ISO 16094-2:2025-09 (E)

Water quality - Analysis of microplastic in water - Part 2: Vibrational spectroscopy methods for waters with low content of suspended solids including drinking water

Contents

Page

Foreword v

Introduction vi

1 Scope 1

2 Normative references 2

3 Terms,definitionsandabbreviations 2
3.1 Terms and definitions 2
3.2 Abbreviations 3

4 Principle 4

5 Interferences 4

6 Reagents, consumables and reference materials 4
6.1 General 4
6.2 Particle-free water of known quality 4
6.3 Surfactant solution 5
6.4 Ethanol 5
6.5 Plastic reference material 5
6.6 Containers for filter storage 5

7 Precautions for the laboratory environment, equipment and materials 5
7.1 Operating precautions linked to the laboratory environment 5
7.2 Equipment 5
7.2.1 General 5
7.2.2 Infrared (IR) apparatus coupled to microscope 5
7.2.3 Raman coupled to microscope 6
7.2.4 Filtration system 6
7.2.5 Characteristics of filters: type and sizes 7
7.3 Precautions and cleaning protocol for materials 7
7.4 Bottles or containers for sampling 7

8 Sampling 8

9 Operating protocol 8
9.1 Volume of test sample 8
9.2 Sample filtration protocol 8
9.3 Analytical control blanks 9
9.4 Adjustment and calibration of instruments 9
9.4.1 Infrared microscope 9
9.4.2 Raman microscope 9
9.5 Cartesian coordinates of analysed particles 10
9.6 Analysis of the filter surface 10
9.6.1 General 10
9.6.2 Choice of the optical objectives 10
9.6.3 Selection of particles to be analysed or choice of the analysed surface area 10
9.6.4 TOTAL Model 10
9.6.5 RANDOM Model 11

9.6.6 CAKE Model 11
9.6.7 SPIRAL or HELIX Model 12
9.6.8 Particles enumeration and size description 12
9.6.9 IR spectra acquisition and particle identification 12
9.6.10 Raman spectral acquisition and particle identification 13
9.7 Sampling and analytical control blank analysis 13
9.8 Spectra treatment 13
9.9 Criteria of chemical composition identification 14
9.10 Spectral interferences 14
9.10.1 General 14

9.10.2 Pigments or dyes 15
9.10.3 Polyamide versus natural proteins 15
9.10.4 Polyethylene versus other molecules with long CH-chain 15

10 Methodcharacterizationandverification 15
10.1 General 15
10.2 Verification of the particle size measurement accuracy 15
10.3 Verification of microplastics identification and classification at claimed size 15
10.4 Determination of minimal HQI for automatic identification 16
10.5 Determination of the reporting limits of the method 16
10.6 Verification of microplastics recovery rate of the method 17

11 Quality check of analytical control blanks in test series 17

12 Expression of results 18

13 Test report 18

Annex A (informative) List of characteristic wavenumbers for the main polymers 20

Annex B (informative) Creation of an internal spectral database 23

Annex C (informative) Description of known interference during acquisition of spectral fingerprint--Presenceofpigments 26

Annex D (informative) Description of known interference during acquisition of spectral fingerprint--Interferencebetweennaturalandsyntheticpolyamides(proteinsand polyamide 6-6) 27

Annex E (informative) Description of a known interference during acquisition of a spectral fingerprint-InterferencesofmoleculeswithlongCH-chain 29

Annex F (informative) Quantum Cascade Laser (QCL) IR microscopy 32

Annex G (informative) Performance data 33

Bibliography 35