International Standard 312

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Manganese ores — Determination of active oxygen content, expressed as manganese dioxide — Titrimetric method

Minerais de manganèse — Dosage de l'oxygène actif, exprimé en dioxyde de manganèse — Méthode titrimétrique

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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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 312 was prepared by Technical Committee ISO/TC 65, *Manganese and chromium ores.*

This third edition cancels and replaces the second edition (ISO 312-1980), of which it constitutes a minor 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.

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Manganese ores — Determination of active oxygen content, expressed as manganese dioxide — Titrimetric method

1 Scope and field of application

This International Standard specifies a titrimetric method, by reduction with ammonium iron(II) sulfate, for the determination of the active oxygen content (conventionally expressed as manganese dioxide) of manganese ores.

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 Principle

Dissolution of a test portion in an excess of a standard solution of ammonium iron(II) sulfate in sulfuric acid, to reduce the manganese dioxide present in the test portion. Back-titration of the excess of ammonium iron(II) sulfate with standard volumetric potassium dichromate solution in the presence of sodium diphenylamine sulfonate as indicator.

4 Reagents

4.1 Phosphoric acid, ϱ 1,7 g/ml.

4.2 Ammonium iron(II) sulfate, 60 g/l solution.

Dissolve 60 g of ammonium iron(II) sulfate $[(NH_4)_2Fe(SO_4)_2 \cdot 6H_2O]$ in sulfuric acid, diluted (1 + 7), and dilute to 1 litre with the same acid.

4.3 Potassium dichromate, 8,780 g/l standard volumetric solution.

4.3.1 Preparation of the solution

Dissolve 8,780 g of potassium dichromate, recrystallized and dried at 180 to 200 °C, in 100 ml of water. Transfer the solution quantitatively to a 1 litre one-mark volumetric flask, dilute to the mark and mix.

4.3.2 Standardization of the solution

Take three test portions from a standard sample of manganese ore having a known manganese dioxide content approximately the same as that of the sample to be analysed and pass them through all stages of the analysis (7.4).

The titre of the potassium dichromate solution is given by the formula

$$T = \frac{B \times m}{V \times 100}$$

where

T is the titre of the potassium dichromate solution, expressed as grams of manganese dioxide corresponding to 1 ml of the solution;

B is the manganese dioxide content, as a percentage by mass, of the standard sample of manganese ore;

m is the mass, in grams, of the test portion from the standard sample;

V is the volume, in millilitres, of potassium dichromate solution used.

Take as the titre the average of the three results.

4.4 Sodium diphenylamine sulfonate, 0,8 g/l solution.

Dissolve 0,8 g of powdered sodium diphenylamine sulfonate ($C_6H_5NHC_6H_4 \cdot SO_3Na$) in a small volume of water and dilute with water to 1 litre.

Store the solution in a brown glass bottle.

5 Apparatus

Ordinary laboratory apparatus and

5.1 Conical flask, 300 ml capacity, fitted with a stopper with two outflow pipes (see figure).

5.2 Source of carbon dioxide.