

# INTERNATIONAL STANDARD

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## **Iron ores — Determination of total iron content — Titanium(III) chloride reduction methods**

*Minerais de fer — Dosage du fer total — Méthodes par réduction au chlorure de titane(III)*



Reference number  
ISO 9507 : 1990 (E)

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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 9507 was prepared by Technical Committee ISO/TC 102, *Iron ores*.

Annex A forms an integral part of this International Standard. Annex B is for information only.

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# Iron ores — Determination of total iron content — Titanium(III) chloride reduction methods

## 1 Scope

This International Standard specifies two titrimetric methods, free from mercury pollution, for the determination of total iron content in iron ores, using potassium dichromate as titrant after reduction of the iron(III) by tin(II) chloride and titanium(III) chloride. The excess reductant is then oxidized by either dilute potassium dichromate (method 1) or perchloric acid (method 2).

Both methods are applicable to a concentration range of 30 % (*m/m*) to 72 % (*m/m*) of iron in natural iron ores, iron ore concentrates and agglomerates, including sinter products.

## 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 385-1: 1984, *Laboratory glassware — Burettes — Part 1: General requirements*.

ISO 648: 1977, *Laboratory glassware — One-mark pipettes*.

ISO 1042: 1983, *Laboratory glassware — One-mark volumetric flasks*.

ISO 2596: 1984, *Iron ores — Determination of hygroscopic moisture in analytical samples — Gravimetric and Karl Fischer methods*.

ISO 3081: 1986, *Iron ores — Increment sampling — Manual method*.

ISO 3082: 1987, *Iron ores — Increment sampling and sample preparation — Mechanical method*.

ISO 3083: 1986, *Iron ores — Preparation of samples — Manual method*.

ISO 7764: 1985, *Iron ores — Preparation of predried test samples for chemical analysis*.

## 3 Principle

### 3.1 Decomposition of the test portion

#### 3.1.1 Acid decomposition

For samples containing not more than 0,05 % (*m/m*) of vanadium, 0,1 % (*m/m*) of molybdenum or 0,1 % (*m/m*) of copper: by treatment with hydrochloric acid, filtration of the residue, ignition, treatment with hydrofluoric and sulfuric acids, fusion with potassium pyrosulfate, leaching of the melt and combination with the main iron solution.

#### 3.1.2 Fusion-acidification

For samples containing not more than 0,05 % (*m/m*) of vanadium, 0,1 % (*m/m*) of molybdenum or 0,1 % (*m/m*) of copper: by fusion with alkali, leaching of the cold melt with water and acidification with hydrochloric acid.

#### 3.1.3 Fusion-filtration

For samples containing more than 0,05 % (*m/m*) of vanadium and/or 0,1 % (*m/m*) of molybdenum but not more than 0,1 % (*m/m*) of copper: by fusion with alkali, leaching of the cold melt with water followed by filtration. Dissolution of the precipitate in hydrochloric acid.

### 3.2 Titration of iron

Reduction of the major portion of the iron(III) by tin(II) chloride and reduction of the remainder of the iron(III) by titanium(III) chloride. Oxidation of the excess reductant with either dilute potassium dichromate solution (method 1) or dilute perchloric acid (method 2). Titration of the reduced iron with potassium dichromate solution using sodium diphenylaminesulfonate indicator.

## 4 Reagents

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

<b>4.1 Potassium pyrosulfate</b> ( $K_2S_2O_7$ ), fine powder.	<b>Method</b> 1 and 2
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<b>4.2 Sodium carbonate</b> ( $Na_2CO_3$ ), anhydrous, or pre-ignited at 500 °C.	1 and 2
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