


DIN EN 71-3:2021-06 (E)

Safety of toys - Part 3: Migration of certain elements (includes Amendment A1:2021)

Contents		Page
European foreword.....		5
Introduction		7
1 Scope.....		8
2 Normative references.....		8
3 Terms and definitions		8
4 Requirements.....		9
4.1 Toy material categories (see H.4)		9
4.2 Specific requirements.....		10
5 Principle		11
6 Reagents and apparatus		12
6.1 Reagents		12
6.2 Apparatus.....		12
7 Sampling and sample preparation.....		12
7.1 Selection of test portions.....		12
7.2 Sample preparation.....		13
7.2.1 General.....		13
7.2.2 Sampling.....		13
7.2.3 Dewaxing (see H.11)		15
8 Migration methodology		16
8.1 Preparation of test portions before migration testing.....		16
8.1.1 General.....		16
8.1.2 Category I: Dry, brittle, powder like or pliable materials and Category II: Liquid or sticky materials.....		16
8.1.3 Category III: Scraped-off materials.....		16
8.2 pH adjustment (see H.10).....		17
8.2.1 General.....		17
8.2.2 pH adjustment - no buffering effect by toy material.....		17
8.2.3 pH adjustment - buffering effect by toy material.....		17
8.3 Migration procedure.....		18
8.3.1 Migration.....		18
8.3.2 Filtration (see H.8).....		19
9 Stabilization and analysis of migration solutions		19
9.1 General.....		19
9.2 General elements		19
9.3 Chromium (VI)		19
9.4 Organic tin		20
10 Calculation of results		20
10.1 Calculation of migration		20
10.1.1 General.....		20
10.1.2 Calculation of Chromium (III).....		20
10.2 Interpretation of results.....		21
11 Method performance		21

11.1	Repeatability and reproducibility	21
11.2	Estimation of bias	23
11.3	Limit of detection (LOD) and limit of quantification (LOQ)	23
12	Test report	24
Annex A (informative) Significant technical changes between this document and the previous version		25
Annex B (informative) Information on method validation.....		27
B.1	General	27
B.2	Samples of interlaboratory comparison	27
B.3	Selection of material category/element combinations	28
Annex C (informative) Estimation of reproducibility.....		29
Annex D (informative) Toy material visual particle size comparison materials.....		31
Annex E (normative) Method of analysis for general elements.....		33
E.1	Principle.....	33
E.2	Working solutions.....	33
E.2.1	Stock solution (M_1).....	33
E.2.2	Diluted stock solution (M_2)	34
E.2.3	Working solutions.....	34
E.2.4	Internal standard stock solution	34
E.3	Procedure	34
E.4	Analysis	34
E.5	Calculation.....	35
E.5.1	Calibration curve	35
E.5.2	Calculation of migration.....	35
Annex F (normative) Method of analysis for Chromium (VI)		36
F.1	Principle.....	36
F.2	Reagents.....	36
F.3	Apparatus	37
F.4	Procedure	38
F.5	Analysis	38
F.5.1	General	38
F.5.2	Chromatographic conditions.....	38
F.5.3	Limit of detection and quantification.....	39
F.6	Calculation.....	39
F.6.1	Calibration curve	39
F.6.2	Calculation of migration.....	40
Annex G (normative) Method of analysis for organic tin (see H.9)		41

G.1	Principle	41
G.2	Reagents	42
G.3	Apparatus	45
G.4	Procedure	45
G.4.1	Sample derivatisation	45
G.4.2	Calibration standards	47
G.5	Analysis	47
G.5.1	General	47
G.5.2	Example of GC conditions	49
G.5.3	Example of MS conditions	49
G.5.4	Limit of detection and quantification	49
G.5.5	Example of a GC-MS chromatogram	50
G.6	Calculation	51
G.6.1	Calibration curve	51
G.6.2	Standard addition	51
G.6.3	Calculation of migration of organic tin	51
Annex H	(informative) Rationale	53
H.1	General	53
H.2	Mouthing behaviour of children (see Clause 1)	53
H.3	Skin contact (see Clause 1)	54
H.4	Toy categories (see 4.1)	54
H.5	Test portions (see Clause 7)	54
H.6	Size of test pieces (see 7.2)	54
H.7	Stability of Chromium (VI) in the migration solution (see 9.3)	55
H.8	Filtration of migration solutions (see 8.3.2)	55
H.9	Organic tin (see Annex G)	55
H.10	pH value (see 8.2 and 8.3.1.2)	57
H.11	De-waxing (see 7.2.3)	57
Annex ZA	(informative)  Relationship between this European Standard and the essential requirements of EU Directive 2009/48/EC aimed to be covered	58
	Bibliography	59