International Atomic Energy Agency
Analytical Quality Control Services
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REFERENCE SHEET

REFERENCE MATERIAL

IAEA-V-10

Trace Elements in Hay (Powder)

Date of issue: January 2000⊕

Recommended Values
(Based on dry weight)

Element	Recommended Value mg/kg	95% Confidence Interval mg/kg	N*
Ba	6	4 - 7	10
Br	8	7 - 11	11
Ca	21600	21000 - 22200	26
Cd	0.03	0.02 - 0.05	12
Co	0.13	0.11 - 0.14	11
Cr	6.5	5.6 - 7.1	32
Cu	9.4	8.8 - 9.7	33
Fe	186	177 - 190	38
Hg	0.013	0.009 - 0.016	6
Mg	1360	1330 - 1450	20
Mo	0.9	0.6 - 1.1	11
Ni	4.2	3.8 - 4.9	19
P	2300	2100 - 2500	11
Pb	1.6	0.8 - 1.9	19
Rb	7.6	7.3 - 7.8	17
Sc	0.014	0.012 - 0.015	9
Sr	40	37 – 44	18
Zn	24	23 - 25	40

* *Number of accepted laboratory results which were used to calculate the recommended values and confidence intervals about the median value.*

⊕ *Update of the reference sheet dated July 1985*

Information Values
(Based on dry weight)

Element	Information Value mg/kg	95% Confidence Interval mg/kg	N*
Al	**47**	**30 - 87**	**7**
Cs	**0.017**	**0.016 - 0.019**	**4**
Eu	**0.0024**	**0.0023 - 0.0032**	**3**
K	**21000**	**19600 - 22500**	**27**
La	**0.07**	**0.06 - 0.09**	**3**
Mn	**47**	**44 - 51**	**33**
Na	**500**	**440 - 570**	**20**
Sb	**0.019**	**0.018 - 0.020**	**3**
Se	**0.022**	**0.019 - 0.030**	**3**

***** *Number of accepted laboratory results which were used to calculate the information values and confidence intervals about the median value.*

The values listed above were established on the basis of statistically valid results submitted by laboratories which had participated in an international intercomparison exercise conducted in 1984. The details concerning the criteria for qualification as a recommended value can be found in the report (IAEA/RL/123) "Report on the Intercomparison V-10 of the Determination of Trace Elements in Hay Powder" [1]. This report is available free of charge upon request.

Intended Use

This sample is intended to be used as a reference material for the measurement of trace elements in vegetation samples. The material can also be used as a quality control material for the assessment of a laboratory's analytical work, for the validation of analytical methods and for quality assurance within a laboratory.

Preparation of the material

The material, lucerne hay (*Medicago satira*), was grown on calcareous soil at Churn, Berkshire, UK, by the University of Reading. About 75 kg of the ground hay material was supplied to the Agency's Laboratories, Seibersdorf, by Dr. H. M. J. Bowen of the University of Reading (UK) and subjected to further processing.

The product was ground to pass 125 µm sieve and thoroughly mixed in a rotating plastic drum for 70 hours. The material was then bottled into plastic containers each containing approximately 50 g at the Agency's Laboratories, Seibersdorf. Finally, the samples were irradiated to a dose of 2.5 x 10^4 Gy using a ^{60}Co source to ensure long-term stability of the material by inhibiting microbial action.

Homogeneity

The homogeneity was evaluated by determining the content of six marker elements (Co, Cr, Cs, Fe, Sr and Zn) by non-destructive analysis using instrumental neutron activation analysis (INAA) in single samples (100 mg) taken from twelve bottles, selected at random. A statistical analysis of the results using F and t-tests indicated that the results did not differ significantly and the material can therefore be considered homogeneous (at a sample intake mass at, or above, 100 mg).

Dry weight determination

All values are expressed on a dry weight basis. Therefore the dry weight must be determined at the time of analysis, using separate sub-samples of at least 500 mg dried to constant weight in a drying oven set to 105 °C. Subsequent weighings should differ by less than 5 mg.

Instructions for use

The recommended minimum sample size for analysis is 100 mg. Analysts are reminded to take appropriate precautions in order to avoid contaminating the remaining material in the bottle. No special precautions are required for the storage of this material.

Legal disclaimer

The IAEA makes no warranties, expressed or implied, with respect to the data contained in this reference sheet and shall not be liable for any damage that may result from the use of such data.

Reference

[1] Pszonicki L. and Hanna A. N., Report on the Intercomparison V-10 of the Determination of Trace Elements in Hay Powder
IAEA/RL/123, IAEA, Vienna, Austria 1985.

Issued & supplied by

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