National Research Council Canada | Conseil national de recherches Canada

Certificate of Analysis

Reference Material

POTS-1

Potato Starch Reference Material for Trace Metals and other Constituents

POTS-1 is a Reference Material prepared from food grade potato starch. Reference and information quantity values are provided in the following tables for trace metals and other constituents. The expanded uncertainty (U_{CRM}) in the reference value is equal to $U = ku_c$ where u_c is the combined standard uncertainty calculated according to the JCGM Guide [1] and k is the coverage factor. A coverage factor of two (2) was applied for all elements. All listed values are expressed on a dry mass basis.

Table 1: Reference values and expanded uncertainties (k = 2) for POTS-1

Analyte	Mass fraction, mg/kg
calcium	397 ± 88
iron	4.4 ± 1.6
magnesium	58 ± 10
phosphorus	663 ± 98
potassium	417 ± 54
sulfur	30 ± 4

Table 2: Information values for POTS-1

Quantity	Value	Unit
energy content	6150	kcal/(100 g)
energy content	1470	kJ/(100 g)
carbohydrates	88	g/(100 g), %
ash	0.25	g/(100 g), %
total fiber	0.8	g/(100 g), %
fat	0.004	g/(100 g), %
saturated fat	0.005	g/(100 g), %

Reference values

Reference values are non-certified values for which insufficient data are available to provide a comprehensive estimate of uncertainty to permit their full certification (Table 1).

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Information values

Information values are those for which insufficient data are available to provide any estimate of uncertainty (Table 2).

History

POTS-1 was prepared and characterized by the Centre for Land and Biological Resources Research, Agriculture Canada [2,3]. The materials were transferred from the National Institute of Standards and Technology (NIST) to the National Research Council of Canada (NRC). In 2014 NRC distributed samples of POTS-1 to several laboratories for elemental analysis. Reference values are weighted means of results from at least two different analytical methods applied by analysts in different laboratories. The material was renamed POTS-1 by the NRC.

Intended use

This Reference Material (RM) is intended for use in evaluating analytical methods and instruments used for the determination of major, minor, and trace constituent elements in potato starch and other similar food, agricultural, and biological materials. A minimum sample mass of 500 mg is recommended.

This material is intended for laboratory use, not for human consumption.

Storage and sampling

POTS-1 should be stored at room temperature in its original bottle, tightly capped, and not exposed to intense direct light or ultraviolet radiation. Prior to each use, contents of the bottle should be well mixed by gentle shaking and rolling of the container. Values reported in this certificate represent total mass fractions of elements in this reference material.

Instructions for drying

Moisture content should be determined on a separate subsample for conversion of analytical results to a dry-mass basis. The recommended method is drying for 4 hours in an air oven at 85 °C.

Preparation of material

The source of material for POTS-1 was food-grade potato starch obtained from Kingsley & Keith (Canada) Inc. Montreal, QC, Canada. All preparatory work following acquisition of the commercial product was performed at the facilities of Agriculture Canada, Ottawa [2,3]. The dry bulk powder was sterilized with ^{60}Co gamma radiation to 20 kGy. All subsequent processing was performed using plastic equipment. The material was sieved through nylon monofilament sieve cloths supported in high density white polyethylene holders. Pairs of sieves with openings of approximately 90 µm and 50 µm were used to yield suitable narrow middle cuts constituting the RM. This fraction was blended in a poly(methylmethacrylate) V-configuration blender and packaged into clean 150 mL brim capacity, colorless glass bottles.

Stability

The stability of similar materials have been assessed and confirmed by NRC and comparable behavior is expected from POTS-1.

Homogeneity

The analytical results obtained from the laboratories were assessed to provide homogeneity estimates.

Uncertainty

Uncertainties are estimated from the results of various laboratories using DerSimonian-Laird random effects model. They are believed to take into account the batch characterization, possible between-bottle variation, and inconsistency between the various measurement methods.

Metrological traceability

In 2014 the material was reassessed for elemental content using SI traceable calibrants and CRMs. As such, POTS-1 serves as suitable reference material for laboratory quality assurance programs, as outlined in ISO/IEC 17025.

Quality System (ISO/IEC 17025, ISO 17034)

This material was produced in compliance with the NRC Metrology Quality Management System, which conforms to the requirements of ISO 17034 and ISO/IEC 17025. The Metrology Quality Management System supporting NRC Calibration and Measurement Capabilities, as listed in the *Bureau international des poids et mesures* (BIPM) Key Comparison Database (kcdb.bipm.org/), has been reviewed and approved under the authority of the Inter-American Metrology System (SIM) and found to be in compliance with the expectations of the *Comité international des poids et mesures* (CIPM) Mutual Recognition Arrangement. The SIM approval is available upon request.

Updates

Users should ensure that the certificate they have is current. For updates, please refer to doi.org/10.4224/crm.2015.pots-1

References

1. Evaluation of measurement data: Guide to the expression of uncertainty in measurement JCGM100:2008. https://www.bipm.org/en/publications/guides/gum.html
2. M. Inhat (2001) Twenty five years of reference material activity at Agriculture and Agri-Food Canada. Fresenius J Anal Chem 370: 279-285. doi.org/10.1007/s002160100803
3. M. Inhat (1988) Preparation of twelve candidate agricultural reference materials. Fresenius Z Anal Chem 332: 539-545. doi.org/10.1007/BF00472638

Authorship

Scott Willie[1], Patricia Grinberg[1], Juris Meija[1], and Z. Mester[1].

[1] National Research Council Canada, 1200 Montreal Rd, Ottawa, ON, K1A 0R6, Canada

Acknowledgements

The material was prepared at Agriculture Canada under the direction of M. Ihnat, Centre for Land and Biological Resources Research (CLBRR).

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Date of Issue: September 2015
Date of Expiry: September 2028
Revised: March 2016 (editorial update); May 2024 (date of expiry extended and editorial update)

Approved by:

Patricia Grinberg

Digitally signed by Grinberg, Patricia
DN: cn=Grinberg, Patricia, c=CA, o=GC, ou=NRC-CNRC, email=patricia.grinberg@cnrc-nrc.gc.ca

Patricia Grinberg, Ph. D.
Team Leader, Inorganic Chemical Metrology
NRC Metrology

This Certificate is only valid if the corresponding material was obtained directly from the NRC or an Authorized Reseller.

National Research Council Canada
Metrology
1200 Montreal Road
Building M36, Room 1029
Ottawa, Ontario K1A 0R6

Telephone: 613-993-2359
Fax: 613-993-8915
Email: CRM-MRCOttawa@nrc-cnrc.gc.ca

Canada