

TECHNICAL REPORT

IEC TR 62434

First edition
2006-03

pH measurements in difficult media – Definitions, standards and procedures

© IEC 2006 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

U

For price, see current catalogue

CONTENTS

FOREWORD.....	3
1 Scope and object.....	5
2 Normative references	5
3 General principles	5
3.1 Terms and definitions	5
3.2 Symbols	5
3.3 pH value.....	5
3.4 Standard reference buffer solutions (primary and secondary pH standards)	7
3.5 Widths of normal pH scales or normal pH ranges in the general solvents Z	10
3.6 Electrodes and operating conditions	12
4 Solvent media of applicability	14
5 Procedure for specification	14
6 Recommended standard values and ranges of influence quantities	14
7 Verification of values	14
8 Other difficult media for pH determinations	15
Annex A (informative) Values of the Nernstian slope factor $k = 2,3026 RT/F$	16
Annex B (informative)	17
Annex C (informative)	22
Annex D (informative)	23
Annex E (informative)	26
Annex F (informative)	27
Bibliography.....	28
Figure 1 – Schematic structure of the hydrogen gas electrode and of the AgCl electrode forming the cell (13)	9
Figure 2 – Intercomparing widths and relative positions of normal pH scales (with neutral points indicated by halving dots) in different solvents	11
Table A.1 – Values of the Nernstian slope factor $k = 2,3026 RT/F$	16

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**pH MEASUREMENTS IN DIFFICULT MEDIA –
DEFINITIONS, STANDARDS AND PROCEDURES**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC 62434, which is a technical report, has been prepared by subcommittee 65D: Analyzing equipment, of IEC technical committee 65: Industrial-process measurement and control.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
65D/121/DTR	65D/124/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this Technical report may be issued at a later date.

pH MEASUREMENTS IN DIFFICULT MEDIA – DEFINITIONS, STANDARDS AND PROCEDURES

1 Scope and object

This Technical Report concerns analyzers, sensor units and electronic units used for the determination of pH in non-aqueous solvents and aqueous organic solvent mixtures using glass electrodes. IEC 60746-1 includes further definition of the scope and provides for the general aspects of all electrochemical analyzers, including pH. It is worthwhile to remind that IEC 60746-2 contains specifications for simulators used for testing pH electronic units.

This technical report specifies the terminology, definitions, methodology, requirements for statements by manufacturers and performance tests for analyzers, sensor units and electronic units used for the determination of pH value in non-aqueous and aqueous-organic solvent mixtures.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60746-1, *Expression of performance of electrochemical analyzers – Part 1: General*

IEC 60746-2, *Expression of performance of electrochemical analyzers – Part 2: pH value*