SLOVENSKI STANDARD
SIST EN 17721:2025

01-februar-2025

Nadomešča:
SIST-TS CEN/TS 17721:2023

Rastlinski biostimulanti - Določanje pH-vrednosti za tekoče mikrobne biostimulante/mikrobne proizvode - Določanje pH-vrednosti

Plant biostimulants - Determination of the pH for liquid microbial plant biostimulants/pH in microbial products - Determination of pH

Pflanzen-Biostimulanzien - Bestimmung des pH-Wertes für flüssige mikrobielle Pflanzen-Biostimulanzien/pH-Wert in mikrobiellen Produkten - Bestimmung des pH-Wertes

Biostimulants des végétaux - Détermination du pH des biostimulants microbiens liquides des végétaux/pH dans les produits microbiens - Détermination du pH

Ta slovenski standard je istoveten z: **EN 17721:2024**

ICS:

65.080 Gnojila Fertilizers

SIST EN 17721:2025 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 65.080

Supersedes CEN/TS 17721:2022

English Version

Plant biostimulants - Determination of the pH for liquid microbial plant biostimulants/pH in microbial products - Determination of pH

Biostimulants des végétaux - Détermination du pH des biostimulants microbiens liquides des végétaux/pH dans les produits microbiens - Détermination du pH

Pflanzen-Biostimulanzien - Bestimmung des pH-Wertes für flüssige mikrobielle Pflanzen-Biostimulanzien/pH-Wert in mikrobiellen Produkten - Bestimmung des pH-Wertes

This European Standard was approved by CEN on 26 August 2024.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 17721:2024) has been prepared by Technical Committee CEN/TC 455 “Plant Biostimulants”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2024, and conflicting national standards shall be withdrawn at the latest by May 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 17721:2022.

EN 17721:2024 includes the following significant technical changes with respect to CEN/TS 17721:2022:

— the European foreword and the Introduction have been updated;

— Clause 2, Normative references, has been updated;

— in Clause 3.2, the formula has been revised;

— in Clause 3.10, the definition of pH glass membrane has been revised;

— in Clause 5.5, the description of pH electrode has been revised;

— in Clause 10, Test Report, the list has been revised;

— Annex A on repeatability and reproducibility data has been added;

— Annex ZA has been added;

— the Bibliography has been revised.

This document has been prepared under a Standardization Request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

The European Committee for Standardization (CEN) was requested by the European Commission (EC) to draft European Standards or European Standardization deliverables to support the implementation of Regulation (EU) 2019/1009 of 5 June 2019 [1] laying down rules on the making available on the market of EU fertilising products ("FPR" or "Fertilising Products Regulation").

This standardization request, presented as SR M/564 and relevant amendments, also contributes to the Communication on "Innovating for Sustainable Growth: A Bio economy for Europe". The interest in plant biostimulants has increased significantly in Europe as a valuable tool to use in agriculture. Standardization was identified as having an important role in order to promote the use of biostimulants. The work of CEN/TC 455 seeks to improve the reliability of the supply chain, thereby improving the confidence of farmers, industry, and consumers in biostimulants, and will promote and support commercialisation of the European biostimulant industry.

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably trained staff.

1 Scope

This document specifies a method for laboratory measurement of the pH value in liquid microbial plant biostimulants, using pH electrodes with a glass membrane.

This document does not apply to plant biostimulants other than microbial plant biostimulants.

This document is applicable to the blends of fertilizing products where a blend is a mix of at least two of the following component EU fertilising products categories: Fertilizers, Liming Materials, Soil Improvers, Growing Media, Plant Biostimulants and where the following category Plant Biostimulants is the highest percentage in the blend by mass or volume, or in the case of liquid form by dry mass. If Plant Biostimulants is not the highest percentage in the blend, the European Standard for the highest percentage of the blend applies. In case a blend of fertilizing products is composed of components in equal quantity or in case the component EU fertilising products used for the blend have identical formulations[1], the user decides which standard to apply.

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.

EN 17702-1:2024, *Plant biostimulants — Sampling and sample preparation — Part 1: Sampling*

EN 17702-2:2024, *Plant biostimulants — Sampling and sample preparation — Part 2: Sample preparation*

EN 17724:2024, *Plant biostimulants — Terminology*

EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17724:2024 and the following apply.

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

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

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

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

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.

[1] An example of such a blend is a product with 2 claimed functions consisting of a non-microbial plant biostimulant and an organic fertilizer composed of 1 kg/kg of plant biostimulant from seaweed.

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

$$\mathrm{pH} = \mathrm{pa}_{\mathrm{H^+}} = -\lg\left(\frac{\mathrm{a}_{\mathrm{H^+}}}{\mathrm{m}_0}\right) = -\lg\left(\frac{\mathrm{m}_{\mathrm{H^+}} \cdot \gamma_{\mathrm{m,H^+}}}{\mathrm{m}_0}\right)$$

With

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

a_{H^+} is the activity of the hydrogen ion, expressed in mole per kilogram (mol/kg);

m_0 is the standard molality expressed in mole per kilogram (mol/kg);

γ_{m,H^+} is the activity coefficient of the hydrogen ion;

m_{H^+} is the molality of the hydrogen ion, expressed in mole per kilogram (mol/kg).

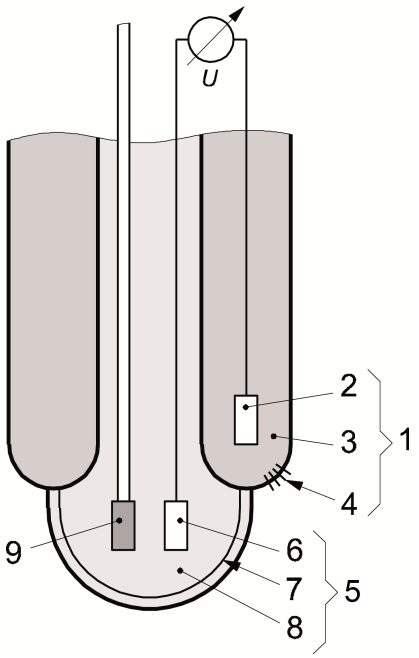
Note 1 to entry: The pH value is not measurable as a measure of a single ion activity. Therefore, pH(PS) values of solutions of primary reference material (PS, en: Primary Standard) are determined, which are approximated to it and can be attributed to it. This is based on a worldwide agreement; see EN ISO 80000-9:2019, Annex C [2].

3.3
potentiometric measuring chain
combination of electrochemical half cells

3.4
pH combination electrode
pH single-rod measuring chain
potentiometric measuring chain (3.3) providing a voltage which depends on the *pH value* (3.2) of the measuring solution

Note 1 to entry: One of the two electrochemical half cells is the pH measuring electrode, the second is a *reference electrode* (3.5) (see Figure 1).

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



Key

1	reference electrode, consisting in 2, 3 and 4
2	reference element
3	reference electrolyte
4	diaphragm
5	pH measuring electrode, consisting of 6, 7 and 8
6	reference element
7	glass membrane
8	internal buffer
9	temperature sensor
U	pH proportional voltage

Figure 1 — Design of a pH electrode with glass membrane and temperature sensor (schematic illustration)

Note 3 to entry: This document refers to pH electrodes with glass membranes. The electrode shaft should be made of material resistant to chemicals and solvents.

3.5
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* (3.7).

3.6
reference element
galvanic cell which dips into the *reference electrolyte* (3.7) and transmits the reference potential to the pH meter

Note 1 to entry: The reference elements of the pH measuring electrode and of the reference electrode should be aligned so that identical temperature characteristics are given.

3.7
reference electrolyte
aqueous salt solution (generally potassium chloride solution), whose chloride ion activity determines the potential of the *reference electrode* (3.5)

Note 1 to entry: At the *diaphragm* (3.8), the reference electrolyte has contact with the measuring medium. Potassium chloride solution is used as reference electrolyte, because K^+ ions and Cl^- ions have almost the same ion mobility and, therefore, only slight diffusion potential result.

Note 2 to entry: The reference electrolyte should flow out of the diaphragm in order to ensure a constant reference potential. Therefore, it shall be refilled occasionally. For *reference electrodes* (3.5) or *pH electrodes* (3.4) with thickened/gel or solidified electrolyte, refilling of the electrolyte can be omitted. Such reference electrodes or pH electrodes are called low-maintenance.

3.8
diaphragm
permeable material in the sides of the casing of *reference electrodes* (3.5), which enables the electrolytic contact between *reference electrolyte* (3.7) and measuring solution and simultaneously impedes the exchange of electrolyte

3.9
measuring electrode with glass membrane
electrode providing a potential which is a function of the *pH value* (3.2)

3.10
pH glass membrane
membrane made of special glass on whose interface is generated an electrical potential (electrode function) by the solution in which it is introduced, which is proportional to the *pH* (3.1) of the solution

3.11
temperature compensation
compensation of the temperature-dependent measuring signal only of the *buffer solutions* (3.15) with known temperature dependency

Note 1 to entry: The temperature dependency of the *pH value* (3.2) of the measuring medium cannot be compensated. Therefore, the temperature is always recorded together with the pH value.

3.12
theoretical slope
k
change of the voltage of the *pH electrode* (3.4) with temperature

$$k = -\frac{R \cdot T}{F} \ln 10 = -2{,}303 \cdot \frac{R \cdot T}{F}$$

where

T is the thermodynamic temperature, in Kelvin (measuring temperature, in °C + 273,15 °C);

R is the gas constant 8,314 $Jmol^{-1}K^{-1}$;

F is the Faraday constant 96 485 $Cmol^{-1}$.

Note 1 to entry: At 23°C, k = −58,77 mV.