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# INTERNATIONAL STANDARD



# 806

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

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## Aluminium oxide primarily used for the production of aluminium — Determination of loss of mass at 1 000 °C and 1 200 °C

*Oxyde d'aluminium principalement utilisé pour la production de l'aluminium — Détermination de la perte de masse à 1 000 °C et à 1 200 °C*

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**Descriptors** : aluminium oxide, tests, determination of content, absorbed water, mass loss by heating.

## 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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 47 has reviewed ISO Recommendation R 806 and found it technically suitable for transformation. International Standard ISO 806 therefore replaces ISO Recommendation R 806-1968 to which it is technically identical.

ISO Recommendation R 806 was approved by the Member Bodies of the following countries :

Austria	Hungary	South Africa, Rep. of
Belgium	India	Spain
Brazil	Ireland	Sweden
Bulgaria	Italy	Switzerland
Canada	Japan	Turkey
Chile	Korea, Rep. of	United Kingdom
Czechoslovakia	Netherlands	U.S.A.
Egypt, Arab Rep. of	Norway	U.S.S.R.
France	Poland	Yugoslavia
Germany	Romania	

No Member Body expressed disapproval of the Recommendation.

The Member Body of the following country disapproved the transformation of ISO/R 806 into an International Standard :

Egypt, Arab Rep. of

# Aluminium oxide primarily used for the production of aluminium – Determination of loss of mass at 1 000 °C and 1 200 °C

## 0 INTRODUCTION

Aluminium oxide for industrial use undergoes a loss of mass when it is heated. Up to 300 °C, this loss of mass is due solely to the loss of moisture absorbed by the aluminium oxide owing to its porosity. At high temperatures, the loss of mass observed is due in part to the residual water of constitution significantly increased by the loss by dissociation of certain impurities (carbonates, sulphates, etc.). The total loss of mass depends on the length of time the material is kept at these temperatures, on the content of water and impurities, and on the nature of the impurities.

As there is no specific temperature at which loss of water can be obtained exclusively and quantitatively, 1 000 °C and 1 200 °C have been chosen arbitrarily as ignition temperatures for the determination of loss of mass on heating.

Neither of these two determinations can be considered as a criterion of the state of calcination of aluminium oxide for industrial use. They can be carried out either separately or simultaneously.

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies two methods for the determination of loss of mass by ignition at 1 000 °C and 1 200 °C of aluminium oxide primarily used for the production of aluminium.

## 2 REFERENCES

ISO 802, *Aluminium oxide primarily used for the production of aluminium – Preparation and storage of test samples.*

ISO 2927, *Aluminium oxide primarily used for the production of aluminium – Sampling.*

## 3 PRINCIPLE

Ignition of two test portions taken from the same aluminium oxide sample, previously dried at 300 °C, and ignited, one at 1 000 °C and the other at 1 200 °C, for 2 h.

## 4 APPARATUS

Ordinary laboratory apparatus and

**4.1 Platinum crucible**, of diameter approximately 30 mm and depth approximately 40 mm, fitted with a platinum lid.

**4.2 Electric oven**, capable of being controlled at  $300 \pm 10$  °C.

**4.3 Electric furnace**, capable of being controlled at  $1\,000 \pm 10$  °C.

**4.4 Electric furnace**, capable of being controlled at  $1\,200 \pm 10$  °C.

**4.5 Desiccator**, preferably containing freshly activated alumina or phosphorus(V) oxide (use of calcium chloride shall be avoided).

## 5 PROCEDURE

### 5.1 Test portion

Ignite the crucible and lid (4.1) in the electric furnace (4.4), controlled at  $1\,200 \pm 10$  °C, for 15 min. Remove from the furnace, place in the desiccator (4.5) and, after cooling, weigh to the nearest 0,000 1 g (mass  $m_4$ ).

Then weigh, to the nearest 0,000 1 g, approximately 5 g of the crude sample (see 3.2 of ISO 802) into the crucible. Place the uncovered crucible, containing the test portion, and the lid in the electric oven (4.2), controlled at  $300 \pm 10$  °C, and keep there for 2 h. Cover the crucible with the lid, remove from the oven, place in the desiccator and, after cooling, weigh to the nearest 0,000 1 g (mass  $m_1$ ).

The mass of the test portion dried at 300 °C is given by the difference ( $m_1 - m_4$ ).

### 5.2 Determination

#### 5.2.1 Loss of mass at 1 000 °C

Place the uncovered crucible containing the test portion, prepared as specified in 5.1, and the lid in the electric furnace (4.3), controlled at  $1\,000 \pm 10$  °C, and keep there for 2 h. Cover the crucible with the lid, remove from the furnace, place in the desiccator and weigh, to the nearest 0,000 1 g, as quickly as possible, immediately after cooling (mass  $m_2$ ).

**5.2.2 Loss of mass at 1 200 °C**

Place the uncovered crucible containing another test portion, prepared as specified in 5.1, and the lid in the electric furnace (4.4), controlled at  $1\ 200 \pm 10$  °C, and keep there for 2 h. Cover the crucible with the lid, remove from the furnace, place in the desiccator and weigh, to the nearest 0,000 1 g, as quickly as possible, immediately after cooling (mass  $m_3$ ).

**5.3 Blank test**

**5.3.1 Principle**

Determination of any variation in mass of the platinum crucible and lid (4.1) after each determination.

**5.3.2 Procedure**

Carefully empty the crucible and weigh it with its lid (mass  $m_5$ ).

**6 EXPRESSION OF RESULTS**

**6.1** The loss of mass between 300 and 1 000 °C is given, as a percentage by mass, by the formula

$$\frac{(m_1 - m_2) - (m_4 - m_5)}{m_0} \times 100$$

**6.2** The loss of mass between 300 and 1 200 °C is given, as a percentage by mass, by the formula

$$\frac{(m_1 - m_3) - (m_4 - m_5)}{m_0} \times 100$$

where

$m_0$  is the mass, in grams, of the test portion dried at 300 °C [equal to  $(m_1 - m_4)$ ];

$m_1$  is the mass, in grams, of the crucible containing the test portion and the lid after drying at 300 °C;

$m_2$  is the mass, in grams, of the crucible containing the test portion and the lid after ignition at 1 000 °C;

$m_3$  is the mass, in grams, of the crucible containing the test portion and the lid after ignition at 1 200 °C;

$m_4$  is the mass, in grams, of the empty crucible and the lid before the determination and after ignition at 1 200 °C;

$m_5$  is the final mass, in grams, of the empty crucible and the lid after the determination.

**7 TEST REPORT**

The test report shall include the following particulars :

- a) the reference to the method used;
- b) the results and the method of expression used;
- c) any unusual features noted during the determination;
- d) any operation not included in this International Standard or in the International Standards to which reference is made, or regarded as optional.

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## ANNEX

**ISO PUBLICATIONS RELATING TO ALUMINIUM OXIDE  
PRIMARILY USED FOR THE PRODUCTION OF ALUMINIUM**

- ISO 802 – Preparation and storage of test samples.
- ISO 803 – Determination of loss of mass at 300 °C (conventional moisture).
- ISO 804 – Preparation of solution for analysis – Method by alkaline fusion.
- ISO 805 – Determination of iron content – 1,10-Phenanthroline photometric method.
- ISO 806 – Determination of loss of mass at 1 000 and 1 200 °C.
- ISO 900 – Determination of titanium content – Diantipyrylmethane photometric method.
- ISO 901 – Determination of absolute density – Pyknometer method.
- ISO 902 – Measurement of the angle of repose.
- ISO 903 – Determination of untamped density.
- ISO 1232 – Determination of silica content – Reduced molybdosilicate spectrophotometric method.
- ISO 1617 – Determination of sodium content – Flame emission spectrophotometric method.
- ISO 1618 – Determination of vanadium content – *N*-Benzoyl-*N*-phenylhydroxylamine photometric method.
- ISO 2069 – Determination of calcium content – Flame atomic absorption method.
- ISO/R 2070 – Determination of calcium content – Spectrophotometric method using naphthalhydroxamic acid.
- ISO 2071 – Determination of zinc content – Flame atomic absorption method.
- ISO/R 2072 – Determination of zinc content – PAN photometric method.
- ISO 2073 – Preparation of solution for analysis – Method by hydrochloric acid attack under pressure.
- ISO 2828 – Determination of fluorine content – Alizarin complexone and lanthanum chloride spectrophotometric method.
- ISO 2829 – Determination of phosphorus content – Reduced phosphomolybdate spectrophotometric method.
- ISO 2865 – Determination of boron content – Curcumin spectrophotometric method.
- ISO 2926 – Particle size analysis – Sieving method.
- ISO 2927 – Sampling.
- ISO 2961 – Determination of an adsorption index.
- ISO 3390 – Determination of manganese content – Flame atomic absorption method.

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