
**Water quality — Determination of
nitrogen —**

Part 2:

Determination of bound nitrogen, after
combustion and oxidation to nitrogen dioxide,
using chemiluminescence detection

Qualité de l'eau — Dosage de l'azote —

*Partie 2: Dosage de l'azote lié, après combustion et oxydation en dioxyde
d'azote, par détection chimiluminescente*



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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 11905-2, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical, biochemical methods*.

This document is being issued in the Technical Report (type 2) series of publications (according to subclause G.3.2.2 of part 1 of the ISO/IEC Directives, 1995) as a "prospective standard for provisional application" in the field of water quality because there is an urgent need for guidance on how standards in this field should be used to meet an identified need.

This document is not to be regarded as an "International Standard". It is proposed for provisional application so that information and experience of its use in practice may be gathered. Comments on the content of this document should be sent to the ISO Central Secretariat.

A review of the Technical Report (type 2) will be carried out not later than three years after its publication with the options of: extension for another three years; conversion into an International Standard; or withdrawal.

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

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ISO 11905 consists of the following parts, under the general title *Water quality — Determination of nitrogen*

- *Part 1: Method using oxidative digestion with peroxodisulfate*
- *Part 2: Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, using chemiluminescence detection* (Technical Report)

Annexes A to D of this Technical Report are for information only.

Introduction

It is absolutely essential that the tests described in this Technical Report be carried out by suitably qualified staff.

This Technical Report specifies a method for the determination of bound nitrogen, after oxidation of inorganic and organic nitrogen compounds by combustion to nitric oxide and oxidation (by conversion with ozone) to electronically excited nitrogen dioxide. Quantification is carried out by chemiluminescence detection.

The procedure described is the reference method. Whilst staying within the scope of this Technical Report, it is permissible to use such alternatives as given in annex A, provided that their performance is equal to or better than that given in annex C, when calculated using the procedures given in ISO 5725-2, and when the comparison of performance data between this Technical Report and any alternative technique is carried out using the procedures described in ISO 2854.

All references to mass concentrations of nitrogen are expressed in milligrams of nitrogen per litre of solution (i.e. mg/l).

Water quality — Determination of nitrogen —

Part 2:

Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, using chemiluminescence detection

1 Scope

This Technical Report specifies a method for the determination of nitrogen present in water in the form of free ammonia, ammonium, nitrite, nitrate and organic compounds capable of conversion to nitrogen dioxide under the oxidative conditions described. Determination is carried out instrumentally using chemiluminescence detection. Dissolved nitrogen gas is not determined by this method.

This method is applicable to the analysis of natural freshwater, sea water, drinking water, surface water, waste water and treated sewage effluent.

1.1 Range

The concentration range of the method will depend on the injection volume used, which is instrument specific. Nitrogen can be determined in the range up to 200 mg/l. Higher concentrations can, if necessary, be determined by dilution of the sample.

1.2 Limit of detection

The limit of detection will depend on the instrument used. Using a suitable injection volume, the limit of detection is typically 0,5 mg/l.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Technical Report. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Technical Report are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*.

ISO 5667-3:1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*.

3 Principle

Oxidation of the sample containing nitrogen, by combustion in an oxygen atmosphere at 1 000 °C, to nitric oxide. Reaction with ozone to give electronically excited nitrogen dioxide (NO₂*). Quantification of nitrogen concentration by chemiluminescence detection.

4 Reagents

4.1 General requirements

During the analysis, use Grade 3 purity water as specified in ISO 3696 and only reagents of recognized analytical grade. The content of bound nitrogen in water used for the preparation of calibration solutions shall be negligibly low compared with the lowest concentration to be determined.