
**Determination of total sulfur in
fertilizers by high temperature
combustion**

*Dosage du soufre total dans les engrais par combustion à haute
température*



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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).

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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.

Introduction

This document was created out of a need for newer and faster laboratory techniques to determine the total sulfur in fertilizer materials. There are numerous documented and validated methods available for determining total sulfur, but they are time-consuming and, in some cases, require the use of hazardous chemicals (e.g. bromine, perchloric acid). These methods also rely on the competency of the chemist/analyst and the laboratory technique is a critical component for producing accurate and reproducible results.

Combustion as an analytical tool has made great strides in recent years and, in some laboratories, this is a commonly used technique. Various detectors have been coupled to a furnace (combustion chamber) and the ensuing gases are measured for the analyte in question.

Determination of total sulfur in fertilizers by high temperature combustion

1 Scope

This document specifies a method to measure the total sulfur content in fertilizer and soil conditioner materials.

This method is applicable for measuring total sulfur concentration in solid and liquid fertilizers and its raw inputs in the range of 0,1 % to 97 %.

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 8157, *Fertilizers and soil conditioners — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8157 apply.

ISO and IEC maintain terminological 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

This procedure involves conversion of sulfur (S) species from fertilizers and chemical standards into SO₂ through combustion at a temperature > 1 100 °C followed by measurement with thermal conductivity detection (TCD) or infrared (IR) detection reported as mass fraction percentage (w/w %). In the case of thermal conductivity detection and where simultaneous measurements of additional elements, such as carbon (C), hydrogen (H), or nitrogen (N), are performed, an intermediate SO₂ separation by thermal adsorption/desorption is necessary.

5 Apparatus, material and reagents

5.1 General

CAUTION — Incorrect handling during the elemental analysis using combustion can lead to the risk of burns as certain instrument components are heated during the method. Even after switching off the instrument, some components stay hot for long periods of time. Serious burns can occur if working carelessly with the instrument. Follow the manufacturer's specific operating instructions to ensure safe handling of equipment.

Total sulfur measurements can be performed via variable apparatus types depending on detection method of choice.