INTERNATIONAL STANDARD

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Aluminium oxide primarily used for the production of aluminium — Determination of loss of mass at 300 °C and 1 000 °C

Oxyde d'aluminium principalement utilisé pour la production de l'aluminium — Détermination de la perte de masse à 300 °C et à 1 000 °C

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 806 was prepared by Technical Committee ISO/TC 226, *Materials for the production of primary aluminium*.

This second edition cancels and replaces the first edition (ISO 806:1976) together with ISO 803:1976, which have been technically revised. This International Standard is based on AS 2879.1-2000 prepared by the Standards Australia Committee MN/9, Alumina and Materials used in Aluminium Production, as a revision of AS 2879:1986, *Alumina — Determination of loss of mass at 300 °C and 1 000 °C*.

Introduction

The objective of this revision is to incorporate sample preparation procedures, improve the description of the method and to provide a method for determination of loss of mass by automatic procedures.

Aluminium oxide primarily used for the production of aluminium — Determination of loss of mass at 300 °C and 1 000 °C

1 Scope

This International Standard specifies a method for the determination of loss of mass on heating of aluminium oxide at 300 °C and further loss of mass on ignition at 1 000 °C. By industry convention, these mass losses are often referred to as “moisture (MOI)” and “loss on ignition (LOI)” respectively.

This method is suitable for calcined alumina in the range 0,2 % to 5 % loss of mass at 300 °C and 0,1 % to 2 % loss of mass at 1 000 °C.

This method provides for samples to be treated on an “as-received” basis for determination of actual MOI and LOI in alumina samples. To improve precision of analysis in cases where “as-received” results are not required, samples can be “air-equilibrated” prior to analysis. “Air-equilibration” can greatly affect MOI results and significantly alter LOI results. The “air-equilibration” procedure and its effects are discussed in Annex A.

Instrumental methods are also discussed.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

AS 2850, *Chemical analysis — Interlaboratory test programs — For determining precision of analytical method(s) — Guide to the planning and conduct*

3 Principle

The test portion of aluminium oxide is dried at 300 °C for 2 h and the loss of mass is determined by mass difference. The test portion is then ignited at 1 000 °C for 2 h and the further loss of mass is determined.

4 Desiccants

WARNING — Because of the risk of explosion, do not attempt regeneration of magnesium perchlorate by oven drying. Magnesium perchlorate and phosphorus pentoxide are hazardous and reference should be made to appropriate material safety information.

One of the following desiccants shall be used:

a) phosphorus pentoxide;

b) activated alumina;

c) magnesium perchlorate.

If alumina is to be used as a desiccant it shall be freshly activated by heating for 12 h at (300 ± 10) °C and shall then be cooled for at least 4 h in the desiccator before use. The alumina shall be activated daily.

5 Apparatus

5.1 Vacuum desiccator (see Figure 1), containing an aluminium heat sink (5) with positions for four crucibles and tray of desiccant.

Figure 2 shows a suitable design for a heat sink. A metal tray of approximate dimensions 150 mm diameter and 30 mm depth and containing approximately 250 g of desiccant is suitable. The desiccator should be of such dimensions that the free circulation of air is not restricted (see Figure 1 for a suitable configuration). The desiccator lid inlet should also be fitted with a moisture trap containing a granular desiccant.

5.2 Platinum crucibles with lids, of 25 ml capacity and having approximate dimensions of 35 mm diameter and 40 mm depth.

5.3 Electric oven, capable of being controlled at (300 ± 2) °C, and fitted with mechanical air circulation.

NOTE Ovens utilizing natural air convection are not likely to achieve the required temperature control.

5.4 Electric furnace, capable of being controlled at (1 000 ± 10) °C.

5.5 Balance, capable of weighing to the nearest 0,000 1 g.

5.6 Thermogravimetric instrument, if required (see Clause 11).

6 Sample handling and preparation

Aluminium oxide used for aluminium production is a mixture of phases, most of which are active and will rapidly absorb moisture from the atmosphere. Consequently, great care needs to be taken to minimize exposure to atmosphere.

Seal samples in an airtight container immediately after collection. Leave space in the container to allow tumble mixing. Unless samples are prepared promptly and with a minimum of exposure to the laboratory atmosphere, inaccurate values for both moisture content and loss on ignition on an “as-received” basis will result.

Tumble the sample bottle to mix the sample prior to analysis. Remove the test portion and seal immediately after the test portion has been taken from it. Do not use any sub-sampling or mixing technique that involves removing all the bottle contents.

7 Procedure

7.1 Preparation of crucible and lid

Prepare the crucible and lid as follows.

a) Heat the crucible and lid in the furnace (5.4) at (1 000 ±10) °C for 15 min.

b) Remove the crucible and lid from the furnace, place in the desiccator (5.1) and allow to cool for 10 min.

c) Weigh the crucible and lid and record the mass to the nearest 0,000 1 g (m_1).