INTERNATIONAL STANDARD

ISO 5073

Fourth edition
2021-12

Brown coals and lignites — Determination of humic acids

Charbons bruns et lignites — Dosage des acides humiques

Reference number
ISO 5073:2021(E)

COPYRIGHT PROTECTED DOCUMENT

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**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principle **2**
4.1 Total humic acids 2
4.2 Free humic acid 2
5 Reagents **2**
6 Apparatus **3**
7 Sample **3**
8 Procedure **3**
8.1 Extraction of total humic acids 3
8.2 Extraction of free humic acid 3
8.3 Determination of humic acids in extracts 4
8.3.1 For total humic acids 4
8.3.2 For free humic acids 4
9 Calculation and expression of results **4**
10 Precision **5**
10.1 Repeatability limit 5
11 Test report **5**
Annex A (normative) **Determination of the ratio of carbon mass fraction to humic acids mass fraction of brown coals and lignites** **6**

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 5073:2013), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— referenced documents have been updated;

— terms and definitions have been added;

— sample has been added;

— determination of humic acids in extracts has been amended;

— calculation and expression of results have been amended;

— precision has been amended;

— test report has been amended;

— Annex A has been amended.

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

Introduction

In this document, humic acids are determined by the volumetric method with titration of extracts.

The test is empirical and, in order to ensure reproducible results, it is essential that the composition of the extraction solution, the temperature and the time of extraction be carefully controlled. The value 0,59, which is the average ratio of carbon content of humic acids for many brown coals and lignites, has been proved to be applicable. Another value may also be used, predetermined as described in Annex A, and applicable to different countries or locations.

Brown coals and lignites — Determination of humic acids

1 Scope

This document specifies volumetric methods for the determination of total humic acids and free humic acid of brown coals and lignites.

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 1171, *Solid mineral fuels — Determination of ash*

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

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

ISO 13909-4, *Hard coal and coke — Mechanical sampling — Part 4: Coal — Preparation of test samples*

ISO 18283, *Coal and coke — Manual sampling*

3 Terms and definitions

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

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 https://www.electropedia.org/

3.1
humic acids
group of complex organic, amorphous compounds of high relative molecular mass which occur as free acid and as metal salts (humates)

3.2
total humic acids
humic acids (3.1) extracted by an alkaline sodium pyrophosphate solution

3.3
free humic acid
humic acid (3.1) extracted by a sodium hydroxide solution