INTERNATIONAL STANDARD

ISO 23497

First edition
2019-07

Determination of pH value — Technical buffer solutions for the calibration of technical measuring installations

Détermination de la valeur pH — Solutions tampons techniques pour l'étalonnage des installations techniques de mesure du pH

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO 23497:2019
https://standards.iteh.ai/catalog/standards/iso/188f2305-f9be-45ce-80c3-a9e93129fbac/iso-23497-2019

Reference number
ISO 23497:2019(E)

© ISO 2019

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO 23497:2019
https://standards.iteh.ai/catalog/standards/iso/188f2305-f9be-45ce-80c3-a9e93129fbac/iso-23497-2019

COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

 © ISO 2019 – All rights reserved

Contents

Page

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO 23497:2019
https://standards.iteh.ai/catalog/standards/iso/188f2305-f9be-45ce-80c3-a9e93129fbac/iso-23497-2019

© ISO 2019 – 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.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

This document was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

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.

https://standards.iteh.ai/catalog/standards/iso/188f2305-f9be-45ce-80c3-a9e93129fbac/iso-23497-2019

 © ISO 2019 – All rights reserved

Determination of pH value — Technical buffer solutions for the calibration of technical measuring installations

1 Scope

This document specifies requirements for technical buffer solutions. These buffer solutions are preferably used for the calibration and adjustment of technical pH measuring equipment as well as pH measuring installations in laboratories. Measuring methods are given to determine pH values and buffer capacities of such buffer solutions based on pH reference buffer solutions in accordance with ISO 23496.

NOTE Annex A gives examples of technical buffer solutions.

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 23496, *Determination of pH value — Part 3: Reference buffer solutions for the calibration of pH measuring equipment*

ISO 80000-9, *Quantities and units — Part 9: Physical chemistry and molecular physics*

DIN 19268:2007, *pH measurement — pH measurement of aqueous solutions with pH measuring chains with pH glass electrodes and evaluation of measurement uncertainty*[1)]

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO 23497:2019
https://standards.iteh.ai/catalog/standards/iso/188f2305-f9be-45ce-80c3-a9e93129fbac/iso-23497-2019

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 80000-9 and the following apply.

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/

3.1
pH
measure for the acidic or basic character of an aqueous solution

Note 1 to entry: Notation of pH: the "p" and the "H" are upright on one line.

Note 2 to entry: The acidic character is determined by the activity of the existing “hydrogen ions”.

[SOURCE: ISO 23496:2019, 3.1]

1) A measuring chain in the sense of this standard is generally represented by a combined electrode.

© ISO 2019 – All rights reserved

3.2
pH value
decadal logarithm of the hydrogen ion activity multiplied with (−1)

$$\mathrm{pH} = -\lg\left(\frac{a_{\mathrm{H}^+}}{m^0}\right) = -\lg\left(\frac{m_{\mathrm{H}^+} \cdot \gamma_{m,\mathrm{H}^+}}{m^0}\right)$$

where

a_{H^+}	is the activity of the hydrogen ion, in mol/kg;
m^0	is the standard molality (1 mol/kg);
γ_{m,H^+}	is the activity coefficient of the hydrogen ion;
m_{H^+}	is the molality of the hydrogen ion, in mol/kg.

Note 1 to entry: Molality is understood as moles per kilogram solvent.

Note 2 to entry: The pH value is not measurable as a measure of a single ion activity. Therefore, pH(PR) values of solutions of primary reference material are determined, which are approximate to it and can be attributed to it. This is based on a worldwide agreement, see ISO 80000-9:2009, Annex C.

[SOURCE: ISO 23496:2019, 3.2]

iTeh Standards
(https://standards.iteh.ai)
Document Preview

4 pH values and buffer capacities of technical buffer solutions

4.1 General

ISO 23497:2019
https://standards.iteh.ai/catalog/standards/iso/18873505-196e-45ce-80c3-a9e93129fbac/iso-23497-2019

The reference buffer solutions given in ISO 23496 are the basis for practical pH measurement. The pH values of these reference buffer solutions are traceable to primary standards, the pH values of which have been determined by national metrology institutes by means of measurements using primary methods[1]. The accuracy and reproducibility have been confirmed by international interlaboratory tests[2].

The reference buffer solutions in accordance with ISO 23496 are diluted solutions (ionic strength ≤0,1 mol/kg). Consequently, they have a relative low buffer capacity. This complicates the handling in practice, since the pH value can change due to the addition of acid or bases (e.g. CO_2 from the air, carryovers of other solutions). For the calibration of combined pH electrodes in industrial environment, thus, further buffer solutions are required, which have a higher buffer capacity.

The pH values of these technical buffer solutions shall be measured in accordance with DIN 19268, so that the traceability of the pH values to the reference buffer solutions in accordance with ISO 23496 is provided for.

The uncertainty budget illustrated in DIN 19268 shall be considered as a simplified illustration without consideration of influences during application. Temperature and diffusion potentials of the diaphragm are the parameters with the most significant influence[3][4].

In comparison to reference buffer solutions, technical buffer solutions are solutions which have higher ionic strength and, consequently, a higher buffer capacity. The pH values of technical buffer solutions are measured based on reference buffer solutions in accordance with ISO 23496 and show measurement uncertainties due to this measurement.

pH values of technical buffer solutions with pH <10 at 25 °C shall have an expanded measurement uncertainty of $U \leq 0{,}03$ ($k = 2$) and pH values of technical buffer solutions with pH ≥10 at 25 °C shall

 © ISO 2019 – All rights reserved