

STANDARD

**10229**

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**Water quality — Determination of the prolonged toxicity of substances to freshwater fish — Method for evaluating the effects of substances on the growth rate of rainbow trout [*Oncorhynchus mykiss* Walbaum (Teleostei, Salmonidae)]**

*Qualité de l'eau — Détermination de la toxicité prolongée de substances vis-à-vis d'un poisson d'eau douce — Méthode d'évaluation des effets de substances sur le taux de croissance de la truite arc-en-ciel [*Oncorhynchus mykiss* Walbaum (Teleostei, Salmonidae)]*



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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.

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.

International Standard ISO 10229 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 5, *Biological methods*.

Annexes A and B of this International Standard are for information only.

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## Introduction

This International Standard describes methods of determining the long-term toxicity of substances to freshwater fish. The methods include the determination of lethal and sublethal responses. In all cases, the specified use of one species does not preclude the use of other species. It is possible for the methods presented here to be used for other species of freshwater fish, provided that appropriate modifications to, for example, quality of water used for dilution, temperature conditions and feeding rates are made and the relationships between growth rates, feeding rates and conversion efficiencies are established.

Within this International Standard, a choice may be made between semi-static and flow-through methods. These have already been described for the determination of the acute lethal toxicity of substances to a freshwater fish in ISO 7346-2 and ISO 7346-3 respectively. The choice of the method of presentation of the test solution depends on two factors: the nature of the test substance and the form of the test method.

The flow-through method can be used for most types of substances, including those unstable in water, but the concentrations of the test substance are determined wherever possible. The semi-static method can be used for testing those substances whose concentrations can be maintained satisfactorily throughout the test by renewal of the solutions every 24 h.

To assist in the preparation and maintenance of concentrations of substances which may invoke the chosen responses in the fish at concentrations close to that of their aqueous solubility, a small volume of solvent is sometimes used, as specified in the methods.

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# Water quality — Determination of the prolonged toxicity of substances to freshwater fish — Method for evaluating the effects of substances on the growth rate of rainbow trout [*Oncorhynchus mykiss* Walbaum (Teleostei, Salmonidae)]

## 1 Scope

This International Standard specifies a method for the determination of the long-term sublethal toxicity of substances soluble in water under specified conditions to a species of anadromous fish [*Oncorhynchus mykiss* Walbaum (Teleostei, Salmonidae) — common name, rainbow trout] in fresh water.

NOTE 1 "Substances" is considered to include pure chemicals tested singly or in mixtures, waste waters, process waters or other waters whose sublethal toxicity to fish it is necessary to determine. A range of concentrations of waste and process waters should be tested (see 8.2).

The response measured is the change in rate of growth of fish exposed to the test substance over periods of 14 d and 28 d (see [1] in annex B).

NOTE 2 The mass of each fish at the start of the test, the period of exposure, the feeding regime and temperature range have been chosen to ensure that the control fish will be growing exponentially throughout the test.

The method is applicable for assigning, for each test substance, a category of prolonged sublethal toxicity to *Oncorhynchus mykiss* under the test conditions.

The results are insufficient by themselves to define water quality limits for environmental protection.

It is possible for the method to be adapted for use with other freshwater fish and marine and brackish water fish with appropriate modification of the test conditions, particularly with respect to the tempera-

ture, the quantity and quality of the dilution water, the food and the fish-marking technique.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 7346-2:1984, *Water quality — Determination of the acute lethal toxicity of substances to a freshwater fish (Brachydanio rerio Hamilton-Buchanan (Teleostei, Cyprinidae)) — Part 2: Semi-static method.*

ISO 7346-3:1984, *Water quality — Determination of the acute lethal toxicity of substances to a freshwater fish (Brachydanio rerio Hamilton-Buchanan (Teleostei, Cyprinidae)) — Part 3: Flow-through method.*

## 3 Principle

Determination, under specified conditions, of the concentrations at which a substance statistically and significantly reduces the rate of growth of a test population of *Oncorhynchus mykiss* after exposure periods of 14 d and 28 d to that substance in the ambient water.