International Standard 750

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Fruit and vegetable products — Determination of titratable acidity

Produits dérivés des fruits et légumes — Détermination de l'acidité titrable

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 750 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in August 1980.

It has been approved by the member bodies of the following countries :

Australia	India	Poland
Austria	Iran	Portugal
Brazil	Israel	Romania
Bulgaria	Kenya	South Africa, Rep. of
Canada	Korea, Rep. of	Spain
Czechoslovakia	Malaysia	Sri Lanka
Egypt, Arab Rep. of	Netherlands	Thailand
France	New Zealand	Turkey
Germany, F. R.	Peru	USSR
Hungary	Philippines	Yugoslavia

No member body expressed disapproval of the document.

This International Standard has also been approved by the International Union of Pure and Applied Chemistry (IUPAC).

This International Standard cancels and replaces ISO Recommendation R 750-1968, of which it constitutes a technical revision.

Fruit and vegetable products — Determination of titratable acidity

1 Scope and field of application

This International Standard specifies two methods for the determination of the titratable acidity of fruit and vegetable products :

— potentiometric reference method;

— routine method using a coloured indicator.

By convention, the latter method does not apply to wines.

In the case of some coloured products, it may be difficult to determine the end point of the titration in the latter method and the former method should preferably be used.

NOTE — The determination of titratable acidity is of no value in the case of products to which sulphur dioxide has been added.

2 Preparation of test sample and test portion

2.1 Apparatus

Usual laboratory apparatus, and in particular

2.1.1 Homogenizer or **mortar.**

2.1.2 One-mark pipette, to deliver 25 ml, complying with the requirements of ISO 648.

2.1.3 Conical flask, capable of being fitted with the reflux condenser (2.1.5).

2.1.4 One-mark volumetric flask, of capacity 250 ml, complying with the requirements of ISO 1042.

2.1.5 Reflux condenser.

2.1.6 Balance.

2.2 Procedure

NOTE — The water used for preparation of the test sample shall be distilled water, recently boiled and cooled.

2.2.1 Liquid products or products from which the liquid is easily separable (for example juices, canned fruit syrups, pickling liquids, brines, liquids from fermented products)

Take part of the previously mixed laboratory sample and filter it through cotton wool, filter paper or cloth. Transfer, by means of the pipette (2.1.2), 25 ml of the filtrate (see note 2) into the volumetric flask (2.1.4). Dilute to the mark with water and mix thoroughly.

NOTES

1 It is necessary to remove carbon dioxide from carbonated liquid products by shaking under reduced pressure for 3 to 4 min.

2 It is also possible to take a sample by mass, weighing, to the nearest 0,01 g, at least 25 g of the laboratory sample.

2.2.2 Other products

Remove any stalks, stones, hard seed-cavity walls and, whenever possible, pips (after thawing in the case of frozen or deep-frozen products).

Allow frozen or deep-frozen products to thaw in a closed vessel and add the liquid formed during this process to the product.

In the case of dehydrated or dried products, cut a part of the laboratory sample into small pieces.

Homogenize the product or grind it in the mortar (2.1.1).

Weigh, to the nearest 0,01 g, at least 25 g of the laboratory sample and transfer it to the conical flask (2.1.3) with 50 ml of hot water. Mix well until homogeneity is obtained.

Fit the reflux condenser (2.1.5) to the conical flask and heat the contents on a boiling water bath for 30 min.

Cool, quantitatively transfer the contents of the conical flask into the volumetric flask (2.1.4) and dilute to the mark with water. Mix well and filter.

3 Potentiometric method (Reference method)

3.1 Principle

Potentiometric titration with standard volumetric sodium hydroxide solution.

3.2 Reagents

3.2.1 Sodium hydroxide, standard volumetric solution, c(NaOH) = 0,1 mol/l.[1)]

3.2.2 Buffer solutions, of known pH.

3.3 Apparatus

Usual laboratory apparatus, and in particular

3.3.1 One-mark pipette, to deliver 25 — 50 or 100 ml (see 3.4.2), complying with the requirements of ISO 648.

3.3.2 pH meter.

3.3.3 Beaker, of capacity 250 ml, together with a magnetic or mechanical stirrer.

3.3.4 Burette, of capacity 50 ml, complying with the requirements of ISO/R 385, class A.

3.4 Procedure

3.4.1 Calibration of the pH meter

Check that the pH meter (3.3.2) is functioning correctly using the buffer solutions (3.2.2).

3.4.2 Aliquot portion

Transfer, by means of the pipette (3.3.1), 25 — 50 or 100 ml of the diluted test portion (see clause 2), according to the expected acidity, into the beaker with its stirrer (3.3.3).

3.4.3 Determination

Start the stirrer and add quickly, from the burette (3.3.4), the sodium hydroxide solution (3.2.1) until the pH is about 7. Then, slowly add more until the pH is 8,1 ± 0,2.

3.4.4 Number of determinations

Carry out two determinations on the same test sample (see clause 2).

4 Method using a coloured indicator (Routine method)

4.1 Principle

Titration with standard volumetric sodium hydroxide solution in the presence of phenolphthalein as indicator.

4.2 Reagents

4.2.1 Sodium hydroxide, standard volumetric solution, c(NaOH) = 0,1 mol/l.[1)]

4.2.2 Phenolphthalein, 10 g/l solution in 95 % (V/V) ethanol.

4.3 Apparatus

Usual laboratory apparatus, and in particular

4.3.1 One-mark pipette, to deliver 25 — 50 or 100 ml (see 4.4.1), complying with the requirements of ISO 648.

4.3.2 Burette, of capacity 50 ml, complying with the requirements of ISO/R 385, class A.

4.3.3 Beakers, of appropriate capacity.

4.4 Procedure

4.4.1 Aliquot portion

Transfer, by means of the pipette (4.3.1), 25 — 50 or 100 ml of the diluted test portion (see clause 2), according to the expected acidity, into a beaker (4.3.3).

4.4.2 Determination

Add 0,25 to 0,5 ml of the phenolphthalein solution (4.2.2) and, with shaking, titrate, using the burette, with the sodium hydroxide solution (4.2.1) until a pink colour, persisting for 30 s, is obtained.

4.4.3 Number of determinations

Carry out two determinations on the same test sample (see clause 2).

1) Hitherto expressed as "0,1 N standard volumetric solution".

5 Expression of results

5.1 Method of calculation and formulae

5.1.1 Laboratory sample taken by volume

The titratable acidity, expressed in millimoles of H^+ per 100 ml of product, taking into account the dilution carried out in 2.2, is given by the formula

$$\frac{250}{V} \times V_1 \times c \times \frac{100}{V_0}$$

$$= \frac{1\,000\,V_1 c}{V_0}$$

where

V is the volume, in millilitres, of the test portion, i.e. 25 ml;

V_0 is the volume, in millilitres, of the aliquot portion (3.4.2 or 4.4.1);

V_1 is the volume, in millilitres, of the sodium hydroxide solution (3.2.1 or 4.2.1) used for the determination (3.4.3 or 4.4.2);

c is the exact concentration, in moles per litre, of the sodium hydroxide solution (3.2.1 or 4.2.1).

5.1.2 Laboratory sample taken by mass

The titratable acidity, expressed in millimoles of H^+ per 100 g of product, taking into account the dilution carried out in 2.2, is given by the formula

$$\frac{250}{m} \times V_1 \times c \times \frac{100}{V_0}$$

where

V_0, V_1 and c have the same meanings as in 5.1.1;

m is the mass, in grams, of the test portion (see 2.2.1, note 2, or 2.2.2).

5.1.3 Result

Take as the result the arithmetic mean of the values obtained in the two determinations (3.4.4 or 4.4.3), provided that the requirement for repeatability (see 5.2) is satisfied. Report the result to one decimal place.

5.2 Repeatability

The difference between the values obtained in the two determinations (3.4.4 or 4.4.3), carried out simultaneously or in rapid succession by the same analyst, shall not exceed 2 % of the mean.

5.3 Other methods of expression

It is also possible to express the titratable acidity conventionally in grams of acid per 100 g or per 100 ml of product, as appropriate, by multiplying the formula (5.1.1 or 5.1.2) by a factor appropriate to the acid (see the table).

Table

Acid	Factor
Malic acid	0,067
Oxalic acid	0,045
Citric acid monohydrate	0,070
Tartaric acid	0,075
Sulphuric acid	0,049
Acetic acid	0,060
Lactic acid	0,090

6 Test report

The test report shall show the method used and the result obtained. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any circumstances that may have influenced the result.

The test report shall include all the details required for the complete identification of the sample.