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Engrais organiques et organo-minéraux - Détermination de la teneur en mercure

Organische und organisch-mineralische Düngemittel - Bestimmung des Quecksilbergehaltes

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European foreword

This document (CEN/TS 17769:2022) has been prepared by Technical Committee CEN/TC 260 “Fertilizers and liming materials”, the secretariat of which is held by DIN.

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Introduction

This document concerns the analytical measurement step for the determination of mercury in organic fertilizers and organo-mineral fertilizers after digestion by aqua regia according to CEN/TS 17768. The document covers cold vapour generation followed by mercury determination using atomic absorption spectrophotometry (AAS). Different cold vapour generation techniques can be used (flow injection, segmented flow, batch). The document also includes a method based on a direct amalgamation technique which is widely used in many analytical laboratories. It is also possible to use other suitable methods of mercury determination described in Annex A, if users prove that the methods give the same results as the methods described in this document.

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1 Scope

This document specifies a method for determination of the content of mercury (Hg) in organic fertilizers and organo-mineral fertilizers using (cold) vapour generation apparatus coupled to an atomic absorption spectrophotometer and a method using a direct amalgamation technique. It is applicable to aqua regia digests prepared according to CEN/TS 17768.

NOTE It is also possible to use other suitable methods for the determination of mercury described in Annex A if users prove that the method gives the same results as the methods described in this standard.

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.

CEN/TS 17773, *Organic and organo-mineral fertilizers — Determination of the dry matter content*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Principle

4.1 Vapour generation atomic absorption spectrophotometry (VG-AAS)

Mono- and divalent mercury is reduced to the elemental form by tin(II) chloride or sodium borohydride in an acid medium. Elemental mercury is stripped off from the solution and determined in the form of an atomic gas by an atomic absorption spectrophotometer.

4.2 Direct amalgamation (DA)

The sample is thermally decomposed in an oxygen rich environment. The decomposition products are carried to an amalgamator that selectively traps mercury. After the system is flushed with oxygen to remove any remaining gases or decomposition products, the amalgamator is rapidly heated, releasing mercury vapour. Flowing oxygen carries the mercury vapour through absorbance cells positioned in the light path of a single wavelength atomic absorption spectrophotometer. Absorbance is measured at 253,7 nm as a function of mercury concentration.

5 Interferences

5.1 Vapour generation atomic absorption spectrophotometry (VG-AAS)

The matrix of the solution analysed is dominated by the acids used in the digestion step. Tin(II) chloride as a reduction substance is recommended, because sodium borohydride reduces many elements commonly found in organic fertilizers and organo-mineral fertilizers digests to the elemental state, which can cause matrix problems under particular circumstances. However, it is still possible to use sodium borohydride as a reduction agent. The interferences due to the presence of other elements in

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