SLOVENSKI STANDARD
SIST EN 12147:1998

01-junij-1998

Sadni in zelenjavni sokovi - Določevanje kislosti s titracijo

Fruit and vegetable juices - Determination of titrable acidity

Frucht- und Gemüsesäfte - Bestimmung der titrierbaren Säure

Jus de fruits et de légumes - Détermination de l'acidité titrable

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English version

Fruit and vegetable juices - Determination of titrable acidity

Jus de fruits et de légumes - Détermination de l'acidité titrable

Frucht- und Gemüsesäfte - Bestimmung der titrierbaren Säure

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 174, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a method for the determination of the titratable acidity of fruit and vegetable juices and related products.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 3696:1995	Water for analytical laboratory use - Specification and test methods
ISO 5725:1986	Precision of test methods - Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests

3 Definitions and symbols

3.1 Definitions

For the purposes of this standard the following definition applies :

Titratable acidity : A measure of the content of mineral and organic acids determined by titration, according to this standard.

3.2 Symbols

For the purposes of this standard the following symbol applies :

c substance concentration.

4 Principle

Potentiometric titration with standard volumetric sodium hydroxide solution to a pH-value of 8,1.

5 Reagents

Use only reagents of recognized analytical grade and only degassed water in accordance with at least grade 3 of EN ISO 3696:1995.

5.1 Sodium hydroxide, standard volumetric solution, c (*NaOH*) = 0,25 mol/l.

5.2 Buffer solutions of suitable pH.

6 Apparatus

Usual laboratory apparatus and, in particular, the following :

6.1 pH meter accurate to at least 0,01 pH units.

6.2 pH glass electrode.

6.3 Reference electrode, e.g. calomel electrode.

6.4 Combination glass electrode, alternative to 6.2 and 6.3.

6.5 Magnetic stirrer.

6.6 Burette of 25 ml capacity, graduated in 0,05 ml divisions.

6.7 Low form beaker (typically 50 ml).

6.8 One-mark pipette of 25 ml capacity.

7 Procedure

7.1 Preparation of the test sample

Normally products shall not be pre-treated and their analysis by this method shall be on a volumetric basis, results being expressed per litre of sample. The analysis of concentrated products may also be carried out on a volumetric basis, after dilution to a known relative density. In this case, the relative density shall be indicated. Based on a weighed sample and taking the dilution factor for analysis into account, the results may also be expressed per kilogram of product. In products with a high viscosity and/or a very high content of cells (for example pulp), a determination on the basis of a weighed test sample is the usual procedure.

If the sample contains appreciable quantities of carbon dioxide, degas it by shaking in a stoppered conical flask and removing the stopper from time to time, or by using vacuum or ultrasound treatment until no more gas evolves.

7.2 Calibration

Perform two-point calibration of the pH meter at 20 °C using the buffer solution (5.2) with agitation and following the instrument manufacturer's instructions. If the pH meter is equipped with a temperature compensation facility, the calibration can be carried out at a temperature other than 20 °C but in any case between 10 °C and 30 °C.

7.3 Determination

Transfer at 20 °C, by means of the pipette (6.8) 25 ml of the test sample (V_0) into the beaker (6.7). Start the stirrer (6.5) and titrate by means of the burette (6.6) with sodium hydroxide solution (5.1) until a pH of 8,1 is obtained. Record the amount of solution (V_1) used. If the pH meter is equipped with a temperature compensation facility the determination can be carried out at a temperature other than 20 °C but in any case between 10 °C and 30 °C.

8 Calculation

8.1 Calculation as titratable acidity

The titratable acidity C_{H^+}, expressed in mmoles of H^+ per litre of product, is given by the formula :

$$C_{H^+} = \frac{1000 \times V_1 \times c}{V_0} \qquad (1)$$

where :

V_0 is the volume, in millilitres, of the test portion (7.3), as a rule 25 ml ;
V_1 is the volume, in millilitres, of the sodium hydroxide solution (7.3) used for the determination ;
c is the exact concentration, in moles per litre, of the sodium hydroxide solution (5.1).

If V_0 is 25 ml and c is 0,25 mol/l (see 5.1), the titratable acidity C_{H^+} expressed in mmoles of H^+ per litre of product, is given by the formula :

$$C_{H^+} = V_1 \times 10 \qquad (2)$$

Report the result without a decimal place.

8.2 Calculation as acid content

It is also possible to calculate the titratable acidity conventionally as acid content expressed in grams per litre of product, by multiplying the formula (8.1) by a factor given in table 1 corresponding to the acid.

Table 1 : Factors corresponding to different acids

Acid	Factor
Tartaric acid	0,075
Malic acid	0,067
Citric acid, anhydrous	0,064

Take into account the dilution and the relation of the values to mass or volume. If a concentrated product has been diluted to single strength, report the relative density of the single strength sample.

Report the result as tartaric, malic, anhydrous citric acid in accordance with the regulations in force in the country concerned to one decimal place.

9 Precision

Details of the interlaboratory test on precision of the method are given in Annex B. The values derived from the interlaboratory test may not be applicable to analyte concentration ranges and matrices other than given in Annex B.

9.1 Repeatability

The absolute difference between two single test results found on identical test material by one operator using the same apparatus within the shortest feasible time interval will exceed the repeatability limit *r* in not more than 5 % of the cases.

The value is :

r = 1,03 mmol H^+/l

9.2 Reproducitility

The absolute difference between two single test results on identical test material reported by two laboratories will exceed the reproducibility limit *R* in not more than 5 % of the cases.

The value is :

R = 2,28 mmol H^+/l

10 Test report

The test report shall contain the following data :

- all information necessary for the identification of the sample (kind of sample, origin of sample, designation) ;
- a reference to this European Standard ;
- the date and type of sampling procedure (if known) ;
- the date of receipt ;
- the date of test ;
- the test results and units in which they have been expressed ;
- whether the repeatability of the method has been verified ;
- any particular points observed in the course of the test ;
- any operation not specified in the method or regarded as optional, which might have affected the results.