
**Selection of methods for the
determination of trace elements in coal**

*Sélection des méthodes de détermination des éléments en traces
dans le charbon*



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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 5, *Methods of analysis*.

This second edition cancels and replaces the first edition (ISO 23380:2008), of which it constitutes a minor revision.

Introduction

The determination of trace elements in coal and coke is becoming more important due to the considerable emphasis being placed on the effect of these elements on the environment. In order to have accurate and precise results for the analysis of trace elements, it is imperative that standard methods be available and that these methods be based on reliable procedures.

The objective of this International Standard is to assist in the selection of the appropriate methods available to determine the common trace elements in coal.

Selection of methods for the determination of trace elements in coal

1 Scope

This International Standard provides guidance on the selection of methods used for the determination of trace elements in coal. The trace elements of environmental interest include antimony, arsenic, beryllium, boron, cadmium, chlorine, chromium, cobalt, copper, fluorine, lead, manganese, mercury, molybdenum, nickel, selenium, thallium, vanadium, and zinc. The radioactive trace elements thorium and uranium can be added to this list.

This International Standard does not prescribe the methods used for the determination of individual trace elements. The analysis of appropriate certified reference materials (CRMs) is essential to confirm the accuracy of any method used (see ISO Guide 33).

2 Normative references

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

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

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO Guide 33, *Reference Materials — Good practice in using reference materials*

3 Terms and definitions

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

4 Abbreviations

AAS	atomic absorption spectrometry
AFS	atomic fluorescence spectrometry
CVAAS	cold-vapour atomic absorption spectrometry
GFAAS	graphite-furnace atomic absorption spectrometry
IC	ion chromatography
ICP-AES	inductively coupled plasma atomic emission spectrometry — often referred to as ICP-OES, i.e. inductively coupled plasma optical emission spectrometry
ICP-MS	inductively coupled plasma mass spectrometry
INAA	instrumental neutron activation analysis
ISE	ion-selective electrode
XRF	x-ray fluorescence spectrometry