

### 1.0 ACCREDITATION / REGISTRATION

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories." Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).



### 2.0 PRODUCT DESCRIPTION

Product Code: **PH Buffer**  
 Catalog Number: PHRED-4  
 Lot Number: P2-WCS680743  
 Matrix: H<sub>2</sub>O  
 Value / Analyte(s): pH-4 Red  
 Starting Material: KHP

### 3.0 CERTIFIED VALUES AND UNCERTAINTIES

Temperature °C	Certified pH
5	4.006 ± 0.022
10	4.002 ± 0.022
15	4.002 ± 0.022
20	4.004 ± 0.022
25	4.008 ± 0.022
30	4.015 ± 0.022
35	4.024 ± 0.022
37	4.028 ± 0.022
40	4.034 ± 0.022
45	4.047 ± 0.022
50	4.061 ± 0.022

**Assay Information:** traceable to NIST SRM 185i

The following equations are used in the calculation of the certified value and the uncertainty. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

#### Characterization of CRM/RM by Two Methods

**Certified Value,  $X_{CRM/RM}$ , where two methods of characterization are used is the weighted mean of the two results:**

$$X_{CRM/RM} = [(w_a)(X_a) + (w_b)(X_b)]$$

$X_a$  = mean of Assay Method A with standard uncertainty  $u_{char a}$

$X_b$  = mean of Assay Method B with standard uncertainty  $u_{char b}$

$w_a$  and  $w_b$  = the weighting factors for each method calculated using the inverse square of the variance:

$$w_a = (1/u_{char a})^2 / ((1/u_{char a})^2 + (1/u_{char b})^2)$$

$$w_b = (1/u_{char b})^2 / ((1/u_{char a})^2 + (1/u_{char b})^2)$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a \& b}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char a \& b} = [(w_a)^2 (u_{char a})^2 + (w_b)^2 (u_{char b})^2]^{1/2}$  where  $u_{char a}$  and  $u_{char b}$  are the square root of the sum of the squares of errors from characterization which include instrument measurement, density, NIST SRM uncertainty, weighing, and volume

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

#### Characterization of CRM/RM by One Method

**Certified Value,  $X_{CRM/RM}$ , where one method of characterization is used is the mean of individual results:**

$$X_{CRM/RM} = \text{mean of Assay Method A with standard uncertainty } u_{char a}$$

$$CRM/RM \text{ Expanded Uncertainty } (\pm) = U_{CRM/RM} = k (u_{char a}^2 + u_{bb}^2 + u_{lts}^2 + u_{ts}^2)^{1/2}$$

$k$  = coverage factor = 2 in all cases at Inorganic Ventures

$u_{char a} = \text{square root of the sum of the squares of the errors from characterization which include instrumental measurement, density, NIST SRM uncertainty, weighing, and volume}$

$u_{bb}$  = bottle to bottle homogeneity standard uncertainty

$u_{lts}$  = long term stability standard uncertainty (storage)

$u_{ts}$  = transport stability standard uncertainty

No correction has been applied for transpiration that will occur after the CRM/RM bottle has been removed from the sealed aluminized bag. See Section 7.0 (Instructions for the Correct Use of this Reference Material) for more information.

#### **4.0 TRACEABILITY TO NIST**

-This product is traceable to NIST via an unbroken chain of comparisons. The uncertainties for each certified value are reported, taking into account the SRM/RM uncertainty error and the measurement, weighing and volume dilution errors. In rare cases where no NIST SRM/RM are available, the term 'in-house std.' is specified.

##### **4.1 Thermometer Calibration**

-All thermometers are NIST traceable through thermometers that are calibrated by an accredited calibration laboratory.

##### **4.2 Balance Calibration**

-All analytical balances are calibrated by an accredited calibration laboratory and procedure. The weights used for testing are annually compared to master weights and are traceable to NIST.

##### **4.3 Glassware Calibration**

-An in-house procedure is used to calibrate all Class A glassware used in the manufacturing and quality control of CRM/RMs.

#### **5.0 TRACE METALLIC IMPURITIES (TMI) DETERMINED BY ICP-MS AND ICP-OES ( $\mu\text{g}/\text{mL}$ ) - N/A**

#### **6.0 INTENDED USE**

-For the calibration of analytical instruments and validation of analytical methods as appropriate.

#### **7.0 INSTRUCTIONS FOR THE CORRECT USE OF THIS REFERENCE MATERIAL**

##### **7.1 Storage and Handling Recommendations**

-Store between approximately 4° - 30°C while in sealed TCT bag.

-While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag, transpiration of the CRM/RM will occur. It is the responsibility of the user to account for this effect. When the bottle is weighed, both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.

-After opening the sealed TCT bag, keep cap tightly sealed when not in use. Store and use at 20° ± 4°C. Do not pipette from the container. Do not return removed aliquots to container.

-For more information, visit [www.inorganicventures.com/TCT](http://www.inorganicventures.com/TCT).

#### **8.0 HAZARDOUS INFORMATION**

-Please refer to the Safety Data Sheet for information regarding this CRM/RM.

#### **9.0 HOMOGENEITY**

-This solution was mixed according to an in-house procedure and is guaranteed to be homogeneous. Homogeneity data indicate that the end user should take a minimum sample size of 0.2 mL to assure homogeneity.

#### **10.0 QUALITY STANDARD DOCUMENTATION**

##### **10.1 ISO 9001 Quality Management System Registration**

- QSR Certificate Number QSR-1034

##### **10.2 ISO/IEC 17025 "General Requirements for the Competence of Testing and Calibration Laboratories"**

-Chemical Testing – Accredited / A2LA Certificate Number 883.01

**10.3 ISO 17034 “General Requirements for the Competence of Reference Material Producers”**

-Reference Material Producer – Accredited / A2LA Certificate Number 883.02

**11.0 CERTIFICATION, LOT EXPIRATION AND PERIOD OF VALIDITY**

**11.1 Certification Issue Date**

**May 31, 2019**

-The certification is valid within the measurement uncertainty specified, provided the CRM/RM is stored and handled in accordance with instructions given in Section 7.1. This certification is nullified if instructions in Section 7.1 are not followed or if the CRM/RM is damaged, contaminated or otherwise modified.

**11.2 Period of Validity**

-Sealed TCT Bag Open Date: \_\_\_\_\_

-This CRM/RM should not be used longer than one year from the date of opening the sealed TCT bag or after the date given in Section 11.3, whichever comes first. This is contingent upon the CRM/RM being stored and handled in accordance with the instruction given in Section 7.1.

**11.3 Lot Expiration Date**

**May 31, 2023**

-The date after which this CRM/RM should not be used (See Section 11.2)

-The lot expiration date reflects the period of time the stability of a CRM/RM can be supported by long-term stability studies conducted on properly stored and handled CRM/RMs.

**12.0 NAMES AND SIGNATURES OF CERTIFYING OFFICERS**

**Certificate Prepared By:**

Uyen Truong  
Product Documentation Supervisor



**Certificate Approved By:**

Michael Booth  
Manager, Quality Control



**Certifying Officer:**

Paul Gaines  
PhD., Senior Technical Director

