International Standard

ISO 1952

Coal — Determination of extractable metals in dilute hydrochloric acid

Charbon — Détermination des métaux extractibles dans l'acide chlorhydrique dilué

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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 1952:2008), which has been technically revised.

The main changes are as follows:

— the title and scope has been modified to specifically refer to coal;

— the normative references have been updated;

— the mandatory terms and definitions clause (Clause 3) has been added; subsequent clauses have been renumbered;

— Formula (1) has been modified;

— the test report has been modified.

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Introduction

Sodium, potassium, calcium, iron and magnesium are commonly present in coal. They can contribute significantly to coal-utilization problems, such as boiler-tube fouling and ash disposal; they also affect product quality and gaseous emissions from combustion processes.

Research indicates that the amounts of alkaline and earth-alkaline metals extractable with dilute hydrochloric acid are more closely related to the fouling/slagging properties of coal than are the total amounts of the metals.

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Coal — Determination of extractable metals in dilute hydrochloric acid

1 Scope

This document describes the extraction from coal by dilute hydrochloric acid and determination of extractable sodium, potassium, calcium, iron and magnesium.

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 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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

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

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

ISO 18283, *Coal and coke — Manual sampling*

3 Terms and definitions

No terms and definitions are listed in this document.

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

A portion of the sample is extracted with hot, dilute hydrochloric acid after wetting of the coal with alcohol. All forms of sodium, potassium, magnesium, calcium, iron that are exchangeable or extractable with the hydrochloric acid are extracted from the coal. After removal of the residual solid mineral fuel by filtration, the concentrations of the elements in the filtrate are determined by atomic absorption spectrometry.

The mass concentrations of the elements may also be determined by inductively coupled plasma optical emission spectrometry (ICP-OES) if the instrument has been validated for the quantification in an appropriate manner.

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