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Sadni in zelenjavni proizvodi - Določanje topnih snovi - Refraktometrična metoda

Fruit and vegetable products -- Determination of soluble solids -- Refractometric method

Produits dérivés des fruits et légumes -- Détermination du résidu sec soluble -- Méthode réfractométrique

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INTERNATIONAL STANDARD

ISO 2173

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Fruit and vegetable products — Determination of soluble solids — Refractometric method

Produits dérivés des fruits et légumes — Détermination du résidu sec soluble — Méthode réfractométrique

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Foreword

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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 identifying any or all such patent rights.

ISO 2173 was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 3, *Fruit and vegetable products*.

This second edition cancels and replaces the first edition (ISO 2173:1978), which has been technically revised.

Fruit and vegetable products — Determination of soluble solids — Refractometric method

1 Scope

This International Standard specifies a refractometric method for the determination of the soluble solids in fruit and vegetable products.

This method is particularly applicable to thick products, to products containing suspended matter, and to products rich in sugar. If the products contain other dissolved substances, the results will be only approximate; nevertheless, for convenience the result obtained by this method can be considered conventionally as the soluble solids content.

NOTE For the determination of the soluble solids in fruit juices (not containing suspended matter) and in concentrated juices (clarified), the pyknometric method specified in ISO 2172 is applicable.

2 Terms and definitions

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

2.1
soluble solids determined by the refractometric method
concentration of sucrose in an aqueous solution which has the same refractive index as the product analysed, under specified conditions of preparation and temperature

NOTE This concentration is expressed as a mass fraction in percent.

3 Principle

The refractive index of a test solution is measured at 20 °C ± 0,5 °C using a refractometer. The refractive index is correlated with the amount of soluble solids (expressed as sucrose concentration) using tables, or by direct reading on the refractometer of the mass fraction of soluble solids.

4 Reagents

Use only reagents of recognized analytical grade.

4.1 Water

The water used shall have been distilled twice in borosilicate glass apparatus, or shall be water of at least equivalent purity.

5 Apparatus

Usual laboratory apparatus and, in particular, the following.

5.1 Refractometer

Use one of the following.

5.1.1 Refractometer indicating the refractive index, by means of a scale graduated in 0,001, in order to allow readings to be estimated to 0,000 2.

This refractometer shall be adjusted so that at 20 °C ± 0,5 °C it registers a refractive index of 1,333 0 for distilled water.

5.1.2 Refractometer indicating the mass fraction of sucrose, by means of scale graduated in 0,10 %.

This refractometer shall be adjusted so that at 20 °C ± 0,5 °C it registers a mass fraction of soluble solids (sucrose) of zero for distilled water.

5.2 Means for circulating water, to maintain the temperature of the prisms of the refractometer (5.1.1 or 5.1.2) constant to within ± 0,5 °C, in the neighbourhood of 20 °C, which is the reference temperature (see 8.1).

5.3 Beaker, of capacity 250 ml.

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.

7 Procedure

7.1 Preparation of test solution

7.1.1 Clear liquid products

Thoroughly mix the laboratory sample and use it directly for the determination.

7.1.2 Semi-thick products (purees, etc.)

Thoroughly mix the laboratory sample. Press a part of the sample through a gauze folded in four, rejecting the first drops of the liquid and reserving the remainder of the liquid for the determination.

7.1.3 Thick products (jams, jellies, etc.)

Weigh into the tared beaker (5.3), to the nearest 0,01 g, a suitable quantity (up to 40 g) of the laboratory sample and add 100 ml to 150 ml of water. Heat the contents of the beaker to boiling and allow to boil gently for 2 min to 3 min, stirring with a glass rod. Cool the contents and mix thoroughly.

After 20 min, weigh to the nearest 0,01 g, then filter through a fluted filter or a Büchner funnel into a dry vessel. Reserve the filtrate for the determination.

7.1.4 Frozen products

After thawing the sample and removing, if necessary, stones, pips and hard seed-cavity walls, mix the product with the liquid formed during the thawing process and proceed as described in 7.1.2 or 7.1.3 as appropriate.

7.1.5 Dried products

Cut a part of the laboratory sample into small pieces. Remove, if necessary, stones, pips and hard seed-cavity walls, and mix carefully. Then weigh into a tared beaker, to the nearest 0,01 g, 10 g to 20 g of the sample. Add 5 to 10 times this mass of water and place on a boiling water bath for 30 min, stirring from time to time with a glass rod. If necessary, prolong the heating time until a homogeneous mixture is obtained. Cool the contents of the beaker and mix well.

After 20 min, weigh to the nearest 0,01 g, then filter into a dry vessel. Reserve the filtrate for the determination.

If the test solution is too dark to be read in the refractometer, dilute the test solution with concentrated sugar solution; never use water for this purpose. Mix weighed amounts of the solution under examination and a solution of pure sugar of about the same strength (see reference [1]).

7.2 Determination

Adjust the water circulation (5.2) in order to operate at the required temperature (between 15 °C and 25 °C) and allow it to flow to bring the prisms of the refractometer (5.1.1 or 5.1.2) to the same temperature, which shall remain constant to within ± 0,5 °C during the determination.

Bring the test solution (7.1) to the measuring temperature. Put a small quantity of test solution (2 or 3 drops are sufficient) onto the fixed prism of the refractometer (5.1.1 or 5.1.2) and immediately adjust the movable prism. Suitably illuminate the field of view. The use of a sodium vapour lamp allows more precise results to be obtained (especially in the case of coloured and dark products).

Bring the line dividing the light and dark parts of the surface into the field of view to the crossing of the threads. Read the value of the refractive index or the mass fraction of sucrose, according to the instrument used (5.1.1 or 5.1.2).

8 Expression of results

8.1 Corrections

8.1.1 If the determination has been carried out at a temperature other than 20 °C ± 0,5 °C, the following corrections are required.

a) For the scale indicating the refractive index (5.1.1), apply the formula:

$$n_D^{20} = n_D^t + 0{,}0013(t - 20)$$

where

n_D^{20} is the refractive index at 20 °C;

n_D^t is the refractive index at the temperature of measurement;

t is the temperature of measurement, in degrees Celsius.

b) For the scale indicating the mass fraction of sucrose (5.1.2), correct the result according to Table A.1.

8.1.2 If the determination has been carried out for the products with added salt, correct the refractometer reading, expressed as a concentration of sucrose at 20 °C ± 0,5 °C, for added salt by the following formula (see reference [2]):

$$S = (R - N) \times 1{,}016$$