
**Soil quality — Determination of
selected explosives and related
compounds —**

Part 3:
**Method using liquid chromatography-
tandem mass spectrometry (LC-MS/
MS)**

*Qualité du sol — Dosage d'une sélection d'explosifs et de composés
apparentés —*

*Partie 3: Méthode utilisant la chromatographie en phase liquide
couplée à la spectrométrie de masse en tandem (CL-SM/SM)*

ISO 11916-3:2021

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Contents

Page

Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	2
4 Principle.....	2
5 Interferences.....	2
6 Reagents.....	2
6.1 General.....	2
6.2 Chemicals.....	2
6.3 Standard substances and solutions.....	3
6.3.1 Standard substances.....	3
6.3.2 Standard solutions.....	3
7 Apparatus.....	4
7.1 General.....	4
7.2 Equipment for extraction.....	4
7.3 Liquid chromatograph-tandem mass spectrometer (LC-MS/MS).....	4
8 Procedure.....	5
8.1 Sample pre-treatment, sample storage and determination of water content.....	5
8.2 Extraction.....	5
8.2.1 General.....	5
8.2.2 Extraction using ultrasonic waves.....	5
8.2.3 Extraction using mechanical shaking.....	6
8.3 Storage of extract.....	6
9 Liquid chromatography tandem mass spectrometry (LC-MS/MS).....	6
9.1 General.....	6
9.2 Identification and quantification.....	6
9.3 Calibration.....	7
10 Calculation of results.....	7
11 Quality assurance/quality control (QA/QC).....	8
12 Expression of results.....	9
13 Test report.....	9
Annex A (informative) Conditions of high performance liquid chromatography tandem mass spectrometry (LC-MS/MS).....	10
Annex B (informative) Comparison of LC-MS and LC-MS/MS application for PETN, 1,3,5-TNB and tetryl.....	13
Annex C (informative) Comparison of LOD and LOQ in the measurement of HPLC and LC-MS/MS.....	16
Annex D (informative) Comparison of extractive capability of acetonitrile and methanol when using LC-MS/MS.....	19
Annex E (informative) Report of interlaboratory validation study for ISO 11916-3.....	21
Bibliography.....	23

Foreword

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This document was prepared by Technical Committee ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical and physical characterization*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 444, *Environmental characterization of solid matrices*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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Introduction

Currently two ISO standards exist for the analysis of explosives and related compounds in soil: ISO 11916-1 (HPLC with UV detection method), ISO 11916-2 (GC-ECD or MS). According to the results of inter-laboratory trial with ISO 11916-1, it showed some problematic aspects to analyze PETN, 1,3,5-TNB and tetryl. In case of ISO 11916-2, it also gave poor inter-laboratory trial results for 1,3,5-TNB. Therefore, it is necessary to develop new method effectively applicable to the determination of PETN, 1,3,5-TNB and tetryl. In addition to this, lower risk-based PRGs (Preliminary Remediation Goal), new regulatory concerns, and change of land use have created the atmosphere to apply more sensitive and selective instruments to determine explosive and related compounds. From the view of these aspects, liquid chromatography–tandem mass spectrometry (LC-MS/MS) is one of alternative methods for these purposes. LC-MS/MS method provides 10-20 times or more lower detection limit than that of HPLC/UV method. In this document, LC-MS/MS method is intended for the trace analysis of explosives and related compounds and applicable to 12 compounds (1,3-DNB, 1,3,5-TNB, 2,4-DNT, 2,6-DNT, 2,4,6-TNT, 4-A-2,6-DNT, 2-A-4,6-DNT, Tetryl, Hexyl, RDX, HMX, PETN) listed in ISO 11916-1 (soil, HPLC with UV detection method) except for nitrobenzene, 2-nitrotoluene, 3-nitrotoluene and 4-nitrotoluene (see [Annex E](#)). In case of nitrobenzene and nitrotoluenes, they have the low sensitivity in LC-MS/MS measurement than using HPLC with UV detection method. In particular LC-MS/MS measurement is effective for the analysis of PETN, 1,3,5-TNB and tetryl when comparing with the method using HPLC with UV detection method. Also LC-MS/MS method is getting more familiar in ISO standard development (e.g. ISO 22104 Water quality-Microcystins, ISO/NP 21677 Water quality-HBCD, ISO 21675 Water quality-PFAS).

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