



SLOVENSKI STANDARD

SIST EN ISO 5377:1998

01-november-1998

Starch hydrolysis products - Determination of reducing power and dextrose equivalent - Lane and Eynon constant titre method (ISO 5377:1981)

Stärkehydrolyseprodukte - Bestimmung des Reduktionsvermögens und des Dextroseäquivalents - Verfahren mit konstantem Titer nach Lane und Eynon (ISO 5377:1981)

Produits d'hydrolyse de l'amidon ou de la fécula - Détermination du pouvoir réducteur et de l'équivalent en dextrose - Méthode Lane et Eynon à titre constant (ISO 5377:1981)

(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN ISO 5377:1994

ICS:

67.180.20 Škrob in izdelki iz njega Starch and derived products

SIST EN ISO 5377:1998

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 5377:1998

<https://standards.iteh.ai/catalog/standards/sist/ac5cebc8-92c0-4e7e-9abe-d7aafd62ac3c/sist-en-iso-5377-1998>

EUROPEAN STANDARD

EN ISO 5377

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 1994

UDC 664.28:664.162.036:543.24

Descriptors: starches, tests, determination, mass losses, dry matter, titration

English version

**Starch hydrolysis products - Determination of
reducing power and dextrose equivalent - Lane
and Eynon constant titre method
(ISO 5377:1981)**

Produits d'hydrolyse de l'amidon ou de la
fécule - Détermination du pouvoir réducteur et
de l'équivalent en dextrose - Méthode Lane et
Eynon à titre constant (ISO 5377:1981)

Stärkehydrolyseprodukte - Bestimmung des
Reduktionsvermögens und des Dextroseäquivalents
- Verfahren mit konstantem Titer nach Lane und
Eynon (ISO 5377:1981)

STANDARD PREVIEW
standards.iteh.ai
<https://standards.iteh.ai/catalog/standards/sist/ac5cebc8-92c0-4e7e-9abe-d7aaf162ac3c/sist-en-iso-5377-1998>

This European Standard was approved by CEN on 1994-08-22. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2
EN ISO 5377:1994

Foreword

The text of the International Standard ISO 5377:1981, prepared by ISO/TC 93 "Starch", was submitted to the formal vote and was approved by CEN as EN ISO 5377:1994 on 1994-08-22 without any modifications.

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 February 1995, and conflicting national standards shall be withdrawn at the latest by February 1995.

According to the CEN/CENELEC Internal Regulations, 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, United Kingdom.

Endorsement notice

The text of the International Standard ISO 5377:1981 was approved by CEN as a European Standard without any modification.

(standards.iteh.ai)

SIST EN ISO 5377:1998

<https://standards.iteh.ai/catalog/standards/sist/ac5cebc8-92c0-4e7e-9abe-d7aafd62ac3c/sist-en-iso-5377-1998>

International Standard



5377

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Starch hydrolysis products — Determination of reducing power and dextrose equivalent — Lane and Eynon constant titre method

Produits d'hydrolyse de l'amidon ou de la fécule — Détermination du pouvoir réducteur et de l'équivalent en dextrose — Méthode Lane et Eynon à titre constant

First edition — 1981-12-15

(standards.iteh.ai)

[SIST EN ISO 5377:1998](https://standards.iteh.ai/catalog/standards/sist/ac5cebc8-92c0-4e7e-9abe-d7aafd62ac3c/sist-en-iso-5377-1998)

<https://standards.iteh.ai/catalog/standards/sist/ac5cebc8-92c0-4e7e-9abe-d7aafd62ac3c/sist-en-iso-5377-1998>

UDC 664.28 : 664.162.036 : 543.24

Ref. No. ISO 5377-1981 (E)

Descriptors : starches, tests, determination, mass losses, dry matter, titration.

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 5377 was developed by Technical Committee ISO/TC 93, *Starch (including derivatives and by-products)*, and was circulated to the member bodies in November 1980.

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

Australia	Netherlands
Austria	Romania
Egypt, Arab Rep. of	South Africa, Rep. of
France	USA
Iran	USSR

No member body expressed disapproval of the document.

Starch hydrolysis products — Determination of reducing power and dextrose equivalent — Lane and Eynon constant titre method

1 Scope and field of application

This International Standard specifies a Lane and Eynon constant titre method for the determination of the reducing power and dextrose equivalent of all starch hydrolysis products.

2 References

ISO 385/1, *Laboratory glassware — Burettes — Part 1: General requirements.*¹⁾

ISO 385/2, *Laboratory glassware — Part 2: Burettes for which no waiting time is specified.*¹⁾

ISO 648, *Laboratory glassware — One-mark pipettes.*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks.*

ISO 1741, *Dextrose — Determination of loss in mass on drying — Vacuum oven method.*

ISO 1742, *Glucose syrup — Determination of dry matter content — Vacuum oven method.*

ISO 1743, *Glucose syrup and dextrose — Determination of dry matter content — Refractive index method.*

ISO 1773, *Laboratory glassware — Boiling flasks (narrow-necked).*

ISO 5809, *Starch, including derivatives and by-products — Determination of sulphated ash.*²⁾

3 Definitions

3.1 reducing power : The content of reducing sugars, expressed as the number of grams of anhydrous D-glucose per 100 g of the sample, when determined by the method specified in this International Standard.

3.2 dextrose equivalent : The content of reducing sugars, expressed as the number of grams of anhydrous D-glucose per 100 g of the dry matter in the sample, when determined by the method specified in this International Standard.

4 Principle

Titration of a prescribed volume of mixed Fehling's solution with a solution of a test portion under specified conditions, using methylene blue as internal indicator.

5 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

5.1 Fehling's stock solutions

Prepare the following solutions, using apparatus in accordance with clause 6.

5.1.1 Stock solution A

Copper(II) sulphate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)	69,3 g
Water to	1 000,0 ml

5.1.2 Stock solution B

Potassium sodium tartrate tetrahydrate ($\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$)	346,0 g
Sodium hydroxide (NaOH)	100,0 g
Water to	1 000,0 ml

Before use, decant the clear solution from any sediment that may form.

5.1.3 Mixed Fehling's solution

Transfer into a dry stock glass bottle, in the following order, 100 ml of solution A (5.1.1) and 100 ml of solution B (5.1.2). Mix well.

NOTE — Do not keep Fehling's solution. Prepare this mixed solution just before use and standardize it as specified in 7.1.

1) At present at the stage of draft. (Revision, in part, of ISO/R 385.)

2) At present at the stage of draft.

ISO 5377-1981 (E)

5.2 Anhydrous D-glucose, complying with the following requirements :

- a) a solution containing 400 g/l shall be free from haze and sediment and shall show no more colour than the water used in its preparation when examined downwards in 50 ml Nessler tubes (6.5) filled to the marks;
- b) the sulphated ash content shall be not greater than 0,01 % (*m/m*) when determined by the method specified in ISO 5809 amended as follows :
 - 1) the mass of the test portion shall be increased to 20 g,
 - 2) only a platinum dish shall be used for incineration,
 - 3) the platinum dish shall be weighed to the nearest 0,1 mg before and after the incineration;
- c) the maltose and/or isomaltose content shall not exceed 0,1 % (*m/m*) and no sugar of greater relative molecular mass shall be detected.

5.3 D-glucose, standard reference solution.

5.3.1 Determine the dry matter content of the anhydrous D-glucose by the method specified in ISO 1741.

5.3.2 Weigh, to the nearest 0,1 mg, a mass of the anhydrous D-glucose (5.2) containing 0,600 g of solids, dissolve it in water, transfer the solution quantitatively into a 100 ml one-mark volumetric flask (6.4), dilute to the mark with water and mix.

Prepare this solution freshly on each day of use.

5.4 Methylene blue ($C_{16}H_{18}ClN_3S \cdot 2H_2O$), indicator, 1 g/l aqueous solution.

6 Apparatus

Ordinary laboratory apparatus and in particular

6.1 Narrow-necked boiling flask, of capacity 250 ml, complying with the requirements of ISO 1773.

6.2 Burette, of capacity 25 ml, graduated in subdivisions of 0,05 ml, complying with the requirements of ISO 385/2, class A.

6.3 One-mark pipettes, of capacity 1 ml and 25 ml, complying with the requirements of ISO 648, class A.

6.4 One-mark volumetric flasks, of capacity 100 ml, 500 ml and 1 000 ml, complying with the requirements of ISO 1042, class A.

6.5 Nessler tubes, of capacity 50 ml.

6.6 Heating device, suitable for maintaining boiling as required in 7.1.4 whilst enabling the colour change at the end-

point of the titration to be observed without the flask having to be removed from the heating device.

6.7 Stop-watch.

7 Procedure

NOTES

- 1 A boiling aid (for example glass beads) may be added, if desired, to ensure freedom from super-heating.
- 2 Shield the burette from the source of heat (6.6) at all times.

7.1 Standardization of the mixed Fehling's solution (5.1.3)

7.1.1 Using a pipette (6.3), place 25,0 ml of the Fehling's solution (5.1.3) in the clean, dry boiling flask (6.1).

7.1.2 Fill the burette (6.2) to the zero mark with the D-glucose standard reference solution (5.3).

7.1.3 Run into the boiling flask from the burette, 18,0 ml of the D-glucose solution (5.3). Swirl the flask to mix the contents.

7.1.4 Place the boiling flask on the heating device (6.6), previously adjusted so that the boiling commences in 120 ± 15 s as timed by the stop-watch (6.7).

Do not adjust the heating device subsequently. This ensures that once boiling has commenced the evolution of steam is brisk and continuous throughout the whole of the titration process, thus preventing to the maximum possible extent the entrance of air to the titration flask with consequent re-oxidation of its contents.

7.1.5 Bring the contents of the flask to the boil and continue boiling for 120 s (timed by the stop watch). Add 1 ml of the methylene blue solution (5.4) towards the end of this period. After expiry of the 120 s period, commence adding the D-glucose solution to the flask from the burette in 0,5 ml increments until the colour of the methylene blue is discharged, boiling being continued during the whole titration.

Note the total volume of the D-glucose solution (V ml), added up to and including the penultimate 0,5 ml increment.

NOTE — The disappearance of the colour of the methylene blue is best seen by looking at the upper layers and the meniscus of the contents of the titration flask, as these will be relatively free from the precipitated, red copper(I) oxide. The colour disappearance is more easily seen when indirect lighting is used. A white screen behind the titration flask is helpful.

7.1.6 Repeat 7.1.1 and 7.1.2.

7.1.7 From the burette run into the boiling flask a volume of the D-glucose solution equal to ($V - 0,3$) ml.

7.1.8 Repeat 7.1.4.

7.1.9 Bring the contents of the flask to the boil and continue boiling for 120 s (timed by the stop-watch). Add 1 ml of the methylene blue solution towards the end of this period. After expiry of the 120 s period, commence adding the D-glucose solution to the flask from the burette, initially in 0,2 ml increments and finally drop by drop, until the colour of the methylene blue (5.4) is just discharged, boiling being continued during the whole titration.

Towards the end of this action, add the successive increments of the D-glucose solution at intervals of 10 to 15 s. Complete these additions within 60 s to give a total time of boiling not longer than 180 s.

A third titration with a slightly larger, appropriately adjusted, initial addition of the D-glucose solution may be necessary to achieve this.

7.1.10 Note the volume of the D-glucose solution used up to the end-point of the final titration.

7.1.11 It is essential that the titre is between 19,0 and 21,0 ml of the D-glucose solution. If it is outside these limits, adjust the concentration of the Fehling's solution A (5.1.1) appropriately and repeat the standardization process.

7.1.12 Repeat 7.1.6 to 7.1.10 and calculate the mean of the two titres (V_1 ml).

7.1.13 For the day-to-day standardization of the mixed Fehling's solution, as V_1 is known with accuracy, a single titration only is necessary, using an initial addition of ($V_1 - 0,5$) ml of the D-glucose solution.

NOTE — As there is a personal factor involved, it is essential that each operator carries out his own standardization titration and uses his own value of V_1 in the calculation (8.1.1).

7.2 Determination

7.2.1 Preparation of test sample

If the sample is in powder or crystalline form, remove it from its container, break down any lumps, mix in an appropriate manner and place in a suitable airtight container.

If the sample is in massive, solid form, e.g. starch sugar (solid glucose), melt it in a closed container immersed in a hot water bath at 60 to 70 °C, allow to cool to ambient temperature and shake a number of times without removing the closure, in order to mix any condensed moisture on the interior into the sample.

If the sample is in liquid form, mix it by stirring it in its container, after removing any skin that may have formed on its surface.

7.2.2 If the reducing sugar content of the sample is unknown, obtain an approximation to its value by prior trial titrations, in general as specified in 7.1.1 to 7.1.5, but with the following modifications :

- a) Add 10,0 ml of the test solution in place of the D-glucose solution added in 7.1.3.

b) After 7.1.4

- 1) Immediately boiling starts, add 1 ml of the methylene blue solution and commence adding the test solution to the flask from the burette in 1,0 ml increments at intervals of approximately 10 s until the blue colour of the methylene blue is discharged. If the blue colour is discharged before the addition of any 1,0 ml increments of test solution, decrease the concentration of the test solution and repeat the titration.

- 2) Note the total volume of test solution (V' ml), added up to and including the penultimate increment.

V' shall not be greater than 50 ml. If it is, increase the concentration of the test solution and repeat the titration.

- 3) The approximate reducing power (see 3.1) (ARP) of the test sample is given by the formula

$$\text{ARP} = \frac{F \times 100 \times 500}{V' \times m_0}$$

$$= \frac{50\,000 \times F}{V' \times m_0}$$

$$= \frac{300 \times V_1}{V' \times m_0}$$

$$F = (0,6 \times V_1) / 100 \\ = 0,006 \times V_1$$

m_0 is the mass, in grams, of the test portion in 500 ml of test solution.

The mass, in grams, of the test portion to be taken is

$$\frac{100 \times 3}{\text{ARP}} = \frac{300}{\text{ARP}}$$

7.2.3 Test portion

Weigh, to the nearest 1 mg, a mass of the test sample (m g) containing between 2,85 and 3,15 g of reducing sugars (expressed as anhydrous D-glucose).

7.2.4 Test solution

Dissolve the test portion (7.2.3) in water, transfer the solution quantitatively to a 500 ml one-mark volumetric flask (6.4), dilute to the mark with water and mix.

7.2.5 Titration

7.2.5.1 Repeat 7.1.1 to 7.1.9 using the test solution (7.2.4) in place of the D-glucose solution (5.3).