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Fruit and vegetable products — Determination of pH

Produits dérivés des fruits et légumes — Mesurage du pH

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Foreword

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International Standard ISO 1842 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Sub-Committee SC 3, *Fruit and vegetable products*.

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Fruit and vegetable products — Determination of pH

1 Scope

This International Standard specifies a potentiometric method of measuring the pH of fruit and vegetable products.

2 Principle

Measurement of the potential difference between two electrodes dipped in the liquid to be tested.

3 Apparatus

Usual laboratory apparatus and, in particular, the following.

3.1 pH meter, with a scale graduated in units of 0,05 pH or, preferably, less.

If a temperature correction system is not provided, the scale shall apply to measurements at 20 °C.

3.2 Electrodes (alternative to 3.3).

3.2.1 Glass electrode

Glass electrodes of different geometrical shapes may be used. They shall be stored in water.

3.2.2 Calomel electrode, containing saturated potassium chloride solution.

Store the calomel electrode according to the instructions of the manufacturer; if these are not available, the electrode shall be stored in saturated potassium chloride solution.

3.3 Combined-electrode system (alternative to 3.2)

The calomel and glass electrodes may be assembled into a system of combined electrodes. Store this in water. The level of the saturated potassium chloride solution in the calomel electrode shall be above the water level.

4 Preparation of the test sample

4.1 Liquid products and easily filtrable products (e.g. juices, liquids from compotes or from pickles, brines, fermented liquids, etc.)

Mix the laboratory sample carefully until it is homogeneous.

4.2 Thick or semi-thick products and products from which it is difficult to separate the liquid (e.g. syrups, jams, purées, jellies, etc.)

Mix a part of the laboratory sample and grind it, if necessary, in a blender or mortar; if the product obtained is still too thick, add an equal mass of distilled water and, if necessary, mix well with a blender or mortar.

4.3 Frozen products

Thaw the product and remove stones and hard seed-cavity walls. Proceed as described in 4.1 or 4.2, as appropriate.

4.4 Dried products

Cut a part of the laboratory sample into small pieces, and remove stones and hard seed-cavity walls. Put the pieces into a beaker, add two to three times their mass of distilled water (or more if required to give a suitable consistency) and heat in a water-bath for 30 min, mixing from time to time with a glass rod. Then grind the product in a blender or mortar.

4.5 Freshly prepared products comprising distinct solid and liquid phases

Proceed as described in 4.2.

5 Procedure

5.1 Test portion

Use as the test portion a volume of the prepared test sample (clause 4) sufficient for immersion of the electrodes, according to the apparatus used.

5.2 Calibration of the pH meter

Calibrate the pH meter using a buffer solution (see clause 7) of exactly known pH, and having a pH as near as possible to that of the sample to be examined at the temperature of measurement.

For precise measurements, to compensate for decreased electrode sensitivity due to, for example, ageing, it is essential to calibrate the pH meter using two buffer solutions. One of the buffer solutions shall have a pH close to the electrical zero of the pH meter.

If the pH meter does not include a temperature correction system, the temperature of the buffer solution shall be within the range 20 °C ± 2 °C.

5.3 Determination

Introduce the electrodes into the test portion (5.1) and set the temperature correction system of the pH meter to the temperature of measurement. If there is no temperature correction system, the temperature of the test portion shall be within the range 20 °C ± 2 °C.

Carry out the determination using the procedure appropriate to the pH meter used. When a constant value has been reached, read the pH directly from the scale on the instrument, to at least 0,05 pH unit.

5.4 Number of determinations

Carry out two determinations on two separate test portions from the same prepared sample.

6 Expression of results

6.1 Method of calculation

Take as the result the arithmetic mean of the results of the two determinations, provided that the requirement concerning repeatability (see 6.2) is satisfied. Report the result to at least 0,05 pH unit.

6.2 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, should not exceed 0,1 pH unit.

If the results do not fall in this range, reject them and carry out two new determinations.

7 Note on procedure

The following buffer solutions can be used for calibration.

7.1 Buffer solution with pH 3,57 at 20 °C, prepared as follows.

Saturate water at 25 °C with potassium hydrogen tartrate ($KHC_4H_4O_6$) of analytical reagent grade.

The pH of this solution is 3,56 at 25 °C and 3,55 at 30 °C.

7.2 Buffer solution with pH 6,88 at 20 °C, prepared as follows.

Weigh, to the nearest 0,001 g, 3,402 g of potassium dihydrogen orthophosphate (KH_2PO_2) and 3,549 g of disodium hydrogen orthophosphate (Na_2HPO_4), both dried for 2 h to 130 °C, into a 1 000 ml one-mark volumetric flask. Make up to the mark with distilled water at 20 °C.

The pH of this solution is 6,92 at 10 °C and 6,85 at 30 °C.

7.3 Buffer solution with pH 4,00 at 20 °C, prepared as follows.

Weigh, to the nearest 0,001 g, 10,211 g of potassium hydrogen phthalate ($KH[C_6H_4(COO)_2]$, dried for 2 h at 110 °C, into a 1 000 ml one-mark volumetric flask. Make up to the mark with distilled water at 20 °C.

The pH of this solution is 4,00 at 10 °C and 4,01 at 30 °C.

7.4 Buffer solution with pH 5,00 at 20 °C [e.g. a 0,1 mol/l solution of disodium hydrogen citrate ($Na_2HC_6H_5O_7$), of analytical reagent grade].

NOTE 1 Equivalent commercially available buffer solutions may be used.

8 Test report

The test report shall specify the method used and the result obtained. It shall also mention all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the result.

The report shall include all information necessary for the complete identification of the sample.

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