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pH measurements in difficult media – Definitions, standards and procedures



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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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- withdrawn,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.

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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*

3 General principles

3.1 Terms and definitions

The required definitions will be given following on the order of appearance of the relevant physical quantities in the text, and they comply with the pertinent IUPAC documents [1,2]¹ and IEC 60746-2.

3.2 Symbols

The meaning of each symbol used here is given immediately after its first appearance in the relevant equation and it is conform to the pertinent IUPAC documents [1,2] and IEC 60746-2.

3.3 pH value

3.3.1 General

A measure of the conventional hydrogen ion activity a_{H^+} in solution given by the expression

$$\text{pH} = -\log a_{\text{H}^+} = -\log(m_{\text{H}^+} \gamma_{\text{H}^+}) \quad (1)$$

where γ_{H^+} is the activity coefficient of the H^+ ion at the molality m_{H^+} (moles of H^+ per kg of solvent). pH is a dimensionless quantity; it is not correct to write the logarithm of a quantity other than a dimensionless number, and the full form of equation (1) is

¹ Numbers in square brackets refer to the bibliography.