

Certificate of Analysis

Product Description:

Name: Pine Needles
Part Number: CRM-PN-A
Lot Number: 205813

Certified Values:

Element	Concentration (µg/g)	Element	Concentration (µg/g)
Al	1,010 ± 40	Cr	(0.5)
Ca	5,020 ± 200	Cu	(1.8)
K	540 ± 25	Fe	133 ± 12
Mg	1,000 ± 30	Mo	<0.02
Mn	232 ± 13	Ni	(0.85)
Na	62 ± 3	Pb	(1)
P	(470)	Sb	<0.01
S	(450)	Se	<0.01
Ag	<0.005	Sn	<0.01
As	<0.01	Sr	5.1 ± 0.2
Ba	10.6 ± 0.6	Tl	<0.005
Cd	0.13 ± 0.01	Zn	28.8 ± 1.5
Co	<0.005		

Note: The values shown in parentheses are provided for information only

The pine needle samples are randomly selected and digested using total digestion method. The metals are determined by inductively coupled plasma optical emission spectrometry (ICP-OES) and graphite furnace atomic absorption spectroscopy (GF-AAS) using an internal laboratory developed methods. The certified values are based on the combination of results by different analytical techniques. The combined effect of uncertainty components associated with sample variation, errors of measurements and method bias is estimated, and the expanded uncertainty in the certified value is calculated at a 95% confidence interval and coverage factor *k* is about 2.

Preparation Information:

This Certified Reference Material is pine needles obtained from a commercial source in Georgia and stored in polyethylene bags. The pine needles were dried under infrared heat lamps, ground in a ball-mill, sieved, and only particles that passed a 60 mesh sieve were saved. The saved material was transferred to a mixing-drum and blended for several hours. Samples were statistically taken from the batch prepared for homogeneity testing. The estimated relative standard deviation for the element in the material in-homogeneity is less than 3%. Then the material was bottled into 30-g units. Randomly selected bottles were taken for the final certification analysis.

Traceability Information:

The traceability of this product is maintained through an unbroken chain of comparisons to appropriate standards with suitable procedure and measurement uncertainties. The maintenance of the base and derived units of International System of Units (SI) with traceability of measurement results (contemporary metrology) to SI ensures their comparability over time as follows.

a. **Standard Weight and Analytical Balance**

The standard weights (NBS weights Inventory No 20231A) are calibrated every two years by South Carolina Metrology Laboratory that is a participant in "NIST Weights and Measures Measurement Assurance Program" with a certificate of measurement traceability to NIST primary standards.

The balances are calibrated yearly by the ISO 17025 accredited metrology service, and are verified weekly by an in-house method using standard weights.

b. **Volumetric Device**

The calibration of volumetric vessels is checked annually using the ASTM method E542-01

c. **Thermometer**

The standard thermometers are calibrated every year by the ISO 17025 accredited metrology service. The thermometers used in-house are verified against the standard thermometers yearly.

d. **Calibration Standards**

The calibration standards used for determination of metals are traceable to the NIST SRM3100 series.

Packaging and Storage Conditions:

The pine needle is packaged in a pre-cleaned amber glass bottle. To maintain the integrity of the material, the product should be kept tightly capped and stored under normal laboratory conditions.

Refer to Material Safety Datasheet (MSDS) for hazardous information.

Expiration Information:

The expiry date is guaranteed to be valid for 3 years from the shipping date provided. For this reason, standards from the same lot may have different expiration dates

Shipped Date:

Expiration Date:

Certificate Issue Date: January 27, 2015

Quality Information:



ISO/IEC 17025:2005 Accreditation
Certificate Number AT-1529



Angel Sellers
Quality Manager

NOTICE: HPS products are intended for laboratory use only. All products should be handled and used by trained professional personnel. The responsibility for the safe handling and use of these products rests solely with the buyer and/or user. The data and information as stated was furnished by the manufacturer of the product. The information provided in this certificate pertains only to the lot number specified. None of the information provided in this certificate may be used, reproduced or transmitted in any form or by any means without written approval from High Purity Standards.

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