

ISO 21362:2026-02 (E)

Nanotechnologies - Analysis of nano-objects using asymmetrical flow and centrifugal field-flow fractionation

Contents

Page

Foreword.....	v
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Symbols and abbreviated terms.....	8
5 Principles of operation.....	10
5.1 Field-flow fractionation (FFF) — General.....	10
5.2 Specific applications by applied field.....	11
5.2.1 Flow field.....	11
5.2.2 Centrifugal field.....	13
6 Method development for asymmetrical flow field-flow fractionation (AF4).....	15
6.1 General.....	15
6.2 Sample specifications.....	15
6.3 Mobile phase specifications.....	16
6.4 Fractionation.....	17
6.4.1 Channel and membrane selection.....	17
6.4.2 Injection and relaxation.....	19
6.4.3 Optimizing flow conditions.....	20
6.4.4 Elution programme.....	20
6.4.5 Using field-flow fractionation (FFF) theory to select initial flow settings.....	21
7 Method development for centrifugal field-flow fractionation (CF3).....	21
7.1 General.....	21
7.2 Choice of mobile phase.....	21
7.3 Field strength selection.....	22
7.4 Field decay programme.....	22
7.5 Channel flow rate selection.....	22
7.6 Calculation of the relaxation time.....	23
7.7 Calculation of sample injection delay.....	23
7.8 Using field-flow fractionation (FFF) theory to select initial settings.....	23
8 Analysis of nano-objects.....	23
8.1 General.....	23
8.2 Online size analysis.....	23
8.3 Online concentration analysis.....	25
8.3.1 General.....	25
8.3.2 Mass-based methods.....	25
8.3.3 Number-based methods.....	26
8.4 Online material identification or composition.....	27
8.5 Off-line analysis (fraction collection).....	27
8.6 Alternative and emerging methods.....	28
9 Qualification, performance criteria and measurement uncertainty.....	29
9.1 System qualification and quality control.....	29
9.1.1 Basic system qualification.....	29
9.1.2 Focusing performance.....	30
9.1.3 Flow rate of the carrier liquid.....	30
9.1.4 Separation field.....	30

9.2	Method performance criteria.....	31
9.2.1	Recovery.....	31
9.2.2	Selectivity.....	32
9.2.3	Retention ratio.....	32
9.2.4	Resolution.....	32
9.3	Method precision and measurement uncertainty.....	32
10	General procedures for measurement of samples.....	33
10.1	Introduction.....	33
10.2	Calibration of retention time for online size analysis.....	33
10.2.1	Calibration of the asymmetrical flow field-flow fractionation (AF4) channel.....	33
10.2.2	Calibration of asymmetrical flow field-flow fractionation (AF4) retention time for online size measurements.....	34
10.3	Asymmetrical flow field-flow fractionation (AF4) general measurement procedure.....	34
10.4	Centrifugal field-flow fractionation (CF3) general measurement procedure.....	35
11	Test report.....	36
11.1	General.....	36
11.2	Apparatus and measurement parameters.....	36
11.2.1	Asymmetrical flow field-flow fractionation (AF4) recording and reporting specifications.....	36
11.2.2	Centrifugal field-flow fractionation (CF3) recording and reporting specifications.....	37
11.3	Test report.....	38
	Annex A (informative) Summary of interlaboratory comparison.....	39
	Bibliography.....	54