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Water quality — Estimation of measurement uncertainty based on validation and quality control data

Qualité de l'eau — Estimation de l'incertitude de mesure basée sur des données de validation et de contrôle qualité

Second edition

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FDIS stage

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Foreword

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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).

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Field Code Changed

This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

This second edition cancels and replaces the first edition (ISO 11352:2012), which has been technically revised.

The main changes are as follows:

- requirements for measurements for estimation of uncertainty component for the within-laboratory reproducibility have been changed from at least eight to ~~twenty~~20 replicates with exception of a first estimation,
- the use of data from target control charts estimation of precision is described
- a new informative annex has been introduced to describe how to divide the measurement range into two parts for constant absolute and constant relative uncertainties,
- In Annex B~~Annex B~~ (former Annex A~~Annex A)~~) the estimation of the standard uncertainty from range control charts has been changed to the use of pooled standard deviation,
- the examples in Annex C~~Annex C~~ have been adjusted,
- this document has been editorially 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.

Introduction

The basic principles of the estimation of measurement uncertainty are set out in ISO/IEC Guide 98-3[1]. There are several ways of estimating measurement uncertainty depending on the purpose of the estimation and the available data; Eurolab TR 1/2007[2] gives an overview of the main approaches.

This document specifies a set of procedures to enable laboratories to estimate the measurement uncertainty of their results, using an approach based on validation and quality control data. Validation data can be used for first estimates of the measurement uncertainty, but should later be confirmed with data from quality control, when the method is in routine use. It is structured in a way that is applicable to analysts that do not have a thorough understanding of metrology or statistics.

Nordtest TR 537[3] has been used as a basis for developing this document. The approach taken is "top-down", contrary to the mainly "bottom-up" strategy adopted in ISO/IEC Guide 98-3[1].

It is statistically acceptable to combine the uncertainty components associate with within-laboratory reproducibility for random error and the uncertainty associated the bias for systematic error into a single measure of uncertainty. The sources of data for this approach are validation and analytical quality control. The experimental approach specified in this document enables a good coverage of the sources of variation observed during routine use of the analytical method.

Water quality — Estimation of measurement uncertainty based on validation and quality control data

1 Scope

This document specifies approaches for the estimation of measurement uncertainty of chemical and physicochemical methods in single laboratories based on validation data and quality control data obtained within the field of water analysis. However, this approach can also be used in many other areas of chemical analysis.

NOTE 1 The principles of the estimation of uncertainty specified in this document are consistent with the principles described in ISO/IEC Guide 98-3.

In this document, the quantification of measurement uncertainty relies on performance characteristics of a measurement procedure obtained from validation and the results of internal and external quality control.

NOTE 2 The approaches specified in this document are mainly based on Nordtest TR 537[0][3], but also QUAM[0][4], and Eurolab TR 1/2007[0][2].

NOTE 3 This document only addresses the evaluation of measurement uncertainty for results obtained from quantitative measurement procedures. The uncertainties associated with results obtained from qualitative procedures are not considered.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC Guide 99 and the following 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~~
precision
measurement precision
closeness of agreement between indications or measured quantity values obtained by replicate measurements on the same or similar objects under specified conditions

[SOURCE: ISO/IEC Guide 99:2007 2.15, modified — Notes 1 to 4 to entry have been deleted.]