

BS ISO 11262:2011



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Soil quality — Determination of total cyanide

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National foreword

This British Standard is the UK implementation of ISO 11262:2011. It supersedes BS ISO 11262:2003, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/4, Soil quality.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Soil quality — Determination of total cyanide

Qualité du sol — Dosage des cyanures totaux



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Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
4.1 Direct liberation of hydrogen cyanide using orthophosphoric acid	2
4.2 Determination of total cyanide content	2
5 Reagents	2
5.1 Reagents for liberation and absorption of cyanide	2
5.2 Reagents for the photometric determination of cyanide	3
5.3 Reagents for the titrimetric determination of cyanide	3
6 Apparatus	4
7 Sample preservation and preparation	5
7.1 Sample preservation	5
7.2 Sample preparation	5
8 Direct liberation using orthophosphoric acid	6
8.1 Procedure	6
8.2 Blank test	6
9 Determination of cyanide — Photometric method	7
9.1 Applicability	7
9.2 Procedure	7
9.3 Preparation of the calibration graph	7
9.4 Calculation	7
10 Determination of cyanide — Titrimetric method using an indicator	8
10.1 Applicability	8
10.2 Procedure	8
10.3 Calculation	9
11 Expression of results	9
12 Precision	10
13 Test report	10
Annex A (informative) Precision data	11
Annex B (informative) Extraction with sodium hydroxide solution and subsequent liberation using orthophosphoric acid	12
Annex C (informative) Comparison of the direct liberation of total cyanide and sodium hydroxide extraction with subsequent liberation	15
Bibliography	16

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11262 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

This second edition cancels and replaces the first edition (ISO 11262:2003), which has been technically revised. This edition specifies two methods for the determination of the total cyanide content. It is only validated for direct liberation using orthophosphoric acid, Annex A provides new validation data. A method with an alkaline extraction before liberation is described in Annex B. In addition, the text has been editorially revised.

Introduction

Cyanides form simple salts with alkali earth cations and ionic complexes of varying strengths with numerous metal cations; the stability of these compounds is dependent on the cation and on the pH. Cyanide forms complexes with gold, mercury, cobalt and iron that are very stable even under mildly acidic conditions. Metal cyanide complexes also form salt-type compounds with alkali or heavy-metal cations, such as potassium ferrocyanide ($K_4[Fe(CN)_6]$) or copper ferrocyanide ($Cu_2[Fe(CN)_6]$). Cyanides can be present in soil both as cyanide ions and as complex cyanides.

Determination of cyanides can be carried out under different conditions. When using mild acidic conditions (e.g. pH = 4), only so-called “easily liberatable cyanides” (also known as “weak-acid dissociable cyanides”) are measured. Under strong acidic conditions (e.g. pH = 1), all cyanides (both easily liberatable and complex cyanides) can be determined, these are called “total cyanides”.

A number of studies in soil samples have demonstrated that it is impossible to obtain reliable results for easily liberatable cyanide (ELC) using a manual ELC cyanide extraction/reflux method. Consequently, this revised International Standard does not include an ELC method.

NOTE ISO 17380 gives details of both an automated ELC method and a total cyanide method.

This International Standard specifies manual methods for the determination of total cyanide only. An alternative method for alkaline extraction prior to liberation using orthophosphoric acid is described in Annex B.

Soil quality — Determination of total cyanide

WARNING — Hydrogen cyanide and its salts are toxic. Therefore, care shall be exercised when manipulating cyanide-contaminated samples. Volatile hydrogen cyanide (with a smell of bitter almonds) is released from acidified solutions containing cyanide salts. As a minimum, all work shall be carried out in a fume hood and suitable plastic gloves shall be worn when handling contaminated samples.

Analytical wastes containing cyanides shall be placed in a special container with a lid, in the laboratory, for temporary storage. This container shall be clearly marked with labels such as “toxic waste” or “cyanides”. Periodically, the container shall be emptied and the wastes containing cyanides disposed of as “special waste” by an appropriate waste-management contractor.

1 Scope

This International Standard is applicable to as-received (field-moist) samples and specifies two different procedures for the liberation of cyanide from the soil:

- direct liberation of hydrogen cyanide using orthophosphoric acid (normative);
- extraction with sodium hydroxide solution and subsequent liberation using orthophosphoric acid (informative, see Annex B).

The liberated cyanide is determined either by a photometric method or a titrimetric method using an indicator.

The method is applicable to all types of soil.

Under the conditions specified in this International Standard, the lower limit of application is 0,5 mg/kg of total cyanide (expressed on the as-received basis) for photometric determination and 10 mg/kg for titrimetric determination.

NOTE Using the alkaline extraction followed by liberation using phosphoric acid, the lower limit of application is 1 mg/kg of total cyanide (expressed on the as-received basis) for photometric determination and 30 mg/kg for titrimetric determination.

2 Normative references

The following referenced documents are indispensable for the application 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 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 9297, *Water quality — Determination of chloride — Silver nitrate titration with chromate indicator (Mohr's method)*

ISO 11464, *Soil quality — Pretreatment of samples for physico-chemical analysis*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO 14507, *Soil quality — Pretreatment of samples for determination of organic contaminants*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.