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Fertilizers and soil conditioners — Determination of total nitrogen by combustion

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 134, *Fertilizers, soil conditioners and beneficial substances*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Fertilizers and soil conditioners — Determination of total nitrogen by combustion

1 Scope

This document specifies a method for the determination of total nitrogen content in all nitrogen containing fertilizers by combustion method.

NOTE 1 The presence of non-nutritive sources of nitrogen (e.g. chelating agents) causes positive bias to samples being analysed for nutritive nitrogen content. The non-nutritive nitrogen content is subtracted from the total nitrogen value to determine the nutritive nitrogen content.

NOTE 2 Common internationally traded fertilizers were evaluated for total nitrogen by combustion analysis in the ring-study in this document. While the fertilizers analysed in this international ring study were mineral fertilizers, previous studies have shown that total nitrogen by combustion is suitable for use with many non-mineral, nitrogen-containing fertilizers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14820-2:2016, *Fertilizers and liming materials — Sampling and sample preparation — Part 2: Sample preparation*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

The sample is combusted at a high temperature of 900 °C or above in the presence of oxygen. Following the reduction of formed nitrogen oxides to elemental nitrogen and the removal of any interfering products of combustion, nitrogen is measured with a thermal-conductivity detector.

5 Apparatus

5.1 **Automatic nitrogen analyser**, based on combustion methods.

5.2 **Analytical balance.**

The accuracy of the balance is a function of the analyser used and the required weighed portions. The resolution should be 0,1 % or better of the weighed portion.

5.3 Auxiliary devices for sample preparation, for example:

— tweezers with a blunt tip;

— micro-spatula with a flattened tip;

— pipette.

The pipette is recommended for weighing in and thus does not need to be calibrated. It is important, however, to obtain a good droplet size (small droplets). Fixed-volume pipettes or pipettes with an adjustable volume in the range from 10 µl to 1 000 µl or single-trip Pasteur pipettes with a fine tip may also be used.

5.4 Customary chemically resistant glass.

6 Chemicals

6.1 Auxiliary combustion agent and other equipment, appropriate for use with the selected nitrogen analyser.

The following materials are merely examples. Other or similar materials may be used as required, depending on the system that is available:

— tin capsule or similar sample containers;

— auxiliary combustion agent, non-nitrogenous saccharide, such as sucrose or cellulose;

— absorbing agent for liquids, non-nitrogenous, such as magnesium oxide or diatomaceous earth.

6.2 Standard substances for nitrogen determination, preferably with certified nitrogen content.

EXAMPLE Suitable standard substances include: ethylenediamine tetraacetic acid (EDTA), nicotinic acid amide, ammonium nitrate, aspartic acid and nicotinic acid.

Low-biuret urea of adequate purity (e.g. crystalline ultra pure or analytical) or other such standard substances recommended by and available from the equipment manufacturer may also be used. Certified standard substances should be preferred.

NOTE Liquid standard substances (e.g. urea solutions) are not suitable for calibration purposes.

6.3 Oxygen, min. 99,999 % O_2.

6.4 Other ultrapure gases, if required to operate the nitrogen analyser, such as helium, min. 99,999 %.

6.5 Other reagents or auxiliary agents, as required by the equipment.

7 Procedure

7.1 General

Fertilizers and soil conditioners should fit the definitions found in ISO 8157. Samples shall be properly prepared to account for small test portions and potential non-uniformity of some fertilizer products in accordance with ISO 14820-2:2016. Liquids should be well mixed and solids should be homogenized and well mixed. A sample that is not sufficiently homogeneous can increase the variability in the results obtained by this method. It is recommended that replicate analysis of each sample be performed to evaluate the homogeneity of the lab samples. Further processing of the non-homogeneous lab samples may be required if the instrumental results show high variability. Replicate values of ±0,20 %*N* have

