

This is a preview of "ISO 10378:2016". [Click here to purchase the full version from the ANSI store.](#)

Third edition  
2016-02-15

---

---

## **Copper, lead and zinc sulfide concentrates — Determination of gold and silver — Fire assay gravimetric and flame atomic absorption spectrometric method**

*Concentrés de sulfure de cuivre, de plomb et de zinc — Dosage de l'or et de l'argent — Méthode gravimétrique par essai au feu et spectrométrie d'absorption atomique dans la flamme*



Reference number  
ISO 10378:2016(E)

© ISO 2016

This is a preview of "ISO 10378:2016". Click [here](#) to purchase the full version from the ANSI store.



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

This is a preview of "ISO 10378:2016". Click here to purchase the full version from the ANSI store.

## Contents

Page

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Principle</b> .....	<b>2</b>
3.1 General.....	2
3.2 Fusion.....	2
3.3 Cupellation.....	2
3.4 Parting.....	2
3.5 Retreatment.....	2
3.6 Correction for blank contamination.....	2
<b>4 Reagents</b> .....	<b>2</b>
<b>5 Apparatus</b> .....	<b>4</b>
<b>6 Sample</b> .....	<b>5</b>
6.1 Test sample.....	5
6.2 Test portion.....	5
<b>7 Procedure</b> .....	<b>6</b>
7.1 Number of determinations.....	6
7.2 Trial fusion.....	6
7.3 Blank tests.....	6
7.4 Charge preparation.....	6
7.5 Primary fusion.....	7
7.6 Cupellation.....	8
7.7 Retreatment of residues.....	8
7.8 Determination of gold in the primary bead.....	9
7.9 Determination of gold and silver in secondary beads and blanks, and of silver in prills....	10
7.10 Determination of silver in the parting solution.....	11
<b>8 Expression of results</b> .....	<b>12</b>
8.1 Mass fraction of gold.....	12
8.2 Mass fraction of silver.....	13
<b>9 Precision</b> .....	<b>14</b>
9.1 Expression of precision.....	14
9.2 Method for obtaining the final result (see Annex H).....	15
9.3 Precision between laboratories.....	15
9.4 Check of trueness.....	17
9.4.1 General.....	17
9.4.2 Type of certified reference material (CRM) or reference material (RM).....	18
<b>10 Test report</b> .....	<b>18</b>
<b>Annex A (normative) Procedure for the preparation and determination of the mass of a predried test portion</b> .....	<b>19</b>
<b>Annex B (normative) Trial fusion</b> .....	<b>21</b>
<b>Annex C (normative) Blank determination</b> .....	<b>22</b>
<b>Annex D (normative) Inquartation</b> .....	<b>23</b>
<b>Annex E (normative) Determination of vaporization loss of silver during the cupellation process</b> .....	<b>24</b>
<b>Annex F (normative) Sulfuric acid — Parting</b> .....	<b>25</b>
<b>Annex G (normative) Determination of impurities in parting solutions and washings</b> .....	<b>27</b>

This is a preview of "ISO 10378:2016". [Click here to purchase the full version from the ANSI store.](#)

<b>Annex H</b> (normative) <b>Flowsheet of the procedure for the acceptance of analytical values for test samples (see 9.2)</b> .....	<b>31</b>
<b>Annex I</b> (informative) <b>Flowsheet of the method</b> .....	<b>32</b>
<b>Annex J</b> (informative) <b>Roasting method</b> .....	<b>33</b>
<b>Annex K</b> (informative) <b>Guide to the preparation of dilutions for the determination of silver in parting solutions and residues</b> .....	<b>34</b>
<b>Annex L</b> (informative) <b>Derivation of precision equations</b> .....	<b>35</b>
<b>Bibliography</b> .....	<b>50</b>

This is a preview of "ISO 10378:2016". [Click here to purchase the full version from the ANSI store.](#)

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 183, *Copper, lead, zinc and nickel ores and concentrates*.

This third edition cancels and replaces the second edition (ISO 10378:2005), in which [6.2](#) has been technically revised and the warning notice in [A.3.1](#) has been updated.

This is a preview of "ISO 10378:2016". [Click here to purchase the full version from the ANSI store.](#)

## **Introduction**

This International Standard describes a method for the determination of the mass fraction of gold and silver in copper, lead, and zinc sulfide concentrates. This International Standard was prepared to enable laboratories to determine the mass fraction of gold and silver in suitable samples using instrumental methods.