



ISO 4491-3

Metallic powders — Determination of oxygen content by reduction methods —

Part 3: Hydrogen-reducible oxygen

Poudres métalliques — Dosage de l'oxygène par les méthodes de réduction —

Partie 3: Oxygène réductible par l'hydrogène

Third edition
2025-09

This is a preview of ISO 4491-3:2025. Click [here](#) to purchase the full version from the ANSI store.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

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

This is a preview of ISO 4491-3:2025. [Click here to purchase the full version from the ANSI store.](#)

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Reagents	2
6 Apparatus	2
7 Sampling	6
8 Procedure	6
9 Calculation and expression of test results	9
10 Test report	9

This is a preview of ISO 4491-3:2025. Click here to purchase the full version from the ANSI store.

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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 119, *Powder metallurgy*, Subcommittee SC 2, *Sampling and testing methods for powders (including powders for hardmetals)*, in collaboration with the European Committee for Standardization (CEN), in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 4491-3:1997), of which it constitutes a minor revision.

The main changes are as follows:

- normative references in [Clause 2](#) have been updated;
- editorial revisions and alignment with current ISO drafting directives.

A list of all parts in the ISO 4491 series can be found on the ISO website.

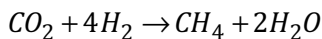
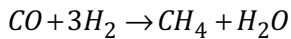
Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This is a preview of ISO 4491-3:2025. [Click here to purchase the full version from the ANSI store.](#)

This document is intended to be used for the determination of hydrogen reducible oxygen content of metallic powders, including powders containing carbon.

If carbon is present in the powder, some metal oxides which can otherwise have been reduced by hydrogen are instead reduced by carbon, producing carbon monoxide or carbon dioxide. These products are not measured by the titration with Karl Fischer reagent which is used to determine the amount of water produced. Consequently, a lower result will be obtained for the hydrogen-reducible oxygen content.

This interference is eliminated by passing the gases emerging from the reduction furnace over a catalyst which converts the CO and CO₂ formed into methane and water, in accordance with the following equations:



The conversion reaction is carried out at 380 °C, over a nickel catalyst.

Certain oxides can be partially reduced by carbon which otherwise would not be reduced by hydrogen. In such cases the interpretation of results should be made with great care (see ISO 4491-1:2023, 5.1.2 d).