

ISO/~~DIS~~FDIS 18227:~~2025~~(~~en~~)

ISO/TC 190/SC 3/~~WG 1~~

~~Date: 2025-07-09~~

Secretariat: DIN

Date: 2025-08-28

## Environmental solid matrices — Determination of elemental composition by X-ray fluorescence spectrometry

*Matrices solides environnementales — Détermination de la composition élémentaire par spectrométrie de fluorescence X*

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

**FDIS stage**

<https://standards.iteh.ai/catalog/standards/sist/48-fb5b9a7c5aaf/iso-fdis-18227>

© ISO ~~2024~~2025

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~~E-mail: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

ISO/FDIS 18227

<https://standards.iteh.ai/catalog/standards/iso/4889d457-dff4-4acc-8f48-fb5b9a7c5aaf/iso-fdis-18227>

## Contents

ISO/FDIS 18227 .....	1
Foreword.....	iv
Introduction .....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions .....	1
4 Safety remarks .....	3
5 Principle .....	3
6 Apparatus .....	3
7 Reagents .....	4
8 Interferences and sources of error.....	5
9 Sample preparation .....	5
9.1 General.....	5
9.2 Drying and determination of dry mass.....	6
9.3 Preparation of pressed pellet.....	6
9.4 Preparation of fused beads .....	6
10 Procedure .....	7
10.1 Analytical measurement conditions .....	7
10.2 Calibration.....	8
10.3 Analysis of the samples.....	13
11 Quality control .....	14
11.1 Drift correction procedure .....	14
11.2 Blank test .....	14
11.3 Reference materials.....	14
11.4 Performance data .....	14
12 Calculation of the result.....	14
13 Test report.....	14
Annex A (informative) Semi-quantitative screening analysis of waste, sludge and soil samples	16
Annex B (informative) Examples for operational steps of the sample preparation for soil and waste samples .....	19
Annex C (informative) Suggested analytical lines, crystals and operating conditions.....	29
Annex D (informative) List of reference materials applicable for XRF analysis.....	31
Annex E (informative) Validation .....	32
Bibliography .....	43

## **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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO ~~had~~ had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical and physical characterization*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 444, *Environmental characterization of solid matrices*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18227:2014), which has been technically revised.

The main changes are as follows:

- the contents of the two almost identical standards ISO 18277:2014 and EN 15309:2007 have been combined;
- normative references have been revised.

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](http://www.iso.org/members.html).

## Introduction

X-ray fluorescence (XRF) spectrometry is a fast and reliable method for the quantitative analysis of the total content of certain elements within different matrices.

The quality of the results obtained depends very closely on the type of instrument used, e.g. bench top or high performance, energy dispersive or wavelength dispersive instruments. When selecting a specific instrument several factors should be considered, such as the matrices to be analysed, elements to be determined, detection limits required and the measuring time. The quality of the results depends on the element to be determined and on the surrounding matrix.

Due to the wide range of matrix compositions and the lack of suitable reference materials in the case of inhomogeneous matrices such as waste, it is generally difficult to set up a calibration with matrix- matched reference materials.

Therefore, this standard document describes two different procedures:

- a quantitative analytical procedure required for homogeneous solid waste, soil and soil-like material, where the calibration is based on matrix-matched standards;
- an optional XRF screening method for solid and liquid material as waste, sludge and soil in Annex A which provides a total element characterization at a semi-quantitative level, where the calibration is based on matrix-independent calibration curves, previously set up by the manufacturer.

Itih Standards  
(<https://standards.itih.ai>)  
Document Preview

ISO/FDIS 18227

<https://standards.itih.ai/catalog/standards/iso/4889d457-dff4-4acc-8f48-fb5b9a7c5aaf/iso-fdis-18227>



# Environmental solid matrices — Determination of elemental composition by X-ray fluorescence spectrometry

## 1 Scope

This document specifies the procedure for a quantitative determination of major and trace element concentrations in homogeneous solid waste, soil, soil-like material and sludge by energy dispersive X-ray fluorescence (EDXRF) spectrometry or wavelength dispersive X-ray fluorescence (WDXRF) spectrometry using a calibration with matrix-matched standards.

This document is applicable for the following elements: Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Br, Rb, Sr, Y, Zr, Nb, Mo, Ag, Cd, Sn, Sb, Te, I, Cs, Ba, Ta, W, Hg, Tl, Pb, Bi, Th and U. Concentration levels between a mass fraction of approximately 0,000 1 % and 100 % can be determined depending on the element and the instrument used.

An optional XRF screening method for solid and liquid material as waste, sludge and soil is added in [Annex A](#) which provides a total element characterization at a semi-quantitative level, where the calibration is based on matrix-independent calibration curves, previously set up by the manufacturer.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/>

### 3.1 ~~3.1~~

#### absorption edge

jump of the mass absorption coefficient at a specific wavelength or energy

### 3.2 ~~3.2~~

#### analytical line

specific characteristic X-ray spectral line of the atom or ion of the analyte used for determination of the analyte content

### 3.3 ~~3.3~~

#### continuous radiation

electromagnetic radiation produced by the acceleration of a charged particle, such as an electron, when deflected by another charged particle, such as an atomic nucleus