et coke — Calculs pour les analyses par rapport à différentes bases

Reference number
ISO 1170:2020(E)

© ISO 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normatives references ... **1**

3 Terms, definitions and symbols ... **1**
3.1 Terms and definitions ... 1
3.2 Symbols ... 1

4 Principle ... **2**

5 Calculations for coal analyses ... **2**
5.1 General ... 2
5.2 Procedure ... 2
5.3 Carbon ... 3
5.4 Hydrogen ... 3
5.5 Nitrogen ... 3
5.6 Sulfur ... 3
5.7 Oxygen ... 4
5.8 Chlorine ... 4
5.9 Volatile matter ... 4
5.10 Net calorific value ... 5

6 Calculations for coke analyses ... **5**

7 Table for calculation to different bases ... **5**

Annex A (informative) **Mineral matter** ... **6**

Bibliography ... **7**

© ISO 2020 – All rights reserved

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 1170:2013), of which it constitutes a minor revision. This edition includes the following changes compared to the previous edition:

— updating of referenced documents;

— adding Terms and Definitions to form Clause 3 “Terms, Definitions and Symbols”

— use of “mass fraction” instead of “content”;

— converting Annex A from normative to informative.

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.

© ISO 2020 – All rights reserved

Coal and coke — Calculation of analyses to different bases

1 Scope

This document gives equations that allow analytical data relating to coal and coke to be expressed on the various different bases in common use. Consideration is given to corrections that can be applied to certain determined values for coal prior to their calculation to other bases.

2 Normatives 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 602, *Coal — Determination of mineral matter*

3 Terms, definitions and symbols

3.1 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

3.2 Symbols

The symbols used in the subsequent clauses are as follows, with suffixes (separated by a comma) "ad" (air-dried), "ar" (as-received), "d" (dry), "daf" (dry, ash-free) or "dmmf" (dry, mineral-matter-free) where appropriate.

w_A ash, expressed as percent mass fraction

w_C carbon mass fraction, expressed as percent

w_{Cl} chlorine mass fraction, expressed as percent

$w_{Cl,inorg}$ inorganic chlorine mass fraction, expressed as percent

w_{CO_2} carbon dioxide mass fraction, expressed as percent

w_H hydrogen mass fraction, excluding hydrogen in the moisture, but including the hydrogen from water of hydration in minerals, expressed as percent

w_{H_2O} moisture mass fraction, expressed as percent

w_h water of hydration in the mineral matter mass fraction, expressed as percent

w_{MM} mineral matter mass fraction, expressed as percent (see Annex A)

w_N nitrogen mass fraction, expressed as percent

© ISO 2020 – All rights reserved

w_O oxygen mass fraction, excluding oxygen in the moisture but including the oxygen from water of hydration in minerals, expressed as percent

$w_{S,o}$ organic sulfur mass fraction, expressed as percent

$w_{S,p}$ pyritic sulfur mass fraction, expressed as percent

$w_{S,s}$ sulfate sulfur mass fraction, expressed as percent

$w_{S,T}$ total sulfur mass fraction, expressed as percent

w_V volatile matter mass fraction, expressed as percent

F_{Cl} national correction factor for the estimation of the inorganic chlorine mass fraction

F_h national correction factor for the estimation of water of hydration

F_{MM} national correction factor for the estimation of the mineral matter (see Annex A)

4 Principle

In order to convert an analytical result expressed on one basis to another basis, it is multiplied by a factor calculated from the appropriate formulae (see Table 1) after insertion of the requisite numerical values.

5 Calculations for coal analyses

5.1 General

In International Standards covering the analysis of coal, it is generally specified that the determination shall be carried out on an air-dried test sample. However, in making use of these analyses, it is sometimes necessary to express or report the results on some other basis. The bases in common use are “air-dried”, “as-received”, “dry”, “dry, ash-free”, and “dry, mineral-matter-free”.

5.2 Procedure

Any analytical value (except net calorific value) on a particular basis may be converted to any other basis by multiplying it by the appropriate factor calculated from the formulae given in Table 1, after insertion of the requisite numerical values for the symbols (for determination of moisture, see ISO 589, ISO 5068-1, ISO 5068-2 or ISO 11722 (as appropriate); for ash, see ISO 1171).

However, in some determinations, there is a direct involvement of the mineral matter and, in these cases, it is essential to apply a correction to the air-dried result prior to its calculation to the dry, mineral-matter-free basis. This correction is dependent on the nature, as well as the quantity, of the mineral matter present. The mineral matter is determined using ISO 602. If it is not possible or not desired to determine the mineral matter for any given sample, the formula recommended by the national standards organization of the country of origin of the sample should be used and should be quoted in full, together with the analysis. An example for a formula and further explanations are given in Annex A. All the determinations that may be expressed on the dry, mineral-matter-free basis are considered individually below.

If it is necessary to calculate an analytical result expressed on the dry, mineral-matter-free basis back to any other basis, then it is essential that any correction deducted during the application of any Formulae (1) to (10) inclusive be added back to the dry, mineral-matter-free value before applying the appropriate formula from Table 1.

© ISO 2020 – All rights reserved