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International Standard



6607

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**Aluminium ores — Determination of total silicon content — Combined gravimetric and spectrophotometric method**

*Minerais alumineux — Dosage du silicium total — Méthodes gravimétrique et spectrophotométrique combinées*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6607 was prepared by Technical Committee ISO/TC 129, *Aluminium ores*.

# Aluminium ores — Determination of total silicon content — Combined gravimetric and spectrophotometric method

## 1 Scope and field of application

This International Standard specifies a combined gravimetric method and spectrophotometric method for the determination of the total silicon content in aluminium ores.

The method is applicable to ores containing between 1 and 25 % (*m/m*) of silicon dioxide.

## 2 References

ISO 5725, *Precision of test methods — Determination of repeatability and reproducibility by intra-laboratory tests.*

ISO 6995, *Aluminium ores — Determination of titanium content — 4,4'-Diantipyrilmethane spectrophotometric method.*

## 3 Principle

Decomposition of the test portion by either

- a) Treatment with a mixture of hydrochloric acid, nitric acid and sulfuric acid.

NOTE — This method is recommended for ores containing gibbsite and/or boehmite and when the residue from the dissolution of the test portion after silica volatilization is less than 1 % of the mass of the test portion;

or

- b) Sintering with sodium peroxide followed by a brief fusion. Dissolution of the melt with sulfuric acid.

NOTE — This method is recommended for ores containing diaspor, and when the residue after silica volatilization for acid decomposition is greater than 1 % of the mass of the test portion.

or

- c) The fusion method given in 3c) and sub-clause 7.5.1.3 of ISO 6995.

Dehydration of silica, dissolution of salts, filtration and ignition of the impure silica, treatment with hydrofluoric acid and sulfuric acid. Fusion of the residue with sodium carbonate/sodium tetraborate flux, dissolution of the melt with sulfuric acid and addition to the main solution.

Treatment of an aliquot portion of the main solution with excess sodium hydroxide and heating to depolymerize the silica in solution. Acidification with sulfuric acid and adjustment to pH 1,40, followed by addition of ammonium molybdate. Destruction of molybdophosphoric and molybdoarsenic acids with further sulfuric acid, reduction of the  $\beta$ -molybdosilicic acid to the blue complex and measurement of the absorbance at about 810 nm.

## 4 Reagents

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

### 4.1 Sodium peroxide.

NOTE — Sodium peroxide should be protected against humidity and should not be used once it has begun to agglomerate.

### 4.2 Sodium carbonate/sodium tetraborate flux.

Mix 3 parts by mass of anhydrous sodium carbonate and 1 part by mass of anhydrous sodium tetraborate flux.

### 4.3 Hydrofluoric acid, 40 % (*m/m*), $\rho_{20} = 1,13$ g/ml.

### 4.4 Sulfuric acid, $\rho_{20} = 1,84$ g/ml, diluted 1 + 1.

### 4.5 Sulfuric acid, $\rho_{20} = 1,84$ g/ml, diluted 1 + 3.

### 4.6 Sulfuric acid, $\rho_{20} = 1,84$ g/ml, diluted 1 + 9.

### 4.7 Sulfuric acid, $\rho_{20} = 1,84$ g/ml, diluted 1 + 39.

### 4.8 Acid mixture.

Measure into a one-litre beaker 225 ml of water and add cautiously, with mixing, 175 ml of sulfuric acid ( $\rho_{20}$  1,84 g/ml). Cool to room temperature and add 150 ml of hydrochloric acid ( $\rho_{20}$  1,17 g/ml) and 50 ml of nitric acid ( $\rho_{20}$  1,42 g/ml). Mix.

Prepare this solution fresh for each series of determinations and discard any unused solution.