National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 1486

Bone Meal

This Standard Reference Material (SRM) is intended primarily for use in evaluating analytical methods used for the determination of selected major, minor, and trace elements in bone and in material of a similar matrix. It consists of steamed bone meal that was sieved and blended to a high degree of homogeneity.

The base material for this SRM was obtained from a commercial supplier. The entire material lot was sieved through a nominal 355 μm sieve (45 mesh), blended in the NIST cone blender, radiation sterilized and bottled into units of 50 g.

Certified and Non-certified Concentrations of Constituent Elements: The certified concentrations of the constituent elements are shown in Table 1. These concentrations are based on the results of a definitive analytical method or the agreement of results by at least two independent methods. Non-certified concentrations, for information only, are provided in Table 2.

NOTICE AND WARNINGS TO USERS:

Expiration of Certification: This certification is valid for five years from the date of shipment. Should any of the certified values significantly change before then, purchasers will be notified by NIST. Please return the attached registration form to facilitate notification.

Storage: The material should be kept tightly closed in its original bottle away from sunlight or ultraviolet radiation.

Use: The bottle should be mixed well by rotating the bottle before each use. Samples of this SRM should be dried under vacuum for 24 h or for 2 h at 105 °C in a conventional drying oven. A minimum sample of 150 mg of the dried material should be used to relate analytical determinations to the certified values in this certificate.

Dissolution Procedure: Samples may be dissolved by heating with hydrofluoric and nitric acids, followed by heating to dryness with perchloric acid, cooling, and adding dilute nitric acid.

Coordination of the analyses was performed by W.F. Koch of the NIST Inorganic Analytical Research Division.

Statistical analysis of the experimental data was performed by S.B. Schiller and L.M. Oakley of the NIST Statistical Engineering Division.

The technical and support aspects involved in the certification and issuance of this SRM were coordinated through the Standard Reference Materials Program by R. Alvarez and T.E. Gills.

Gaithersburg, MD 20899
December 18, 1992

William P. Reed, Chief
Standard Reference Materials Program

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Material Source: The material for this SRM was obtained from the Espoma Company, Millville, NJ.

Homogeneity Assessment: Samples from randomly selected bottles of SRM 1486 were tested for homogeneity using x-ray fluorescence spectrometry. No evidence of material heterogeneity was observed in any of the elements measured which included strontium, zinc, copper, iron, phosphorus, calcium, and potassium.

Certified Concentrations and Uncertainties: The certified value is the weighted mean of method results from a definitive analytical method or the weighted mean of results from at least two independent analytical methods or laboratories. The uncertainty is the half-width of a 95% confidence interval for the mean, with an allowance for systematic differences between methods.

Table 1. Certified Concentrations of Constituent Elements

Element	Concentration, wt. percent	Element	Concentration µg/g
Calcium	26.58 ± 0.24	Iron	99 ± 8
Magnesium	0.466 ± 0.017	Lead	1.335 ± 0.014
Phosphorus	12.30 ± 0.19	Potassium	412 ± 4
		Strontium	264 ± 7
		Zinc	147 ± 16

Non-certified Concentrations: Elements other than those certified are present in this material. Those that were determined but not certified are provided as additional information on the composition.

Table 2. Non-certified Concentrations of Constituent Elements

Element	Concentration, wt. percent	Element	Concentration µg/g
Silicon	(<0.02)		
Sodium	(0.5)	Aluminum	(<1)
Carbon (Total)	(18.6)	Arsenic	(0.006)
Moisture		Cadmium	(0.003)
2 h @ 105 °C	(2.4)	Copper	(0.8)
		Fluorine	(800)
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Loss in Ignition		Selenium	(0.13)
@ 1000 °C	(31.5)		

Table 3. Methods and Analysts for Certified Elemental Determinations

Element	Method Code	Element	Method Code
Calcium	GRAV INAA TITR	Potassium	FAES IDTIMS
Iron	ICP IDTIMS	Strontium	FAES IDTIMS
Magnesium	INAA IDICPMS	Phosphorus	GRAV ICP
		Lead	IDTIMS
		Zinc	ICP IDTIMS

Methods Used for Analysis of SRM 1486:

FAAS = Flame Atomic Absorption Spectrometry
FAES = Flame Atomic Emission Spectrometry
ICP = Inductively-Coupled Plasma Emission Spectrometry
ID ICPMS = Isotope Dilution, Inductively Coupled Plasma Mass Spectrometry
ID TIMS = Isotope Dilution, Thermal Ionization Mass Spectrometry
INAA = Instrumental Neutron Activation Analysis
RNAA = Radiochemical Neutron Activation Analysis
TITR = Titrimetry
XRF = X-ray Fluorescence Spectrometry
GRAV = Gravimetry

Analysts, National Institute of Standards and Technology

D.S. Braverman
R. Demiralp (Guest Researcher)
J.D. Fassett
K.M. Garrity
R.R. Greenberg
J.R. Moody
P.J. Paulsen
P.A. Pella
T.A. Rush
J.M. Smeller
S.F. Stone
T.W. Vetter
R.D. Vocke
L.J. Wood

Cooperating Analysts

A.R. Byrne, Jozef Stefan Institute, Ljubljana, Slovenia, Yugoslavia.

N. Miller-Ihli, Nutrient Composition Laboratory, U.S. Department of Agriculture, Beltsville, MD.

J.B. Bodkin, College of Earth and Mineral Sciences, Mineral Characterization Laboratory, The Pennsylvania State University, University Park, PA.