
International Standard



1743

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Glucose syrup — Determination of dry matter content — Refractive index method

Sirops de glucose — Détermination de la teneur en matière sèche — Méthode réfractométrique

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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 1743 was developed by Technical Committee ISO/TC 93, *Starch (including derivatives and by-products)*, and was circulated to the member bodies in November 1979.

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

Australia	Netherlands	Spain
Canada	Philippines	USA
Ethiopia	Poland	USSR
Germany, F.R.	Romania	Yugoslavia
Korea, Rep. of	South Africa, Rep. of	

No member body expressed disapproval of the document.

This second edition cancels and replaces the first edition (i.e. ISO 1743-1973).

Glucose syrup — Determination of dry matter content — Refractive index method

1 Scope and field of application

This International Standard specifies a method for the determination of the dry matter content of glucose syrups on the basis of their refractive index.

The method is also applicable to glucose syrup containing fructose.

2 Reference

ISO 5377, *Starch hydrolysis products — Determination of reducing power and dextrose equivalent — Lane and Eynon constant titre method*.

3 Principle

Determination of the refractive index of an undiluted product, at a specified temperature; calculation of the dry matter content by means of tables showing refractive index as a function of composition, concentration and temperature.

4 Apparatus

4.1 Refractometer, Abbe type or similar (see 7.1) allowing the reading or the estimation of refractive indices of between 1,300 0 and 1,550 0 to the nearest 0,000 2 unit.

It shall be so designed that samples can be introduced easily and rapidly, and shall be easy to clean. The instrument shall be provided with a thermometer the scale of which covers the temperatures of measurement between 20 and 60 °C, and with a device for the circulation of water to maintain the instrument at these temperatures to $\pm 0,2$ °C.

The operating instructions for this instrument shall always be strictly complied with, especially as far as the calibration is concerned.

4.2 Glass rod, with bent flattened end covered with PTFE¹⁾, for applying the sample to the measuring prism.

4.3 Light source : full daylight or an incandescent bulb (25 to 50 W) or other light source recommended by the manufacturer of the refractometer, arranged so that the light falls on the illumination prism or mirror.

5 Procedure

5.1 Preparation of test sample

Use the product as received.

5.2 Preparation of apparatus

Adjust the water circulation to operate at the required temperature ($20 \pm 0,2$ °C or $30 \pm 0,2$ °C or $45 \pm 0,2$ °C or $60 \pm 0,2$ °C) and to bring the prisms to the same temperature (see 8.3).

5.3 Determination

Bring the test sample (5.1) to the measuring temperature and apply a small quantity of this test sample to the fixed prism of the refractometer (4.1), by means of the glass rod (4.2), and immediately clamp down the movable prism (see 8.4).

Generally, 1 to 3 drops suffice to fill uniformly the space between the prisms. (If the quantity is too small, the contrast is insufficient when reading is attempted.)

With the instrument suitably illuminated, read or estimate the refractive index to the nearest 0,000 2 unit.

Take at least two readings on each test portion and take as the result of the determination the arithmetical mean of the two values obtained.

5.4 Number of determinations

Clean and dry completely the two prisms and carry out a second determination on a new test portion taken from the same test sample (5.1).

1) Polytetrafluoroethylene.

6 Expression of results

Read from the appropriate table the percentage by mass of dry matter in the test portion, corresponding to the measured refractive index (see the annex).

Take as the result the arithmetic mean of two determinations, if the conditions of repeatability (clause 7) are fulfilled.

7 Repeatability

The difference between the results of two determinations carried out in rapid succession and on the same sample by the same analyst shall not exceed 0,2 g of dry matter per 100 g of the product.

8 Notes on procedure

8.1 The procedure specified in 5.3 and the values given in the tables were established as a result of the use of an Abbe type refractometer (4.1).

8.2 The values indicated in the tables were determined by using the method of Lane and Eynon specified in ISO 5377.

8.3 The measuring temperature shall be equal to or higher than the room temperature, and the relative humidity in the room shall be low in order to avoid any fogging of the prisms. Difficulties arising in the analysis of concentrated highly viscous syrups can best be overcome by carrying out the measurement at the higher temperature, at which the viscosity is lower.

8.4 To obtain accurate results with warmed samples, the measurement shall be carried out rapidly; the application of the test portion to the prism face shall not take more than 2 s.

9 Test report

The test report shall show the method used and the results 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 results.

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

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Annex

Tables showing refractive index as a function of composition, concentration and temperature

A.1 The refractive indices of glucose syrups depend on various factors, particularly the degree of saccharification or the value of the dextrose equivalent (DE) and the ash.

A.2 The tables below resume the data published in the *Critical Data Tables* established by the Corn Refiners Association (USA) (1978/1979).

A.3 Tables 1 are valid for glucose syrups obtained by acidic hydrolysis :

1a) 28 DE 0,4 % ash at 20, 30, 45 and 60 °C

1b) 42 DE 0,4 % ash at 20, 30, 45 and 60 °C

1c) 55 DE 0,4 % ash at 20, 30, 45 and 60 °C

A.4 Tables 2 are valid for glucose syrups obtained by partial or total enzymic hydrolysis.

A.5 Tables 3a) and 3b) are valid for high maltose glucose syrups obtained by partial or total enzymic hydrolysis.

A.6 Tables 4 are valid for high fructose glucose syrups obtained by partial or total enzymic hydrolysis :

4a) HFCS 42 % fructose 0,05 % ash at 20, 30, 45 and 60 °C

4b) HFCS 55 % fructose 0,05 % ash at 20, 30, 45 and 60 °C

4c) HFCS 90 % fructose 0,05 % ash at 20, 30, 45 and 60 °C

A.7 Table 5 indicates the correction factors for tables 1, 2, 3 and 4 as a function of temperature.

A.8 Table 6 indicates the correction factors for tables 1, 2, 3 and 4 as a function of DE and ash.