# INTERNATIONAL STANDARD



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# Water quality — Determination of selected organotin compounds — Gas chromatographic method

Qualité de l'eau — Dosage de composés organostanniques sélectionnés — Méthode par chromatographie en phase gazeuse



Reference number ISO 17353:2004(E)

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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 Maison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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

ISO 17353 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.



### Introduction

It should be noted whether and to what extent particular problems will require the specification of additional boundary conditions.

This International Standard describes a gas-chromatographic/organotin specific determination of organotin compounds after derivatization with sodium tetraethyl borate and liquid/liquid extraction.

The user should be aware that particular problems could require the specification of additional marginal conditions.

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# Water quality — Determination of selected organotin compounds — Gas chromatographic method

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

IMPORTANT — It is absolutely essential that tests conducted according to this International Standard be carried out by suitably trained staff.

### 1 Scope

This International Standard specifies a method for the identification and quantification of organotin compounds and/ or cations as mentioned in Table in drinking water, surface water and wastewater containing not more than 2 g/l of suspended material. The working range is 10 ng/l to 1 000 ng/l. The respective anions are not determined.

This method can also be applicable to other compounds such as R = methyl, n = 1 to 2 and R = phenyl, n = 1 to 2. This International Standard is also applicable to marine water.

$R_n Sn^{(4-n)+}$	R	п	Name	Acronym
BuSn <sup>3+</sup>	Butyl	1	Monobutuitin cation	MBT
Bu <sub>2</sub> Sn <sup>2+</sup>	Butyl	2	DibutyItin cation	DBT
Bu <sub>3</sub> Sn <sup>+</sup>	Butyl	3	Tributyltin cation	TBT
Bu <sub>4</sub> Sn	Butyl	4	Tetrabutyltin	ТТВТ
OcSn <sup>3+</sup>	Octyl	1	Monooctyltin cation	МОТ
Oc <sub>2</sub> Sn <sup>2+</sup>	Octyl	2	Dioctyltin cation	рот
Ph <sub>3</sub> Sn <sup>+</sup>	Phenyl	3	Triphenyltin cation	TPhI
Cy <sub>3</sub> Sn <sup>+</sup>	Cyclohexyl	3	Tricyclohexyltin cation	тсу

# Table 1 — Organotin compounds and cations determined using this International Standard

#### 2 Normative references

The following referenced documents are indispensable for the application 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 3696:1987, Water for analytical laboratory use - Specification and test methods

ISO 5667-1, Water quality — Sampling — Part 1: Guidance on the design on sampling programmes

ISO 5667-2, Water quality — Sampling — Part 2: Guidance on sampling techniques

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

#### Terms and definitions 3

For the purposes of this international Standard, the following terms and definitions apply.

3.1	71:
organotin	compound 0
orc substance	with at least one Sn-C bond
NOTE	The number of Sn-C bonds is measure of the degree of substitution.
3.2 organotin	cation
OC	
part of the	organotin compound that contains all Sn-C bonds (and which is formally loaded)

NOTE In this International Standard, the abbreviation OC is also used for the non-dissociated tetrasubstituted organotin. OC therefore comprises the cations MBT, DBF, TBT, TTBT, MOT, DOT, TCyT, and TPhT. BOYEN

#### Principle 4

Organotin compounds in water are alkylated with sodium waterhylborate and extracted with hexane. The extract can be cleaned with silica. After concentration, the tetrasubstituted OTC are separated by capillary gas chromatography and detected with a suitable system such as MS (mass spectrometry), FPD (flame chromatography and detected with a suitable system such as wis (mass spectrometry), FPD (name photometric detection), AED (atomic emission detection). The computation is determined by calibration for the total procedure using an internal standard mixture.
5 Interferences
The reagents sometimes contain impurities of organotin compounds. It is absolutely essential to verify the blanks (see A.4.6).

DY FUS blanks (see A.4.6).

#### 6 Reagents

Use reagents of highest purity.

6.1 Water, free of substances causing interference with this method and complying with ISO 3696:1987, Grade 1.

- Nitric acid,  $\rho(HNO_3) = 1.4$  g/ml. 6.2
- 6.3 Acetic acid, CH<sub>3</sub>COOH, glacial.
- 6.4 Sodium hydroxide solution, c(NaOH) = 1 mol/l.
- 6.5 Sodium acetate, CH<sub>3</sub>COONa, anhydrous.