International Standard

ISO 17244

Water quality — Determination of the toxicity of water samples on the embryo-larval development of the Japanese oyster (*Magallana gigas*) and the blue mussel (*Mytilus edulis or M. galloprovincialis*)

*Qualité de l'eau — Détermination de la toxicité d'échantillons aqueux sur le développement embryolarvaire de l'huître creuse (*Magallana gigas*) et de la moule (*Mytilus edulis *ou* M. galloprovincialis*)*

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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 document 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*.

This second edition cancels and replaces the first edition (ISO 17244:2015), which has been technically revised.

The main changes are as follows:

— Annex C, which gives a protocol to perform the test in direct contact with sediment, has been added;

— for Japanese oyster, the revised nomenclature, *Magallana gigas*,has been used;

— the possibility to extend the test duration to 48 h has been included.

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.

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Introduction

Traditionally, the level of pollution affecting a marine environment is shown in terms of the concentration levels of the contaminants present in the environment of interest. However, these measurements do not provide an estimation of the harmful effects on organisms and have to be complemented with the biological responses obtained through bioassays (see Reference [5]).

Among the marine organisms used to assess the potential impact of chemicals or discharges into the environment, bivalve embryos and larvae are, together with sea urchins, among the organisms which are most frequently used in bioassays (see References [18] and [21]). The embryos and larvae are more sensitive to pollutants than the adults of the same species. Therefore, they represent the critical stages for the toxicity tests (see References [19] and [30]). Since 1972, it is recommended to use the Pacific oyster, *Magallana gigas*, to assess the quality of seawater (see Reference [35]). Furthermore, their worldwide distribution in coastal waters, as well as their commercial importance (see Reference [10]), make bivalves the species of choice for the undertaking of bioassays.

The results of these bioassays demonstrate the necessity to determine the potential toxicity thresholds of chemicals which can enter the marine environment either accidentally or chronically, as well as the "biological quality" of an environment or the potential toxicity of river water or a discharge that reach the sea. Potential toxicity has been defined based on teratological effects (see References [11], [27] and [26]).

This document specifies a method based on the embryo-larval development of bivalves (oyster or mussel). It can be routinely used to assess development abnormalities caused by the possible presence of chemicals and mixtures in seawater. It also allows to assess the toxicity of aqueous samples like seawater, surface water, effluents (urban, agricultural, industrial effluents, etc.), aqueous extracts from sediments and petroleum products that can be leached in the water column at the time of their resuspension or discharge and presence in the sea.

This test can be performed throughout the year with embryos and larvae of mature bivalves sampled from the natural environment during their reproduction periods or mature bivalves which come from a hatchery where they have been conditioned.

This bioassay, recommended by the International Council for the Exploration of the Sea (ICES),[14] has been the subject of the first European inter-calibration test performed in 1991.[31] The protocol described in this document corresponds to a modification and simplification of Reference [3].

The toxicity assessment of metals performed on *M. gigas* and *Mytilus edulis* demonstrated that both organisms had a similar level of sensitivity (see References [19] and [15]). Two other studies performed on urban effluents showed similar findings for both species (see References [16] and [28]). These observations have been confirmed by the work carried out on mercury (see Reference [4]), which compared the findings of four embryo-larval tests: *M. edulis*, *M. galloprovincialis*, *M. gigas* and *C. virginica.* Another study showed that the embryos of *M. gigas* are more sensitive to metals and hydrocarbons than the other marine organisms which are commonly used, for example, polychaete, amphipods, fish and crustaceans (see Reference [8]).

The sensitivity of the bivalve embryo-larval development confirms the suitability of this test to assess the toxicity of chemicals and aqueous samples. The pH, salinity and temperature range acceptable to bivalves make them easy to use in ecotoxicity studies, particularly when assessing the quality of coastal and estuarine environments (see Reference [11]).

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WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff.

1 Scope

This document specifies a method for assessing the effects of chemical and aqueous samples on the embryo-larval development of marine bivalves. This method allows the determination of the concentration levels that result in an abnormality in embryo-larval development. This test is suitable for salinity ranges:

— between 20 PSU (practical salinity unit) and 40 PSU for mussels, and

— between 25 PSU and 35 PSU for oysters.

This method in this document applies to:

— chemical substances and preparations,

— marine and brackish waters,

— streams and aqueous effluents (urban, agricultural, industrial effluents, etc.) as long as the salinity is adjusted or dilution is limited so that the aforementioned salinity ranges are respected,

— aqueous extracts (pore water, elutriates, eluates and leachates) from sediments and petroleum products, and

— samples of contaminated sediment or dredged material (see Annex C).

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 5667-16, *Water quality — Sampling — Part 16: Guidance on biotesting of samples*

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/

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