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International Standard



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

Starch — Determination of ash

Amidons et fécules — Détermination des cendres

Second edition — 1981-10-01

UDC 664.2 : 543.822

Ref. No. ISO 3593-1981 (E)

Descriptors : starch, determination of ash.

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 3593 was developed by Technical Committee ISO/TC 93, *Starch (including derivatives and by-products)*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 3593-1976), which had been approved by the member bodies of the following countries :

Chile	Netherlands	United Kingdom
Czechoslovakia	Poland	USSR
France	Romania	Yugoslavia
Germany, F. R.	Spain	
Iran	Turkey	

The member bodies of the following countries had expressed disapproval of the document on technical grounds :

Australia
USA

3593-81

4851903 0026616 6

Starch — Determination of ash

0 Introduction

Native starches contain naturally small amounts of mineral substances. Converted starches may additionally contain variable amounts of added mineral substances.

This International Standard specifies a procedure for the conventional evaluation of both of these amounts together.

1 Scope and field of application

This International Standard specifies a method for the determination of the ash yielded by starches.

The method is applicable to native starches and to modified starches yielding not more than 2 % of ash. It does not apply to hydrolysis products nor to oxidized starches, nor to other products containing more than 0,2 % of chloride expressed as sodium chloride. In the other cases, use the method specified in ISO 5809.¹⁾

2 Reference

ISO 1666, *Starch — Determination of moisture content — Oven-drying methods.*

3 Definition

For the purpose of this International Standard, the following definition applies :

ash : The residue obtained after incineration of the product under the conditions specified in this International Standard.

The ash is expressed as a percentage by mass either of the product as received or on the dry basis.

4 Principle

Incineration of a test portion, at a temperature of 900 °C, until complete disappearance of the carbon in the residue.

5 Apparatus

Ordinary laboratory apparatus, and in particular :

5.1 Ashing dishes, of platinum or of any other material unaffected under the test conditions, with a flat base, a capacity of about 40 ml and a minimum usable surface area of 15 cm².

5.2 Desiccator, provided with a thick perforated metal plate, and containing an efficient desiccant such as phosphorus(V) oxide, silica gel impregnated with cobalt chloride indicator, or granular anhydrous calcium sulphate similarly treated.

5.3 Electric furnace with ventilation, including a device for control and adjustment of temperature to provide for incineration at a temperature of 900 ± 25 °C.

5.4 Analytical balance.

5.5 Electric hot-plate or bunsen burner.

6 Procedure

6.1 Preparation of the dish

Clean the ashing dish (5.1), whether new or used, for example with boiling dilute hydrochloric acid, and rinse copiously with tap water and then with distilled water.

Place the dish in the furnace (5.3) and heat for 30 min at 900 ± 25 °C. Allow to cool to room temperature in the desiccator (5.2) and then weigh to the nearest 0,000 1 g.

6.2 Test portion

Weigh rapidly, to the nearest 0,001 g, 2 to 10 g of the product²⁾ according to the expected yield of ash. Distribute the material without compression in the dish.

1) ISO 5809, *Starch, including derivatives and by-products — Determination of sulphated ash* (at present at the stage of draft).

2) It is generally convenient to take at least 5 g for potato, wheat and rice starches and 10 g for maize or manioc starches.

6.3 Pre-incineration

Heat the dish and its contents carefully, for example by placing it at the entrance of the furnace or on an electric hot-plate or a bunsen burner (5.5) until the test portion is completely carbonized.

Ignite the volatile substances produced, in order to avoid auto-ignition, which could give rise to a loss of product by projection from the dish.

6.4 Incineration

As soon as the flame has gone out, place the dish in the furnace, raise the temperature to 900 ± 25 °C and maintain at this temperature until the residual carbon has completely disappeared. A period of 1 h is normally sufficient. Place the dish and the residue in the desiccator, allow to cool to room temperature and weigh to the nearest 0,000 1 g.

Do not put more than four dishes at once in the desiccator.

6.5 Number of determinations

Carry out at least two determinations on the same sample.

7 Expression of results

7.1 Method of calculation and formulae

The ash yield, expressed as a percentage by mass of the sample as received, is given by the formula

$$m_1 \times \frac{100}{m_0}$$

The ash yield, expressed as a percentage by mass of the sample on the dry basis, is given by the formula

$$m_1 \times \frac{100}{m_0} \times \frac{100}{100 - H}$$

where

m_0 is the mass, in grams, of the test portion;

m_1 is the mass, in grams, of the residue after incineration;

H is the moisture content of the product, determined by the method specified in ISO 1666.

Take as the result the arithmetic mean of the values obtained in two determinations, provided that the requirement for repeatability (see 7.2) is fulfilled.

Express the result to the second decimal place.

7.2 Repeatability

The difference between the values obtained in two determinations, carried out simultaneously or in rapid succession by the same analyst on the same sample, shall not exceed 0,02 as an absolute value when the ash yield is less than or equal to 1 %, and shall not exceed 2 % of the mean when the ash yield is greater than 1 %.

If the difference exceeds these limits, two further determinations shall be carried out.

8 Test report

The test report shall indicate the method used and the results obtained. In addition, it shall mention all 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 necessary for the complete identification of the sample.