INTERNATIONAL STANDARD

ISO 13546

First edition
2021-07

Copper concentrates — Determination of mercury content — Cold vapour atomic absorption spectrometric method

Concentrés de cuivre — Dosage du mercure — Méthode par spectrométrie d'absorption atomique de vapeur froide

Reference number
ISO 13546:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Principle ... **1**
5 Reagents ... **2**
6 Apparatus ... **3**
7 Sampling and sampling preparation ... **4**
7.1 Test sample ... 4
7.2 Test portion ... 4
8 Procedure ... **4**
8.1 Number of determinations ... 4
8.2 Blank test ... 4
8.3 Dissolution of the test portion ... 4
8.4 Storage of digested solutions ... 5
8.5 Preparation of sample solutions ... 5
8.6 Preparation of test solutions ... 5
8.7 Preparation of calibration solutions ... 5
8.8 Preparation of mercury calibration graph ... 5
8.9 Determination of mercury content in test solutions ... 6
9 Expression of results ... **6**
10 Procedure for obtaining the final result ... **6**
11 Precision ... **6**
11.1 Expression of precision ... 6
11.2 Procedure for obtaining the final result ... 7
11.3 Precision between laboratories ... 7
11.4 Check of trueness ... 8
11.4.1 General ... 8
11.4.2 Type of certified reference material or reference material ... 8
11.4.3 Reference material certified or characterized by an interlaboratory test programme ... 8
11.4.4 Reference material certified or characterized by one laboratory ... 9
12 Test report ... **9**
Annex A (normative) **Procedure for obtaining the final results** ... **10**
Bibliography ... **11**

© ISO 2021 – All rights reserved

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).

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).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 183, *Copper, lead, zinc and nickel ores and concentrates*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2021 – All rights reserved

Copper concentrates — Determination of mercury content — Cold vapour atomic absorption spectrometric method

WARNING — The use of this document can involve hazardous materials, operations and equipment. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This document specifies an acid digestion and vapour generation atomic absorption spectrometric method for the determination of the mercury content in copper sulfide concentrates.

This document is applicable to mass fraction of mercury between 5 µg/g and 65 µg/g in copper sulfide concentrates.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 385, *Laboratory glassware — Burettes*

ISO 648, *Laboratory glassware — Single-volume pipettes*

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

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 4787, *Laboratory glassware — Volumetric instruments — Methods for testing of capacity and for use*

ISO 9599, *Copper, lead, zinc and nickel sulfide concentrates — Determination of hygroscopic moisture content of the analysis sample — Gravimetric method*

ISO 12743:2018, *Copper, lead, zinc and nickel concentrates — Sampling procedures for determination of metal and moisture content*

ISO Guide 35, *Reference materials — Guidance for characterization and assessment of homogeneity and stability*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

The test portion is decomposed by treatment with hydrochloric and nitric acid at a temperature between 60 °C and 80 °C followed by the addition of potassium permanganate as oxidizing agent. Subsequently, the potassium permanganate is reduced by hydroxylamine hydrochloride. The mercury

© ISO 2021 – All rights reserved