Certificate of Analysis – Certified Reference Material

Potassium tetraoxalate dihydrate

Certified secondary standard reference material pH(S)=1.67$_9$ (25°C)

Producer: Merck KGaA, Frankfurter Str. 250, 64293 Darmstadt, Germany
Product no.: 1.01961.0025
Lot no.: 241961A
Description of CRM: Potassium tetraoxalate dihydrate Certipur®
certified secondary standard reference material for pH measurement directly traceable to primary SRM from NIST/PTB pH(S)=1.67$_9$
Expiry date: 2027/12/31
Storage: +15°C to +25°C tightly closed in the original container
Composition: Potassium tetraoxalate dihydrate
Formulation in compliance with DIN 19266, IUPAC, NIST, EP (Ph. Eur.) and USP

T [°C]	Certified value as pH ($KH_3(C_2O_4)_2$* $2H_2O$ 0.05 mol/kg)	Associated uncertainty $U_{CRM}=k\cdot u_{CRM}$ (k=2) as pH
5.0	1.664	± 0.010
10.0	1.666	± 0.010
15.0	1.668	± 0.010
20.0	1.672	± 0.010
25.0	**1.675**	**± 0.010**
30.0	1.681	± 0.010
37.0	1.688	± 0.010
40.0	1.693	± 0.011
45.0	1.700	± 0.011
50.0	1.708	± 0.011

Metrological traceability: This certified secondary standard reference material is directly traceable to primary certified reference material potassium tetraoxalate dihydrate characterised by PTB-OX-530/30606/22 and NIST 189c.
PTB: Physikalisch Technische Bundesanstalt, Braunschweig, Germany
NIST: National Institute of Standards and Technology, Gaithersburg, USA.

Accreditation: Merck KGaA, Darmstadt, Germany is accredited by the German accreditation authority DAkkS as registered reference material producer D-RM-15185-01-00 in accordance with ISO 17034.

Certificate issue date: 2024/04/18

ilac-MRA

DAkkS Deutsche Akkreditierungsstelle D-RM-15185-01-00

ISO 17034

CRM released by Approving Officer
or delegate of Quality Control

A. Yildirim

Dipl.-Ing. Ayfer Yildirim
Responsible Laboratory Manager

Method of analysis:	The pH value is directly measured by differential potentiometry with the aid of two platinum hydrogen electrodes "quasi without transference" according to IUPAC1 recommendations against solutions prepared from primary reference materials characterised by PTB and NIST.
Intended use:	This reference material is intended for use as a calibration standard for pH instruments or pH electrodes or as a control sample for measuring the pH value.
Instructions for handling and correct use:	The formulation is compliant to DIN 19266, IUPAC[1], NIST[2] and Ph. Eur. chapter 2.2.3 and USP chapter<791>.
Health and safety information:	Please refer to the Safety Data Sheet for detailed information about the nature of any hazard and appropriate precautions to be taken.

Details on correct use:

Preparation of potassium tetraoxalate dihydrate 0.05 mol/kg (pH(S)=1.67$_9$):
Dissolve 12.61 g potassium tetraoxalate dihydrate in 800 ml of water and make up to 1000 ml at 25°C.

Through within-bottle homogeneity a minimum sample volume of 30 ml was determined. The weigh-in quantity depends on the buffer substance and has to be calculated.

This reference material is intended for use as a calibration standard for pH instruments and pH electrodes. The pH value strongly depends on the temperature. Therefore it is necessary to keep the temperature constant during the measurement. Details concerning the nature of any hazard and appropriate precautions are provided in the material safety data sheet.

Associated uncertainty:

The associated uncertainty U_{CRM} reported with the certified values is calculated as combined expanded uncertainty $U_{CRM}=k \cdot u_{CRM}$ in accordance with GUM and EA-4/02, with $k=2$ as the coverage factor for a 95% coverage probability.

The combined uncertainty u_{CRM} is derived from combination of the squared uncertainty contributions:

$$u_{CRM} = \sqrt{u^2_{Characterisation} + u^2_{Homogeneity} + u^2_{Stability}}$$

$u_{characterisation}$:	is the uncertainty in accordance with DIN EN ISO/IEC 17025 which includes the contributions of the primary reference material and the measuring system. The characterisation measurements have been conducted by our DAkkS accredited calibration laboratory.
$u_{homogeneity}$:	is the between-bottle variation in accordance with ISO 17034. The assessment of homogeneity is performed by analysis of a representative number of systematically chosen sample units.
$u_{stability}$:	is the uncertainty obtained from short-term and long-term stability in accordance with ISO 17034. The stability studies are the basis for the quantification of the expiry date of this reference material for the unopened bottle.

For more detailed information please read the certification report on our website.

[1] R.P. Buck, et al.: The Measurement of pH – Definition, Standards and Procedures (IUPAC Recommendations 2002), Pure Appl. Chem, Vol 74, No. 11, pp. 2169-2200, 2002

[2] Y. Ch. Wu, W. F. Koch, R. A. Durst: Standardization of pH Measurements, NBS Special Publication 260-53, 1988

Certificate of analysis revision history:

Certificate version	Date	Reason for version
01	2024/04/18	Initial version

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