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Fruit and vegetable products — Determination of titratable acidity

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

Reference number
ISO 750:1998(E)

Foreword

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

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Fruit and vegetable products — Determination of titratable acidity

1 Scope

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

— a potentiometric reference method;

— a 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 endpoint 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 sulfur dioxide has been added.

2 Principle

2.1 Potentiometric method

Potentiometric titration with a standard volumetric solution of sodium hydroxide.

2.2 Routine method

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

3 Reagents

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

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

3.2 Buffer solutions, of known pH.

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

4 Apparatus

Usual laboratory apparatus and, in particular, the following.

4.1 Homogenizer or **mortar and pestle**.

4.2 Pipettes, to deliver 25 ml, 50 ml or 100 ml.

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

4.3 Conical flask, capable of being fitted with the reflux condenser (4.7).

4.4 Volumetric flask, of capacity 250 ml.

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

4.6 Burette, of capacity 50 ml.

4.7 Reflux condenser.

4.8 Analytical balance, capable of weighing to the nearest 0,01 g.

4.9 pH-meter, accurate to at least 0,05 pH units.

4.10 Water bath.

5 Sampling

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

Sampling is not part of the method specified in this International Standard. As there is no specific International Standard dealing with fruit and vegetable products, it is recommended that the parties concerned come to an agreement on the subject.

6 Preparation of test sample

6.1 Liquid products

Liquid products include products from which the liquid is easily separable (e.g. 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 (4.2), 25 ml of the filtrate (see note) into the volumetric flask (4.4). Dilute to the mark with water and mix thoroughly.

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

NOTE 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.

6.2 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). Mix the sample thoroughly.

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

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 (4.1).

Weigh, to the nearest 0,01 g, at least 25 g of the laboratory sample and transfer it to the conical flask (4.3) with 50 ml of hot water. Mix well until homogeneity is obtained.

Fit the reflux condenser (4.7) 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 to a volumetric flask (4.4) and dilute to the mark with water. Mix well and filter.

7 Procedure

NOTE If it is required to check whether the repeatability requirement (clause 9) is met, carry out two determinations in accordance with 7.1.2 and 7.1.3, or 7.2.1 and 7.2.2.

7.1 Potentiometric method (Reference method)

7.1.1 Calibration of the pH meter

Check that the pH meter (4.9) is functioning correctly using the buffer solutions (3.2).

7.1.2 Test portion

Transfer, by means of the pipette (4.2), 25 ml, 50 ml or 100 ml of the diluted test sample (see clause 6), according to the expected acidity, to the beaker with its stirrer (4.5).

7.1.3 Determination

Start the stirrer and add quickly, from the burette (4.6), the sodium hydroxide solution (3.1) until the pH is $7 \pm 0{,}2$. Then, slowly add more until the pH is $8{,}1 \pm 0{,}2$.

7.2 Method using a coloured indicator (Routine method)

7.2.1 Test portion

Transfer, by means of the pipette (4.2), 25 ml, 50 ml or 100 ml of the diluted test sample (see clause 6), according to the expected acidity, to a beaker with its stirrer (4.5).

7.2.2 Determination

Add 0,25 ml to 0,5 ml of the phenolphthalein solution (3.3) and, with shaking, titrate, using the burette (4.6), with the sodium hydroxide solution (3.1) until a pink colour, persisting for 30 s, is obtained.

8 Expression of results

8.1 Method of calculation for laboratory samples taken by volume

The titratable acidity, expressed in millimoles of H^+ per 100 ml of product, taking into account the dilution carried out in clause 6, is given as follows:

$$\frac{250}{V} \times V_1 \times c \times \frac{100}{V_0} = \frac{1000\, V_1\, c}{V_0}$$

where

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

V_0 is the volume, in millilitres, of the test portion (7.1.2 or 7.2.1);

V_1 is the volume, in millilitres, of the sodium hydroxide solution (3.1) used for the determination (7.1.3 or 7.2.2);

c is the exact concentration, in moles per litre, of the sodium hydroxide solution (3.1).

Report the result to one decimal place.

8.2 Method of calculation for laboratory samples taken by mass

The titratable acidity, expressed in millimoles of H^+ per 100 g of product, taking into account the dilution carried out in clause 6, is given as follows:

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

where

V_0, V_1 and c have the same meanings as in 8.1;

m is the mass, in grams, of the test sample (see 6.1and its note, or 6.2).

Report the result to one decimal place.

8.3 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 (8.1 or 8.2) by a factor appropriate to the acid (see table 1).

Table 1

Acid	Factor
Malic acid	0,067
Oxalic acid	0,045
Citric acid monohydrate	0,070
Tartaric acid	0,075
Sulfuric acid	0,049
Acetic acid	0,060
Lactic acid	0,090
Citric acid	0,064

9 Repeatability

The absolute difference between two independent single test results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, will in not more than 5 % of cases be greater than 2 % of the arithmetic mean of the two results.

10 Test report

The test report shall specify:

— all information necessary for the complete identification of the sample;

— the sampling method used, if known;

— the test method used, together with reference to this International Standard;

— all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the test result(s);

— the test result(s) obtained;

— if the repeatability has been checked, the final quoted result obtained.

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