Agri001
Certified Reference Material

NPK Compound Fertilizer, South Africa

Certificate of Analysis

AMIS
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1. Method of Preparation

The particle size distribution for this material was shown to have a nominal top size of 54µm. The procedure of preparation in brief is as follows: the material was crushed, dry-milled and air-classified to <54µm. It was then blended in a bi-conical mixer. The material is dried at 50°C between 12 to 48 hours to ensure the moisture content is below a certain %.

2. Certified Concentrations and Standard Deviations

Table 1 gives the certified concentrations, standard deviation, 2* Standard Deviation, and the Confidence Interval (95%) for the certified reference material.

Table 1:

Analyte	Method	Number of results	Certified Value	Standard Deviation	2*Standard Deviation	Confidence Interval (95%)	Unit
Ca	ICP	40	5.66	0.32	0.64	5.01 - 6.30	Total %
Ca	AA	4	5.31	0.10	0.20	5.11 - 5.51	Total %
K-cs-ws[1, 2]	ICP	28	0.49	0.04	0.80	0.41 - 0.56	%
N	Leco Combustion	11	9.22	0.06	0.11	9.11 - 9.33	Total %
N	Kjeldahl	13	9.24	0.13	0.26	8.98 - 9.50	Total %
N	Auto Anal	6	8.40	0.45	0.90	7.50 - 9.30	Total %
P	ICP	28	18.94	0.77	1.54	17.43 - 20.48	Total %
P	Auto Anal	8	18.91	0.44	0.87	18.03 - 19.78	Total %
P-cs	ICP	22	18.51	0.80	1.59	16.92 - 20.10	%
P-cs	Auto Anal	11	18.30	0.63	1.25	17.04 - 19.55	%
P-ws	Auto Anal	12	17.48	0.37	0.75	16.73 - 18.23	%
P-ws	ICP	11	17.68	0.63	1.26	16.41 - 18.94	%
S	ICP	28	4.88	0.32	0.65	4.24 - 5.53	Total %
S	XRF	8	5.44	0.80	1.59	3.84 - 7.03	Total %
Zn	ICP	33	0.49	0.05	0.10	0.39 - 0.60	Total %
Zn	AA	5	0.39	0.16	0.31	0.08 - 0.71	Total %

1. cs- citrate soluble
2. ws- water soluble
3. Relative Standard Deviation

3. Accepted Assay Data

21 laboratories submitted data however only data from the 12 laboratories were used. After removal of outliers**,** the results were used for certification.

4. Participating Laboratories

The laboratories are in alphabetic order and the laboratory numbers are not the assigned below. The following laboratories submitted data and data from 12 laboratories were used:

1. Absolute Science (Pty) Ltd
2. Agri Enviro
3. Agricultural Research & Extension Trust (ARET)
4. ALS Analysis and Inspection-Durban (Pty)
5. ALS Inspection South Africa (Pty) Ltd
6. ARC - Institute for Soil, Climate & Water
7. Bemlab (Pty) Ltd
8. Crop Nutrition Laboratory Services Ltd
9. Department of Agronomy Soil Science Lab, University of Fort Hare
10. Foskor (Pty) Ltd Chemlab - Phalaborwa
11. Foskor (Pty) Ltd Laboratory – Richard's Bay
12. Intertek Agricultural Laboratory
13. Kimleigh Technologies (Pty) Ltd
14. Modderfontein Laboratory Services (Pty) Ltd
15. Nvirotek Laboratories
16. Omnia Fertilizer (Sasolburg)
17. SA Sugar Research Institute (SASRI)
18. SGS South Africa (Pty) Ltd
19. Tobacco Research Board
20. Trifert (Pty) Ltd (Agron Laboratories)
21. Zambia Bureau of Standards

5. Methods of Analysis Requested and Units

The following methods of analysis were requested:

Element	Lab Method	Unit
Ca	AA	Total %
Ca	ICP	Total %
K-cs-ws	ICP	%
N	Auto Anal	Total %
N	Kjeldahl	Total %
N	LECO Comb	Total %
P	Auto Anal	Total %
P	ICP	Total %
P-cs	Auto Anal	%
P-cs	ICP	%
P-ws	Auto Anal	%
P-ws	ICP	%
S	ICP	Total %
S	XRF	Total %
Zn	AA	Total %
Zn	ICP	Total %

6. Intended Use

Agri001 is a Certified Reference Material, fit for use as a control sample in routine assay laboratory quality control when inserted within runs of test samples and measured in parallel to test samples. This material can also be used for method development, use as independent calibration verification check standard (*i.e.* if not used as a calibration standard in an instrument calibration), or for validation of accuracy in a method validation exercise. The recommend procedure for the use of this CRM as a control standard in laboratory quality control is to develop a Shewhart chart, where a mean value and corresponding 1, 2 and 3 standard deviations are derived from replicate measurements of the CRM. This CRM can also be used to assess inter-laboratory or instrument bias and establish within-laboratory precision and within-laboratory reproducibility. The certified concentrations are property values based on an inter-laboratory measurement campaign and reflect consensus results from the laboratories that participated in the analyses.

7. Health and Safety

The material is a fine powder coloured white (8/N). Safety precautions for handling fine particulate matter are recommended, such as the use of safety glasses, breathing protection, gloves and a laboratory coat.

8. Handling and Storage Information

The material is packaged in Explorer Packs that must be shaken or otherwise agitated before use. The analyte concentrations are quoted on a dry basis; therefore, the user needs to determine the moisture content to convert any obtained assay values to an air-dry basis. The material should be stored in a cool dry place, in such a way that it does not compromise the integrity of the CRM. The material should be stored in conditions which will ensure it does not absorb moisture.

9. Metrological Traceability

Metrological traceability is defined as “the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty”. Measurement of uncertainty of the assigned value is taken into consideration when calculating the Expanded Standard Deviation for Proficiency Assessment, which is used for calculation of the Satisfactory ranges. The values quoted herein are based on the consensus values derived from statistical analysis of the data from an inter-laboratory measurement program. Traceability to SI units is via the standards used by the individual laboratories.

10. Period of Validity

The validity for this product is guaranteed, while still sealed in its original packaging for a specified time, until notification to the contrary. The most common nutrients are nitrogen (N), phosphorous (P) and potassium (K). The amount of each chemical gets listed on the bag as a series of numbers that represent the N-P-K ratio. A fertilizer labelled 15-8-4, for example, is 15 percent nitrogen, 8 percent phosphorous and 4 percent potassium. These elements are all stable and do not degrade over time. As a result, granular fertilizers that contain them never lose their potency or expire. Should product stability become an issue, all customers will be notified and notification to that effect will be placed on the www.amis.co.za website.

11. Minimum Sample Size and Availability

The sample size is 100g for the use of this material. The Explorer Packs contain material in standard envelopes, nitrogen flushed, and vacuum sealed in foil pouches.

12. Certification of Mean

The samples used in this certification process have been selected in such a way as to represent the entire. Initially the data submitted by all the laboratories are subjected to a z-score test, to exclude outliers and the remaining data sets examined for their normality in distribution.

13. Two Standard Deviations

AMIS reports two-standard deviations (2s) with all certified values. Two -standard deviations are calculated using the expression:

$$Two\ standard\ deviations = 2\ (Standard\ Deviation)$$

14. Legal Notice

This certificate and the reference material described in it have been prepared with due care and attention. However, AMIS, Melesha Gopi Mungaroo and Chuma Makele; accept no liability for any decisions or actions taken following the use of the reference material.

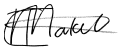
Date of Version 000: 15 January 2021

Version: 000

Approving Officers:

African Mineral Standards: _____

Melesha Gopi Mungaroo (Technical Manager)



African Mineral Standards: _____

Chuma Makele (Quality Coordinator

End of certificate