



BSI Standards Publication

Water quality — Calculation of biological equivalence (BEQ) concentrations

National foreword

This British Standard is the UK implementation of EN ISO 23196:2023. It is identical to ISO 23196:2022. It supersedes BS ISO 23196:2022, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/3/5, Biological Methods.

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

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Published by BSI Standards Limited 2023

ISBN 978 0 539 26195 0

ICS 13.060.70

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2022.

Amendments/corrigenda issued since publication

Date	Text affected
30 September 2023	This corrigendum renumbers BS ISO 23196:2022 as BS EN ISO 23196:2023

English Version

Water quality - Calculation of biological equivalence (BEQ) concentrations (ISO 23196:2022)

Qualité de l'eau - Calcul des concentrations en équivalent biologique (BEQ) (ISO 23196:2022)

Wasserbeschaffenheit - Berechnung biologischer Äquivalenzkonzentrationen (BEQ) (ISO 23196:2022)

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European foreword

The text of ISO 23196:2022 has been prepared by Technical Committee ISO/TC 147 "Water quality" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 23196:2023 by Technical Committee CEN/TC 230 "Water analysis" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2024, and conflicting national standards shall be withdrawn at the latest by February 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 23196:2022 has been approved by CEN as EN ISO 23196:2023 without any modification.

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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).

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This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 5, *Biological methods*.

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.

Water quality — Calculation of biological equivalence (BEQ) concentrations

1 Scope

This document specifies the derivation of biological equivalence (BEQ) concentrations for results of in vitro bioassays which are based on measuring effects on a biological process such as enzyme induction or cellular growth. The concept described here can be used for any biological assay after the proof of its applicability.

To derive BEQ concentrations, the effect on a biological process caused by a sample – i.e. the activity of the sample – is expressed in terms of a concentration of a reference compound which results in an equivalent effect on the process. The term "sample" used in this document addresses environmental samples as well as defined mixtures and pure compounds used as test item in a bioassay. BEQ concentrations can be derived for environmental water samples, extracts of environmental water samples including tap water or solutions of pure chemicals or mixtures of chemicals.

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

biological equivalence concentration

BEQ concentration

concentration of a *reference compound* (3.6) that causes the same effect as the effect measured in a sample, a sample dilution or a solution containing one or more chemicals

3.2

concentration-effect relationship

response to a concentration gradient of an environmental sample or a known substance or mixture of substances which is described by pre-determined diagnostic indicators

[SOURCE: ISO 6107:2021, 3.127, modified — the term "environmental sample" added; Note 1 to entry has been deleted.]

3.3

concentration factor

CF

ratio of the actual concentration of the sample compared to the original sample taking all enrichment and dilution steps of the sample into account

3.4
limit of quantification
LOQ

lowest value of a determinant that can be determined with an acceptable level of accuracy and precision

[SOURCE: ISO 15839:2003, 3.18]

3.5
negative control material

well characterized material and/or substance that, when evaluated by a specific test method, demonstrates the suitability of the test system to yield a reproducible, appropriately negative, non-reactive or minimal response in the test system

Note 1 to entry: In practice, negative controls include blanks, vehicles/solvents and reference materials.

[SOURCE: ISO 7405:2018, 3.4, modified — Note 1 to entry has been deleted.]

3.6
reference compound
RC

compound with one or more property values that are sufficiently reproducible and well established to enable the calibration of the measurement method

Note 1 to entry: For the purpose of this document, a reference compound is any well characterized material and/or substance that, when tested by the procedure described, demonstrates the suitability of the procedure to yield a reproducible, predictable positive response.

[SOURCE: ISO 7405:2018, 3.5, modified — "compound" replaces "material"; "the calibration of the measurement method" replaces "use of the material or substance for the calibration of an apparatus, the assessment of a measurement method or for the assignment of values to materials". Note 1 was modified to cover only a reference compound resulting in a positive response – otherwise the proposed concept is not applicable.]

3.7
x %-effect concentration
EC_x

concentration at which a specific effect is detected; x is the percentage (e.g. 10, 25, 50) of this effect, e.g. growth inhibition

[SOURCE: ISO 15952:2018, 3.6]

3.8
x %-effect concentration of a reference compound
RC_x

concentration of a *reference compound* (3.6) at which a specific effect is detected; x is the percentage (e.g. 10, 25, 50) of this effect, e.g. growth inhibition

4 Principle

The general idea for the derivation of BEQ concentrations, assessed by the test method, is shown in [Figure 1](#). The biological activity of a sample is expressed in terms of a concentration of a reference compound which affects a biological process to the same extent. By this means, BEQ concentrations allow an indirect quantification of results and a comparison of results obtained by different laboratories. Furthermore, a robust way to calculate BEQ concentrations is a necessary requirement for a possible use of effect-based trigger (EBT) values in regulations^{[5],[6],[7],[8]}.