ISO 17294-1:2024-03 (E)

Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 1: General requirements

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Principle **3**

5 Apparatus **4**

5.1 General 4

5.2 Sample introduction 4

5.2.1 General 4

5.2.2 Pump 5

5.2.3 Nebulizer 5

5.2.4 Spray chamber 6

5.2.5 Other systems 6

5.3 Torch and plasma 6

5.4 Gas and gas control 7

5.5 Generator 7

5.6 Transfer of the ions to the mass spectrometer 7

5.7 Mass spectrometer 8

5.7.1 General 8

5.7.2 Lens system 8

5.7.3 Collision or reaction cell 8

5.7.4 Analyser 8

5.7.5 Detector 9

5.7.6 Alternative mass spectrometers and types of instruments 10

5.8 Signal processing and instrument control 11

6 Interferences by concomitant elements **11**

6.1 General 11

6.2 Spectral interferences 11

6.2.1 General 11

6.2.2 Possible elimination strategies for polyatomic ion interferences 12

6.3 Non-spectral interferences 13

6.3.1 General 13

6.3.2 Interferences in the nebulization process 13

6.3.3 Interferences in the plasma 13

6.3.4 Interferences in the interface or lens area 14

6.3.5 Possible elimination strategies for non-spectral interferences (matrix effects) 14

7 Adjustment of the apparatus **17**

7.1 General 17

7.2 Tuning the apparatus 17

7.2.1 General 17

7.2.2 Alignment of the plasma 18

7.2.3 Mass calibration 18

7.2.4 Resolution 18

7.2.5 Detector 18

7.3 Verification of instrument performance criteria 19

8 Preparatory steps **19**
8.1 General 19
8.2 Choice of isotopes 20
8.3 Choice of instrumental settings 20
8.4 Choice of integration time 21
8.5 Choice of reference elements — Internal standards 22
8.6 Linearity and working range 22
8.7 Composition of calibration solutions 23
8.8 Method development for cool plasma conditions 23
8.9 Determination of the method performance 23
8.9.1 General 23
8.9.2 Instrument detection limit 24
8.9.3 Method detection limit 24
8.9.4 Precision of the method 24

9 Procedure **24**
9.1 General 24
9.2 Calibration 24
9.3 Necessary solutions 25
9.4 Measurement 25

Annex A (informative) **Spectral interferences, choice of isotopes and instrument detection limits for quadrupole ICP-MS instruments** **27**

Bibliography **32**