
**Direct reduced iron — Determination of
carbon and/or sulfur — High-frequency
combustion method with infrared
measurement**

*Minerais de fer pré-réduits — Dosage du carbone et/ou du soufre —
Méthode par combustion haute fréquence et mesurage par infrarouge*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Principle.....	1
4 Reagents.....	1
5 Apparatus	2
6 Sampling and samples	3
6.1 Laboratory sample.....	3
6.2 Preparation of predried test samples	3
7 Procedure	3
7.1 General operating instructions	3
7.2 Test portion	3
7.3 Blank test.....	4
7.4 Calibration	4
7.4.1 Crucible preparation.....	4
7.4.2 Combustion	5
7.5 Determination.....	5
8 Expression of results	6
8.1 Calculation of mass fractions of carbon or sulfur	6
8.2 General treatment of results.....	6
8.2.1 Repeatability and permissible tolerance.....	6
8.2.2 Determination of analytical result.....	7
8.2.3 Between-laboratories precision	7
8.2.4 Check for trueness	7
8.2.5 Calculation of final result.....	8
9 Test report	8
Annex A (normative) Crucible loading sequence	9
Annex B (normative) Flowsheet of the procedure for the acceptance of analytical values for test samples.....	10
Annex C (informative) Features of commercial HF combustion/infrared sulfur analysers	11
Annex D (informative) Derivation of repeatability and permissible tolerance equations	12
Annex E (informative) Precision data obtained by international analytical trials	13

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 9686 was prepared by Technical Committee ISO/TC 102, *Iron ore and direct reduced iron*, Subcommittee SC 2, *Chemical analysis*.

This second edition cancels and replaces the first edition (ISO 9686:1992), which has been technically revised. It has been updated to alter the manner in which precision data are presented.

Direct reduced iron — Determination of carbon and/or sulfur — High-frequency combustion method with infrared measurement

WARNING — This International Standard may involve hazardous materials, operations and equipment. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies a method for the determination of the mass fraction of carbon and/or sulfur in direct reduced iron by infrared measurement after high-frequency combustion.

This method is applicable to mass fractions of carbon between 0,05 % and 2,5 %, and/or mass fractions of sulfur between 0,001 % and 0,05 % in direct reduced iron.

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.

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 7550, *Laboratory glassware — Disposable micropipettes*

ISO 7764, *Iron ores — Preparation of predried test samples for chemical analysis*

ISO 10835, *Direct reduced iron — Sampling and sample preparation — Manual methods for reduced pellets and lump ores*

3 Principle

The test portion is combusted in a refractory crucible in a flow of oxygen in the presence of an accelerator, the crucible being inserted in the combustion tube of a high-frequency (HF) furnace.

The carbon present is converted into carbon dioxide and the sulfur into sulfur dioxide. Each gas is measured by infrared absorption, with calibration using barium carbonate and potassium sulfate.

4 Reagents

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

4.1 Oxygen, minimum purity 99,5 % (m/m).

The pressure in the furnace should be controlled by a pressure regulator designed specially for the purpose and complying with the manufacturer's specification.