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Manganese ores and concentrates — Determination of hygroscopic moisture content in analytical samples — Gravimetric method

Minerais et concentrés de manganèse — Détermination de l'humidité hygroscopique dans les échantillons pour analyse — Méthode gravimétrique

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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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 310 was prepared by Technical Committee ISO/TC 65, *Manganese and chromium ores*.

This third edition cancels and replaces the second edition (ISO 310:1981), of which it constitutes a technical revision.

Annex A of this International Standard is for information only.

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Manganese ores and concentrates — Determination of hygroscopic moisture content in analytical samples — Gravimetric method

1 Scope

This International Standard specifies a gravimetric method for the determination of the hygroscopic moisture content of manganese ores and concentrates. The method is applicable to products having hygroscopic moisture contents from 0,1 % (*m/m*) and 10 % (*m/m*).

The determination of the hygroscopic moisture content is intended to be carried out simultaneously with the determination of other constituents of the same analytical sample, so that the contents of the other constituents can be calculated on the basis of the absolutely dry ore.

This International Standard should be read in conjunction with ISO 4297.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4296-1:1984, *Manganese ores — Sampling — Part 1: Increment sampling.*

ISO 4296-2:1983, *Manganese ores — Sampling — Part 2: Preparation of samples.*

ISO 4297:1978, *Manganese ores and concentrates — Methods of chemical analysis — General instructions.*

3 Principle

Drying of an air-dried test portion to constant mass in a laboratory oven at 105 °C to 110 °C, and measurement of the loss in mass.

4 Apparatus

Ordinary laboratory apparatus, and

4.1 Weighing bottle, with stopper.

4.2 Laboratory oven, with a thermoregulator.

4.3 Desiccator, filled with melted calcium chloride, calcinated at 700 °C to 800 °C.

5 Sampling and samples

For analysis, use a laboratory sample of minus 100 µm particle size, which has been taken in accordance with ISO 4296-1 and prepared in accordance with ISO 4296-2.

The sample shall be air-dried under laboratory conditions.

6 Procedure

6.1 Test portion

Weigh, to the nearest 0,001 g, the test sample chosen from table 1, in accordance with the expected hygroscopic moisture content.

Table 1

Expected moisture content % (*m/m*)	Mass of test portion g
From 0,1 to 2	2
From 2 to 10	1

6.2 Determination

Place the test portion (6.1) in a weighing bottle (4.1), previously dried in a laboratory oven (4.2) at 105 °C to 110 °C, and weigh the bottle with the stopper.

Place the open weighing bottle (with the stopper) containing the test portion in the laboratory oven and dry at 105 °C to 110 °C for 2 h. Close the bottle with its stopper, cool it in a desiccator (4.3) for 20 min to 30 min and then weigh. Before weighing, slightly remove the stopper and quickly replace it again. Repeat the drying, cooling and weighing operations until constant mass is obtained. Repeat the drying operation for several 30 min periods. If, after repeated drying, the test portion increases in mass, then accept the mass preceding its increase as the final mass.

7 Expression of results

7.1 Calculation

The hygroscopic moisture content, w_{H_2O}, expressed as a percentage by mass, is given by the equation

$$w_{H_2O} = \frac{(m_1 - m_2) \times 100}{m}$$

where

m_1 is the mass, in grams, of the weighing bottle, its contents and stopper before drying;

m_2 is the mass, in grams, of the weighing bottle, its contents and stopper after drying;

m is the mass, in grams, of the test portion.

7.2 Precision

Precision data derived from analytical results are given in annex A for information.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) all information necessary for the identification of the sample, the laboratory and the date of analysis;

c) the results, and the form in which they are expressed;

d) any operation not specified in this International Standard, or any optional operation which may have influenced the results.

Annex A
(informative)

Precision of the method

The precision data in table A.1, which were derived from analytical results, can be regarded as a useful guideline.

Table A.1

Hygroscopic moisture content % (*m/m*)		Permissible tolerance	
		Three parallel determinations % (*m/m*)	Two parallel determinations % (*m/m*)
from	to		
0,1	0,2	0,04	0,03
0,2	0,5	0,06	0,05
0,5	1,0	0,10	0,08
1,0	2,0	0,15	0,13
2,0	5,0	0,20	0,17
5,0	10,0	0,30	0,25

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