INTERNATIONAL STANDARD

**ISO 2447**

Second edition
1998-08-01

# Fruit and vegetable products — Determination of tin content

*Produits dérivés des fruits et légumes — Détermination de la teneur en étain*



Reference number
ISO 2447:1998(E)

## 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 2447 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 3, *Fruit and vegetable products*.

This second edition cancels and replaces the first edition (ISO 2447:1974), which has been technically revised.





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# Fruit and vegetable products — Determination of tin content

## 1 Scope

This International Standard specifies a method for the determination of the tin content in fruit and vegetable products.

The method is applicable to products which may contain, per kilogram, up to:

— 1,25 g of copper;

— 0,6 g of lead;

— 6 g of zinc;

— 40 g of phosphorus.



## 2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.



ISO 5515:1979, *Fruits, vegetables and derived products — Decomposition of organic matter prior to analysis — Wet method.*

## 3 Principle

After destruction of the organic matter by means of sulfuric and nitric acids, and conversion of the tin to the stannic form, a complex is formed in a buffered solution of pH 1,0 to pH 1,2 [the iron(III) being masked, if necessary, by reduction with ascorbic acid]. The complex is coloured orange with phenylfluorone and the colour compared with those obtained under the same conditions but starting from standard solutions of pure tin.

## 4 Reagents

Use only reagents of recognized analytical grade, and distilled or demineralized water or water of equivalent purity.

**4.1 Sulfuric acid**, $\rho_{20}$ = 1,84 g/ml.

**4.2 Dilute sulfuric acid**, 1,25 mol/l.

**4.3 Ascorbic acid**, 50 g/l solution.

**4.4 Nitric acid**, $\rho_{20}$ = 1,42 g/ml.

**4.5 Hydrochloric acid**, $\rho_{20}$ = 1,19 g/ml.

**4.6 Methanol.**

**4.7 Ethanol**, 95 % (*V*/*V*).

**4.8 Poly(vinyl alcohol)**, 16 g/l solution.

Dissolve 1,6 g of poly(vinyl alcohol) in a little water with gentle warming and agitation. Dilute to 100 ml after cooling.

**4.9 Buffer solution**, containing 450 g of sodium acetate ($CH_3COONa$) and 240 ml of acetic acid ($CH_3COOH$) per litre.

**4.10 Tin, standard volumetric solution I**, containing 500 µg/ml in a sulfuric acid medium, approximately 3 mol/l.

Dissolve, with heating, 0,5 g of pure tin in a mixture of 50 ml of sulfuric acid (4.1), 5 ml of nitric acid (4.4) and 25 ml of water. After complete solution, oxidize the tin to the stannic form by boiling until white fumes appear.

Cool the solution and pour it into a 1 000 ml volumetric flask containing 116 ml of sulfuric acid (4.1) and 100 ml of water. Cool and dilute to 1 000 ml with water.

NOTE Alternatively, the tin standard solution I (4.10) may be prepared by dilution of a suitable proprietary standard solution.

**4.11 Tin**, **standard volumetric solution II**, containing 10 µg/ml in a sulfuric acid medium, approximately 0,25 mol/l.

Transfer 20 ml of the tin standard volumetric solution I (4.10) to a 1 000 ml volumetric flask. Add 10 ml of sulfuric acid (4.1) and dilute to 1 000 ml with water.

**4.12 Phenylfluorone reagent** (2,6,7-trihydroxy-9-phenyl-3-isoxathone).

Dissolve 0,1 g of phenylfluorone in 10 ml of methanol (4.6) and 1 ml of hydrochloric acid (4.5) in a 500 ml volumetric flask. Dilute to the mark with ethanol (4.7).

The reagent shall be stored in a brown bottle in the dark. It is recommended that it should not be stored for longer than 1 week.



## 5 Apparatus

Usual laboratory apparatus and, in particular, the following.

**5.1 One-mark volumetric flasks**, of capacity 50 ml, 200 ml and 500 ml.

**5.2 Pipettes,** for delivering 1 ml, 2 ml, 3 ml, 4 ml, 5 ml, 10 ml and 20 ml.

**5.3 Spectrophotometer** or **photocolorimeter**, with green filter, fitted with a cell of 10 mm light path, enabling measurements to be made at wavelengths from 500 nm to 530 nm.

**5.4 Analytical balance,** capable of weighing to the nearest 0,001 g.

## 6 Sampling

It is important that the laboratory receive a sample which is truly representative and has not been damaged or changed during transport or storage.