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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Manganese ores and concentrates — Determination of aluminium content — Photometric and gravimetric methods

Minerais et concentrés de manganèse — Dosage de l'aluminium — Méthodes photométrique et gravimétrique

Reference number
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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 4295 was prepared by Technical Committee ISO/TC 65, *Manganese and chromium ores*.

This second edition cancels and replaces the first edition (ISO 4195 : 1979), of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Manganese ores and concentrates — Determination of aluminium content — Photometric and gravimetric methods

1 Scope and field of application

This International Standard specifies the following methods for the determination of the aluminium content of manganese ores and concentrates :

- **method A** : photometric method, applicable to products having aluminium contents from 0,1 to 1,5 % (*m/m*);
- **method B** : oxine gravimetric method, applicable to products having aluminium contents over 1,5 % (*m/m*).

It should be read in conjunction with ISO 4297.

2 References

ISO 4296-1, *Manganese ores — Sampling — Part 1 : Increment sampling*.

ISO 4296-2, *Manganese ores — Sampling — Part 2 : Preparation of samples*.

ISO 4297, *Manganese ores and concentrates — Methods of chemical analysis — General instructions*.

3 Method A — Photometric method for aluminium contents from 0,1 to 1,5 % (*m/m*)

3.1 Principle

Decomposition of a test portion by treatment with hydrochloric and nitric acids and double evaporation of the solution with hydrochloric acid to dryness. Dissolution of the dry residue in hydrochloric acid with addition of hydroxylammonium chloride solution. Separation of the insoluble residue by filtration, the filtrate being reserved as the main solution.

Ignition of the filter containing the residue and treatment with sulfuric and hydrofluoric acids. Fusion of the ignited residue with sodium carbonate. Dissolution of the melt in hydrochloric acid and combination of the solution obtained with the main solution.

Separation of iron from aluminium by precipitation as hydroxide, with strong potassium hydroxide solution, in the presence of zinc chloride and boric acid.

Photometric determination in the presence of ascorbic acid and polyvinyl alcohol.

3.2 Reactions

The method is based on the interaction of aluminium with chromazurol-S in the presence of polyvinyl alcohol in acetate buffer solution (pH 6-7) with the formation of a coloured complex between the aluminium and chromazurol-S with a molecular ratio 1 : 3. The influence of iron(III) is eliminated by precipitation with an alkaline borate mixture which prevents sorption of aluminium by the hydroxides.

3.3 Reagents

Use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

3.3.1 Ammonium acetate ($\text{CH}_3\text{COONH}_4$).

3.3.2 Boric acid.

3.3.3 Sodium tetraborate, anhydrous ($\text{Na}_2\text{B}_4\text{O}_7$).

3.3.4 Sodium carbonate, anhydrous.

3.3.5 Sodium acetate trihydrate ($\text{CH}_3\text{COONa} \cdot 3\text{H}_2\text{O}$).

3.3.6 Fusion mixture : three parts of sodium carbonate (3.3.4) and one part of sodium tetraborate (3.3.3).

3.3.7 Buffer solution, pH 6-7.

Dissolve 274 g of ammonium acetate (3.3.1) in 400 ml of water. Dissolve 109 g of sodium acetate (3.3.5) in 250 ml of water. Combine the solutions, dilute to 1 000 ml with water and mix.

3.3.8 Hydroxylammonium chloride ($\text{NH}_2\text{OH} \cdot \text{HCl}$), 100 g/l solution.

3.3.9 Potassium hydroxide, 470 g/l solution, free from aluminium.

3.3.10 Potassium hydroxide, 50 g/l solution, free from aluminium.