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**INTERNATIONAL STANDARD**



**3188**

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

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**Starches and derived products – Determination of nitrogen content by the Kjeldahl method – Titrimetric method**

*Amidons, fécules et produits dérivés – Dosage de l'azote selon la méthode de Kjeldahl – Méthode titrimétrique*

**First edition – 1978-08-15**

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**UDC 664.2 : 546.17 : 543.24**

**Ref. No. ISO 3188-1978 (E)**

**Descriptors :** starches, chemical analysis, determination of content, nitrogen, volumetric analysis, Kjeldahl method.

## FOREWORD

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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 3188 was developed by Technical Committee ISO/TC 93, *Starch (including derivatives and by-products)*, and was circulated to the member bodies in August 1975.

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

Australia	Iran	Thailand
Czechoslovakia	Netherlands	Turkey
France	Poland	United Kingdom
Germany	Romania	Yugoslavia
Hungary	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

U.S.A.

# Starches and derived products – Determination of nitrogen content by the Kjeldahl method – Titrimetric method

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a titrimetric method for the determination, by the Kjeldahl method, of the nitrogen content of starch and its derived products whose presumed nitrogen content is greater than 0,01 % (m/m).<sup>1)</sup>

NOTE – In starches and derived products to which nitrogenous materials have not been added, the nitrogen is present essentially in the form of protein and/or amino acids.

## 2 REFERENCES

ISO 1227/Add. 2, *Starch, including derivatives and by-products – Vocabulary.*

ISO 1871, *Agricultural food products – General directions for the determination of nitrogen by the Kjeldahl method.*

ISO 5378, *Starches and derived products – Determination of nitrogen content by the Kjeldahl method – Spectrophotometric method.*

## 3 DEFINITION

**nitrogen content** : The value found using the procedure specified. It includes the nitrogen content of free amino acids, of compounds producing amino acids on hydrolysis and of ammonium compounds. It does not include the nitrogen of nitrate and nitrite radicals, the nitrogen attached directly to another nitrogen atom or the nitrogen attached to an oxygen atom.

## 4 PRINCIPLE

Destruction of organic matter by sulphuric acid in the presence of a compound catalyst<sup>2)</sup>, alkalization of the reaction products, distillation of the liberated ammonia and collection in a boric acid solution, followed by titration with a standard volumetric sulphuric acid solution.

## 5 REAGENTS

The reagents shall be of recognized analytical quality. Ammonia-free distilled water or water of at least equivalent purity shall be used.

**5.1 Sulphuric acid**, concentrated,  $\rho_{20}$  1,84 g/ml [96 % (m/m)].

**5.2 Sodium hydroxide**, solution 30 % (m/m),  $\rho_{20}$  1,33 g/ml.

NOTE – This solution may be more concentrated.

**5.3 Boric acid**, 20 g/ solution.<sup>3)</sup>

**5.4 Compound catalyst<sup>4)</sup>**, consisting of, for example :

- potassium sulphate : 97 g;
- copper(II) sulphate, anhydrous : 3 g.

**5.5 Sulphuric acid**, approximately 0,02 N or 0,1 N standard volumetric solution.

**5.6 Colorimetric indicator**, prepared by mixing 2 parts by volume of a cold saturated solution of neutral methyl red in 50 % (V/V) ethanol with 1 part by volume of a 0,25 g/l solution of methylene blue in 50 % (V/V) ethanol.

Store the indicator in a brown glass bottle.

## 6 APPARATUS

Usual laboratory equipment and in particular

**6.1 Kjeldahl flask**, of suitable capacity, usually 500 to 800 ml, preferably with a ground glass joint, and provided with a pear-shaped glass bulb fitting loosely in the top of the neck of the flask.

1) For products whose presumed nitrogen content is less than 0,025 % (m/m), see ISO 5378.

2) See ISO 1871.

3) For anticipated low nitrogen contents, a less concentrated solution may be needed in order to obtain greater accuracy.

4) See ISO 1871, sub-clause 5.2.