SLOVENSKI STANDARD
oSIST prEN ISO 19396-2:2019

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Barve in laki - Določevanje pH-vrednosti - 2. del: pH-elektrode s tehnologijo ISFET (ISO 19396-2:2017)

Paints and varnishes - Determination of pH value - Part 2: pH electrodes with ISFET technology (ISO 19396-2:2017)

Beschichtungsstoffe - Bestimmung des pH-Wertes - Teil 2: pH-Elektroden mit ISFET-Technologie (ISO 19396-2:2017)

Peintures et vernis - Détermination de la valeur pH - Partie 2: Électrodes pH avec technique ISFET (ISO 19396-2:2017)

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Paints and varnishes — Determination of pH value —

Part 2: pH electrodes with ISFET technology

Peintures et vernis — Détermination de la valeur pH —

Partie 2: Électrodes pH avec technique ISFET

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Foreword

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

A list of all parts in the ISO 19396 series can be found on the ISO website.

Introduction

The pH value of aqueous products is of decisive importance for the product properties and durability.

Paints and varnishes — Determination of pH value —

Part 2: pH electrodes with ISFET technology

1 Scope

This document specifies a method for measuring the pH value of dispersions and coating materials using pH electrodes with ion-sensitive field-effect transistor (ISFET) technology. ISO 19396-1 specifies a method for measuring the pH value using pH electrodes with a glass membrane.

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 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

ISO 80000-9:2009, *Quantities and units — Part 9: Physical chemistry and molecular physics*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 4618 and ISO 80000-9 and the following apply.

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

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

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

3.1
pH
measure for the acidic or basic reaction of an aqueous solution or polymer dispersion

Note 1 to entry: Notation of pH: the p and the H are vertically on one line. The same is valid for pOH.

Note 2 to entry: The acidic reaction is determined by the activity of the existing “hydrogen ions”. The basic reaction is determined by the activity of the existing hydroxide ions. The direct relationship between the activities of the “hydrogen ions” and the hydroxide ions is described by the ionic product of the water.

[SOURCE: ISO 19396-1:2017, 3.1]

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

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

with $a_{H^+} = m_{H^+} \cdot \gamma_{m,H^+}$

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.

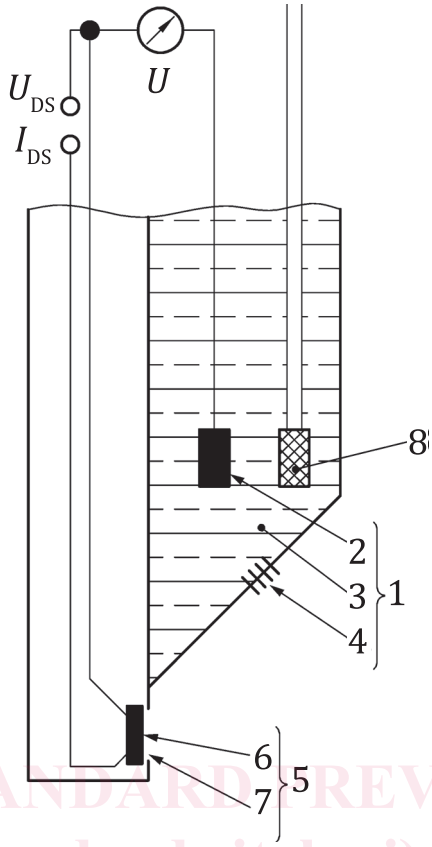
Note 1 to entry: The pH value is not measurable as a measure of a single ion activity. Therefore, pH (PS) values of solutions of primary reference material (PS, en: Primary Standard) are determined, which are approximate to it and can be attributed to it. This is based on a worldwide agreement; see ISO 80000-9:2009, Annex C.

[SOURCE: ISO 19396-1:2017, 3.2]

3.3
ISFET electrode
combined pH electrode with ISFET technology
potentiometric cell providing a voltage which depends on the *pH value* (3.2) of the measuring medium

Note 1 to entry: One of the two electrochemical cells is the ISFET; the second is a reference electrode.

Note 2 to entry: An integrated temperature sensor is recommended (see Figure 1).



Key

1	reference electrode, consisting of 2, 3 and 4	7	opening to the measuring medium (gate)
2	reference element	8	temperature sensor
3	reference electrolyte	U	pH proportional voltage
4	diaphragm	U_{DS}	voltage receiver/sender (drain/source)
5	pH measuring electrode, consisting of 6 and 7	I_{DS}	current receiver/sender (drain/source)
6	ISFET (see Figure 4)		

Figure 1 — Design of an ISFET electrode (schematic diagram)

3.4
reference electrode
electrode providing a constant potential which is independent from the *pH value* (3.2) of the measuring medium

Note 1 to entry: At present, the most commonly used type is the silver/silver chloride reference electrode, whose potential is stabilized by a constant concentration of potassium chloride (KCl) in the *reference electrolyte* (3.6).

[SOURCE: ISO 19396-1:2017, 3.5]

3.5
reference element
galvanic cell which dips into the *reference electrolyte* (3.6) and transmits the reference potential to the pH meter

[SOURCE: ISO 19396-1:2017, 3.6, modified — Note 1 to entry has been deleted.]