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Draft Sri Lanka Standard
METHODS OF TEST FOR FERTILIZERS AND SOIL CONDITIONERS
PART 2: DETERMINATION OF MOISTURE AND ASH
(FIRST REVISION) (DSLS 645 - 2 :)

පොහොර සහ පාංශු සකසන සඳහා පරීක්ෂණ ක්‍රම පිළිබඳ
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කොටස 2 : තෙතමනය හා අළු ප්‍රමාණය නිර්ණය කිරීම
(පළමු ප්‍රතිශෝධනය) (ශ්‍රී ලංකා කෙටුම්පත 645-2 :)

මෙම කෙටුම්පත ශ්‍රී ලංකා ප්‍රමිතියක් ලෙස නොසැලකිය යුතු මෙන් ම භාවිතා නොකළ යුතු ද වේ.
இவ்வரைவு இலங்கைக் கட்டளையெனக் கருதப்படவோ அன்றிப் பிரயோகிக்கப்படவோ கூடாது
This draft should not be regarded or used as a Sri Lanka Standard.

අදහස් එවිය යුත්තේ : ශ්‍රී ලංකා ප්‍රමිති ආයතනය, 17, වික්ටෝරියා ප්‍රදේශ, ඇල්විගල මාවත, කොළඹ 08.

Comments to be sent to: SRI LANKA STANDARDS INSTITUTION, 17, VICTORIA PLACE,
ELVITIGALA MAWATHA, COLOMBO 08.

නැඳින්වීම

මෙම ශ්‍රී ලංකා ප්‍රමිති කෙටුම්පත , ශ්‍රී ලංකා ප්‍රමිති ආයතනය විසින් සකසන ලදුව, සියලුම උදෙසාගේ අංශ වලට තාක්ෂණික විවේචනය සඳහා යටත් ලැබේ.

අදාළ අංශ හැර කමිටු මාර්ගයෙන් ආයතනයේ මහා මණ්ඩල වෙත ඉදිරිපත් කිරීමට පෙර , ලැබෙන සියලුම විවේචන ශ්‍රී ලංකා ප්‍රමිති ආයතනය විසින් සලකා බලා අවශ්‍ය වෙනස්කම් කෙටුම්පත සංශෝධනය කරනු ලැබේ.

මෙම කෙටුම්පතට අදාළ යෝජනා හා විවේචන නියමිත දිනට පෙර ලැබෙන්නට සැලැස්වුවහොත් අභ්‍යන්තර සලකුණු, තවද, මෙම කෙටුම්පත පිළිගත හැකි බැව් හැඟෙන අය ඒ බව දන්වන්නේ නම් එය ආයතනයට උපකාරී වනු ඇත.

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කොළඹ 08.

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Introduction

This Draft Sri Lanka Standard has been prepared by the Sri Lanka Standards Institution and is now being circulated for technical comments to all interested parties.

All comments received will be considered by the SLSI and the draft if necessary, before submission to the Council of the Institution through the relevant Divisional Committee for final approval.

The Institution would appreciate any views on this draft which should be sent before the specified date. It would also be helpful if those who find the draft generally acceptable could kindly notify us accordingly.

All Communications should be addressed to:

The Director General
Sri Lanka Standards Institution,
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.

Draft Sri Lanka Standard
METHODS OF TEST FOR FERTILIZERS AND SOIL CONDITIONERS
PART 2: DETERMINATION OF MOISTURE AND ASH
(First Revision)

SLS 645: Part 2:

Gr.

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SRI LANKA STANDARDS INSTITUTION
17, Victoria Place,
Elvitigala Mawatha,
Colombo 8,

Sri Lanka.**Draft Sri Lanka Standard**
METHODS OF TEST FOR FERTILIZERS AND SOIL CONDITIONERS
PART 2: DETERMINATION OF MOISTURE AND ASH
*(First Revision)***FOREWORD**

This Sri Lanka Standard was approved by the Sectoral Committee on Agriculture and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on.....

This part is one of a series of Standards on testing of fertilizers. Moisture content is one of the most commonly measured properties of fertilizers. Fertilizers can be heterogeneous materials that contain different proportions of chemically bound, physically bound, capillary, trapped or bulk water. As fertilizers are generally hygroscopic in nature, they tend to absorb moisture from the atmosphere. Excessive moisture may damage the granular structure of fertilizers, affect their quality and influence their nutrient content by increasing the weight of fertilizers in a given container. Therefore, moisture estimation is critical to determining the quality of a fertilizer. Ash content of a fertilizer is a measure of the total amount of inorganic residue remaining after dry oxidation at an elevated temperature. It is also an indirect measure of the total amount of minerals present with in the fertilizer.

This Standard was first published in 1984. In this First Revision, drying temperature has been incorporated according to the type of fertilizer in the gravimetric method. **DSLS EN 13466-1** and **DSLS EN 13466-2** methods were introduced for the determination of the moisture content in fertilizers that yield volatile substances other than water at the drying temperature. A method for determination of ash has been incorporated.

This Standard is subjected to the provisions under the Fertilizer Act No. 68 of 1988 and the regulations framed thereunder, and any other regulatory and statutory requirements wherever applicable.

All values given in this Standard are in SI units.

In reporting the result of a test or analysis made in accordance with this Standard, if the final value, observed or calculated is to be rounded off, it shall be done in accordance with **SLS 102**.

In the preparation of this Standard, the valuable assistance derived from the following publications is gratefully acknowledged:

IS 6092 Part 6 Methods of Sampling and Test for fertilizers – Determination of moisture and impurities

MS 417 Part 2 Analysis of Fertilizer- Method for determination of moisture, particle size and ash

1 SCOPE

This part of the Standard specifies an instrumental method for the routine determination of moisture and ash in solid fertilizers and soil conditioners.

2 REFERENCES

ISO 3696	Water for analytical laboratory use — Specification and test methods
SLS 102	Rules for rounding off numerical values
SLS ISO 14820-1	Fertilizers and liming materials - Sampling and sample preparation Part 1: Sampling
SLS ISO 14820-2	Fertilizers and liming materials - Sampling and sample preparation Part 2: Sample preparation
DSLS EN 13466-1	Fertilizers - Determination of water content (Karl Fischer methods) - Part 1: Methanol as extracting medium
DSLS EN 13466-2	Fertilizers - Determination of water content (Karl Fischer methods) - Part 2: 2-propanol as extracting medium

3 SAMPLING AND PREPARATION OF SAMPLE FOR ANALYSIS

Sampling and test sample preparation shall be carried out in accordance with **SLS ISO 14820-1** and **SLS ISO 14820-2**.

4 GRAVIMETRIC METHOD

4.1 Applicability

This method is not applicable to samples that yield volatile substances other than water at the drying temperature, such as urea, calcium ammonium nitrate, diammonium phosphate.

4.2 Apparatus

4.2.1 *Weighing bottle*, 70 mm to 80 mm diameter, fitted with a stopper

4.2.2 *Vacuum desiccator*, internal diameter about 200 mm, containing silica gel desiccant

4.2.3 *Oven*, capable of being controlled at specified temperature for different fertilizers as referred in Table 1.

4.3 Procedure

4.3.1 Dry the weighing bottle (**4.2.1**) in the oven, set at 105 °C, for 2 h.

4.3.2 Allow to cool to ambient temperature in a desiccator.

4.3.3 Weigh to the nearest 0.001 g about 10 g of the test sample into the tared weighing bottle. Prepare the test sample, without grinding, in accordance with Clause 6 of SLS ISO 14820-2.

4.3.4 Place the unstoppered weighing bottle (4.2.1) containing the test portion, and the stopper, in the oven, set for specified temperature and time (see Note) to constant mass.

NOTE: Use drying conditions in Table 1 for fertilizers of the types shown below;

TABLE 1 – Drying conditions for fertilizers

SI No. (1)	Type of fertilizers (2)	Drying temperature (3)	Drying time (4)
i)	Superphosphate of lime, triple super phosphate of lime, or fertilizer containing these	100 °C ± 2 °C	3 hours
ii)	Ammonium sulfate, sodium nitrate, and potassium salts	130 °C ± 2 °C	Until a constant weight is achieved
iii)	Silica gel fertilizer and fertilizer containing silica gel, and silica hydrogel fertilizer	180 °C ± 5 °C	3 hours
iv)	Organic fertilizers, vermicompost, biofertilizers	105 °C ± 2 °C	Until a constant weight is achieved

4.3.5 Transfer the weighing bottle and the stopper to the desiccator (4.2.2) and allow to cool ambient temperature.

4.3.6 Open the desiccator, quickly restopper the weighing bottle and weigh the bottle and its contents to the nearest 0.001 g.

4.4 Calculation

$$\text{Moisture, percent by mass} = \frac{100 (M_1 - M_2)}{(M_1 - M_3)}$$

Where,

M_1 = mass in g of the bottle/container with the material before drying,

M_2 = mass in g of the bottle/container with the material after drying, and

M_3 = mass in g of the bottle/container

5 VACUUM DESICCATOR METHOD

5.1 Applicability

This method shall be used for ammonium chloride and diammonium phosphate.

5.2 Apparatus

5.2.1 Porcelain dish**5.2.2 Balance****5.2.3 Vacuum desiccator****5.3 Procedure**

5.3.1 Weigh accurately about 10 g of the prepared test sample in a weighed shallow porcelain dish and dry for 24 hours in a vacuum desiccator (40 to 50 mmHg or less pressure) over sulphuric acid (98 per cent minimum) and re-weigh to a constant mass.

5.3.2 Preserve the dried material for subsequent tests.

5.4 Calculation

$$\text{Moisture, percent by mass} = 100 \times \frac{M_1 - M_2}{M_1 - M_3}$$

Where,

M_1 = mass in g of the dish with the material before drying,

M_2 = mass in g of the dish with the material after drying, and

M_3 = mass in g of the porcelain dish

6 KARL FISCHER METHOD**6.1 Applicability**

This method shall be used for samples like nitrophosphates, urea, urea-based fertilizers and calcium ammonium nitrate which yield volatile substances other than water on drying by heating.

6.2 This test shall be carried out as prescribed in **DSLS EN 13466-1** or **DSLS EN 13466-2**.

7 DETERMINATION OF ASH CONTENT BY IGNITION METHOD**7.1 Applicability**

The method is applicable to organic fertilizers and fertilizers containing organic matters.

7.2 Apparatus**7.2.1 Silica/Platinum crucible**

7.2.2 Muffle Furnace, capable of achieving 900 °C

7.2.3 Desiccator

7.2.4 Balance, required of three decimal places

7.3 Procedure

7.3.1 Weigh to the nearest mg about 5 g of sample in a weighed clean, dry crucible.

7.3.2 Ignite the crucible and its contents in a muffle furnace for about 6-8 hours at 650-700 °C.

7.3.3 Cool in a desiccator and weigh.

7.3.4 Repeat until constant weight.

7.4 Calculation

$$\text{Ash content in percent by weight} = \frac{100 \times (C - A)}{B - A}$$

A = Weight of the empty crucible

B = Weight of the empty crucible plus material before ashing

C = Weight of the empty crucible plus material after ashing

8 DETERMINATION OF ACID INSOLUBLE ASH CONTENT

8.1 Apparatus

8.1.1 Silica/Platinum crucible

8.1.2 Beaker, 400 ml

8.1.3 Watch glass

8.1.4 Muffle furnace, capable of achieving 900 °C

8.1.5 Asbestos mat

8.1.6 Filter paper disk

8.1.7 Desiccator

8.1.8 Balance, required of three decimal places

8.2 Procedure

8.2.1 Transfer 2 g sample to 400 ml beaker.

8.2.2 Add 100 ml HCl (1+4), cover with watch glass, and immerse 30min in steam or hot water bath (98-100°C), Keeping Liquid level in beaker below that of water in bath.

8.2.3 Stir at 10 min intervals and, after 30 min, remove from bath and filter through 11 or 12.5 cm medium paper, transferring insoluble residue to filter with stream of H_2O .

8.2.4 Fold paper containing residue, place in porcelain crucible, and ignite in muffle furnace 1h at $800^{\circ}C$.

8.2.5 Cool, transfer contents of crucible to original beaker with 50ml HCl (1+4), cover and again immerse in steam or hot water bath 30 min, stirring occasionally.

8.2.6 After 30 min, remove from bath and filter through weighted Gooch containing acid-washed asbestos mat on filter paper disk.

8.2.7 Wash insoluble residue several times with H_2O , dry crucible 1h at $125^{\circ}C$, cool in desiccator, and weigh.

8.2.8 Calculate net increase in weight of crucible to present acid- insoluble ash.