
**Soil quality — Determination of nitrate,
nitrite and ammonium in field-moist soils
by extraction with potassium chloride
solution —**

**Part 1:
Manual method**

*Qualité du sol — Dosage des nitrates, des nitrites et de l'ammonium
dans les sols bruts par extraction au moyen d'une solution de chlorure
de potassium —*

Partie 1: Méthode manuelle



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Contents		Page
Foreword.....		iv
1	Scope.....	1
2	Normative references	1
3	Principle	1
4	Handling of the soil samples	1
5	Laboratory sample	2
6	Procedure.....	2
6.1	Extraction.....	2
6.2	Determination of the sum of nitrate and nitrite.....	3
6.3	Determination of nitrite.....	9
6.4	Determination of ammonium ions.....	11
7	Test report.....	13
Bibliography		14

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 14256-1 was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

ISO/TS 14256 consists of the following parts, under the general title *Soil quality — Determination of nitrate, nitrite and ammonium in field-moist soils by extraction with potassium chloride solution*:

- *Part 1: Manual method*
- *Part 2: Automated method*

Soil quality — Determination of nitrate, nitrite and ammonium in field-moist soils by extraction with potassium chloride solution —

Part 1: Manual method

1 Scope

This part of ISO 14256 describes a method for the determination of nitrate, nitrite and ammonium in a 1 mol/l potassium chloride extract of field-moist soil samples.

This part of ISO 14256 is applicable to all types of soils homogenized by suitable methods.

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 11465:1993, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*.

ISO 14256-2, *Soil quality — Determination of nitrate, nitrite and ammonium in field-moist soils by extraction with potassium chloride solution — Part 2: Automated method*.

3 Principle

The homogenized soil samples are extracted by means of 1 mol/l potassium chloride solution. The concentrations of the inorganic nitrogen compounds nitrate, nitrite and ammonium in the extracts are determined using spectrophotometric methods.

4 Handling of the soil samples

The samples shall be protected from warming during the sampling procedure.

The transportation to the laboratory shall be organized in such a way that no warming occurs. Transportation in a cool box is recommended, especially in late spring and summer.

If the samples are analysed within three days, it is sufficient to store them at 4 °C, otherwise they should be stored at –20 °C (deep-frozen) which enables storing for several weeks, without any significant change in the content of mineral nitrogen.

When the content of mineral nitrogen is determined in deep-frozen soil samples, the temperature and the duration of the thawing process shall be controlled. The samples can be thawed at room temperature, if they are homogenized and extracted within 4 h after beginning of thawing. Thawing at 4 °C is also possible, but the thawing period should not exceed 48 h.

The time period necessary for thawing is greatly influenced by the size of the sample. It is recommended that the soil sample be as small as practicable for the analysis before deep-freezing.

5 Laboratory sample

The laboratory sample is made by homogenizing the original, or the deep-frozen and thawed, soil sample. Homogenizing can be done by mixing thoroughly the total soil sample, either by hand or using a mechanical mixer which ensures that soil aggregates are divided into particles less than 5 mm in diameter.

Use rubber gloves when mixing the soil by hand.

Use part of the laboratory sample to determine the water content in accordance with ISO 11465.

If soil samples cannot be analysed within the time periods given above for fresh soil samples, and therefore have to be deep-frozen, it is recommended to homogenize them before freezing and to freeze only the amount of soil which is necessary for analysis (see Clause 4).

6 Procedure

6.1 Extraction

6.1.1 Principle

The field-moist soil is extracted with 1 mol/l potassium chloride solution at a 1:5 ratio (mass concentration) at $20\text{ °C} \pm 2\text{ °C}$. After 1 h of extraction, the solution is centrifuged for the determination of inorganic nitrogen compounds on the supernatant solution.

In other climatic conditions, a different constant temperature may be chosen. The extraction temperature used should be mentioned in the test report.

NOTE 1 The extraction is performed at a nearly constant temperature of $20\text{ °C} \pm 2\text{ °C}$ because the amount of extractable ammonium nitrogen is influenced by the temperature during the extraction.^[1]

Centrifugation is preferred because most filter papers either absorb ammonium or may be contaminated. When the extracts are filtered, the filter papers should be stored at least one week in a desiccator over concentrated sulfuric acid or a drying medium containing sulfuric acid, and the first 20 ml of the filtrate shall be discarded.

Alternatively, clear supernatant solutions may be obtained by letting the soil settle for 4 h at a temperature not exceeding 4 °C.

6.1.2 Reagents

Use only reagents of recognized analytical grade.

6.1.2.1 Water with a specific conductivity not higher than 0,2 mS/m at 25 °C (Grade 2 water according to ISO 3696)

6.1.2.2 Potassium chloride solution, $c(\text{KCl}) = 1\text{ mol/l}$.

Dissolve 74,55 g of potassium chloride (KCl) in water (6.1.2.1). Make up with water to 1 l.