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Safety of toys - Part 4: Experimental sets for chemistry and related activities

Sicherheit von Spielzeug - Teil 4: Experimentierkästen für chemische und ähnliche Versuche

Sécurité des jouets - Partie 4 : Coffrets d'expériences chimiques et d'activités connexes

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Safety of toys - Part 4: Experimental sets for chemistry and related activities

Sécurité des jouets - Partie 4: Coffrets d'expériences chimiques et d'activités connexes

Sicherheit von Spielzeug - Teil 4: Experimentierkästen für chemische und ähnliche Versuche

This European Standard was approved by CEN on 5 January 2013.

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Contents

Page

Foreword.....	3
Introduction	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	7
4 Chemical substances in experimental sets	8
4.1 Chemistry sets	8
4.2 Crystal growing sets	14
4.3 Carbon dioxide generating experimental sets	16
5 Equipment	17
5.1 General requirements	17
5.2 Containers and glassware	18
5.2.1 Test tubes	18
5.2.2 Other glassware	18
5.2.3 Containers for reagents, substances and mixtures	18
5.2.4 Packaging and closures	18
5.2.5 Empty containers	20
5.2.6 Test method for borosilicate glass	20
5.3 Equipment for the transfer of liquid	21
5.4 Test tube stand and test tube holder (see 5.1)	21
5.5 Eye protection (see 5.1)	21
6 Marking	21
6.1 General requirements	21
6.2 Marking of individual containers, packaging and glassware	22
6.3 Marking of the primary packaging.....	22
7 Contents list with warnings and first aid information (see 5.1)	23
8 Instructions for use (see 5.1)	23
8.1 General instructions	23
8.2 Advice for supervising adults.....	24
8.3 Safety rules.....	25
8.3.1 Chemistry sets	25
8.3.2 Crystal growing sets	25
8.3.3 Carbon dioxide generating experimental sets	26
Annex A (normative) Test methods for closures of reagent containers.....	28
Annex B (informative) Rationale.....	29
Annex C (informative) Environmental considerations.....	30
Annex D (informative) Significant technical changes between this European Standard and the previous version	31
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2009/48/EC	32
Bibliography.....	33

Foreword

This document (EN 71-4:2013) has been prepared by Technical Committee CEN/TC 52 "Safety of toys", the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 71-4:2009.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The significant changes from the previous edition of this standard are detailed in Annex D.

This standard is part 4 of a series of standards for the safety of toys.

This part 4 of the EN 71 series is intended to be read in conjunction with EN 71, part 1.

EN 71, *Safety of toys*, consists of the following parts:

- *Part 1: Mechanical and physical properties*
- *Part 2: Flammability*
- *Part 3: Migration of certain elements*
- *Part 4: Experimental sets for chemistry and related activities* (the present document)
- *Part 5: Chemical toys (sets) other than experimental sets*
- *Part 7: Finger paints — Requirements and test methods*
- *Part 8: Activity toys for domestic use*
- *Part 9: Organic chemical compounds — Requirements*
- *Part 10: Organic chemical compounds — Sample preparation and extraction*
- *Part 11: Organic chemical compounds — Methods of analysis*
- *Part 12: N-Nitrosamines and N-nitrosatable substances*
- *Part 13: Olfactory board games, gustative board games, cosmetic kits and gustative kits*
- *Part 14: Trampolines for domestic use*

EN 71-4:2013 (E)

In addition to the above parts of EN 71, the following guidance documents have been published:

- CR 14379:2002, *Classification of toys — Guidelines*,
- CEN/TR 15071:2005, *Safety of toys — National translations of warnings and instructions for use in EN 71*
- CEN/TR 15371:2013, *Safety of toys — Replies to requests for interpretation of EN 71-1, EN 71-2, and EN 71-8*.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This European Standard, EN 71-4, is intended to reduce the risks and health hazards to a child when *experimental sets* involving chemical experiments are used as intended or in a foreseeable way, bearing in mind the behaviour of children.

During use of these *experimental sets*, the hazards should be kept to a minimum by the provision of appropriate information to make the experiments safe and controllable. Therefore, this European Standard specifies warning phrases and instructions for use for *experimental sets*.

As a general rule, *experimental sets* are designed and manufactured for particular ages of children. Their characteristics are related to the age and stage of development of the children, and their use presupposes certain aptitudes. Age requirements are therefore given.

The requirements of this European Standard do not release parents or carers from their responsibility of watching over the child while he or she is carrying out experiments. On the contrary, the use of these sets requires close supervision by adults.

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1 Scope

This European Standard specifies requirements for the maximum amount and, in some cases, the maximum concentration of certain substances and mixtures used in *experimental sets* for chemistry and related activities.

These substances and mixtures are:

- those classified as dangerous by the EC-legislation applying to dangerous substances [1], [2] and dangerous mixtures [2], [3];
- substances and mixtures which in excessive amounts could harm the health of the children using them and which are not classified as dangerous by the above mentioned legislation; and
- any other chemical substance(s) and mixture(s) delivered with the *experimental set*.

This standard applies to *experimental sets* for chemistry and related activities including *crystal growing sets*, *carbon dioxide generating experimental sets* and *supplementary sets*. It also covers sets for chemical experiments within the fields of mineralogy, biology, physics, microscopy and environmental science whenever they contain one or more chemical substances and/or mixtures which are classified as hazardous according to Regulation (EC) No. 1272/2008 [2].

This standard also specifies requirements for marking, a contents list, instructions for use, eye protection and for the equipment intended for carrying out the experiments.

This standard does not apply to toys that are covered by EN 71-13 (e.g. cosmetic kits). Requirements for certain other *chemical toys* are given in EN 71-5.

NOTE The terms “substance” and “preparation”, as used in Directives 67/548/EEC [1] and 1999/45/EC [3], are also used in the “REACH Regulation” Regulation (EC) No. 1907/2006 [4]. According to the Globally Harmonised System (GHS) of classification and labelling of chemicals, which in the European Union has been enacted by Regulation (EC) No. 1272/2008 (classification, labelling and packaging of substances and mixtures) [2], the timetable for the introduction of GHS has to be followed.

The words “preparation” and “mixture” should be considered synonymous; both are a mixture or solution of substances that do not react with each other. The old term “preparation” will be replaced by the new term “mixture” in due course. In this standard, only the term “mixture” is used.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 71-1, *Safety of toys — Part 1: Mechanical and physical properties*

EN 862, *Packaging — Child-resistant packaging — Requirements and testing procedures for non-reclosable packages for non-pharmaceutical products*

EN ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

EN ISO 8317, *Child-resistant packaging — Requirements and testing procedures for reclosable packages (ISO 8317)*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

chemical toy

toy intended for the direct handling of chemical substances and mixtures and which is used in a manner appropriate to a given age-group and under the supervision of an adult

3.2

experimental set

chemical toy where the experimental and explorative character in playing with single chemical substances and mixtures along strict instructions dominates over the creative ideas of the user

3.3

chemistry set

experimental set consisting of one or more chemical substances and/or mixtures with or without equipment intended for carrying out chemical experiments

Note 1 to entry: The definition also covers *experimental sets* for chemical experiments within the fields of mineralogy, biology, physics, microscopy and environmental sciences whenever they contain one or more chemical substances and/or mixtures which are classified as hazardous according to Regulation (EC) No 1272/2008, excluding *crystal growing sets* and *carbon dioxide generating experimental sets*.

3.4

crystal growing set

experimental set consisting of one or more chemical substances for growing crystals without any reaction between the supplied substances

Note 1 to entry: A *crystal growing set* is used to grow crystals of different substances in aqueous solutions. The crystals may be grown on different materials (e.g. stones or gypsum) and can be coloured in different ways (e.g. with food colours): The expanding nature of the growing crystal is not subject to requirements within EN 71-1 for expanding materials as the expansion is not related to the absorption of water in the crystal and the expansion usually takes place over a long period of time (several days or weeks).

3.5

carbon dioxide generating experimental set

experimental set consisting mainly of a carbon dioxide-donor substance or mixture and a carbon dioxide-liberating substance or mixture which after combination generate carbon dioxide in the presence of water in an open system without any gas-tight restriction or confinement

Note 1 to entry: The set is used to carry out and observe chemical reactions where there is no intention to generate carbon dioxide in order to demonstrate speed, velocity or noise.

3.6

supplementary set

incomplete *experimental set* which is intended to be used with a complete *experimental set*

3.7

cosmetic kit

toy, the purpose of which is to assist a child to learn to make products such as fragrances, soaps, creams, shampoos, bath foams, glosses, lipsticks, other make-up, tooth-paste and conditioners

4 Chemical substances in experimental sets¹⁾

4.1 Chemistry sets

Only the chemical substances, mixtures and indicators given in Table 1 and Table 2 may be supplied in *chemistry sets* or in a *supplementary set* for a *chemistry set* up to the amounts and concentrations specified in those tables.

The quality of the chemicals used should be appropriate for the experiments described. In particular, the chemicals should not contain impurities or substances that allow undefined and dangerous reactions to occur.

Apart from its presence in tincture of iodine, denatured alcohol (ethanol) shall not be supplied in a *chemistry set*. However, where experiments contained in the instructions of a *chemistry set* require it, the use of denatured alcohol may be suggested in the instructions.

The use of reagents listed in Table 3 may be suggested in the instructions at concentrations not exceeding those specified in this table. The substances specified in Table 3 shall not be supplied in a *chemistry set*.

The instructions for use may suggest the use of other substances that are not classified as dangerous substances [1], [2] (e.g. sucrose or table sugar) or mixtures that are not classified as dangerous mixtures [2], [3]. Other dangerous substances shall not be supplied with the set.

The substances and mixtures in a *chemistry set* or in a *supplementary set* of a *chemistry set* shall be supplied in containers which are provided with closures (see 5.2.4.1).

NOTE 1 Samples of rocks, stones, minerals on which to perform experiments in order to distinguish their composition are sometimes supplied with the set.

Colorants and colouring materials which are not specified in Table 2 may only be supplied in chemistry sets if they do not react with the substances and mixtures of the set and if they do not fulfil the criteria of any of the following hazard classes: <https://standards.iteh.ai/catalog/standards/sist/ed372d0e-9c5c-4432-87e7-6803c311eddf/sist-en-71-4-2013>

- “acute toxicity” (hazard class 3.1),
- “skin corrosion/irritation” (hazard class 3.2),
- “serious eye damage/eye irritation” (hazard class 3.3),
- “respiratory or skin sensitisation” (hazard class 3.4),
- “germ cell mutagenicity” (hazard class 3.5),
- “carcinogenicity” (hazard class 3.6),
- “reproductive toxicity” (hazard class 3.7),
- “specific target organ toxicity — single exposure” (hazard class 3.8),
- “specific target organ toxicity — repeated exposure” (hazard class 3.9),
- “aspiration hazard” (hazard class 3.10).

Colorants which are permitted for use in food or cosmetics may be provided.

¹⁾ Words in *italics* are defined in Clause 3 (terms and definitions).

NOTE 2 The classification is detailed in Regulation (EC) No. 1272/2008 (Annex I, Part 3: Health Hazards).

Table 1 — Maximum amounts of chemical substances and mixtures for chemistry sets and labelling
(1 of 3)

Chemical substance/mixture	Max. amount per set	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Aluminium potassium sulphate	10 g	—	—	10043-67-1	233-141-3	—
Ammonium carbonate	5 g	GHS07	Warning	10361-29-2	233-786-0	—
Ammonium chloride	30 g	GHS07	Warning	12125-02-9	235-186-4	017-014-00-8
Ammonium iron (III) sulfate	5 g	GHS07	Warning	10138-04-2	233-382-4	—
Ammonium sodium hydrogen phosphate	5 g	—	—	13011-54-6	235-860-8	—
Calcium carbonate	100 g	GHS07	Warning	471-34-1	207-439-9	—
Calcium chloride	10 g	GHS07	Warning	10043-52-4	233-140-8	017-013-00-2
Calcium hydroxide ^a	20 g	GHS05	Danger	1305-62-0	215-137-3	—
Calcium nitrate	5 g	GHS03, GHS07	Warning	10124-37-5	233-332-1	—
Calcium oxide ^a	10 g	GHS05	Danger	1305-78-8	215-138-9	—
Calcium sulphate	100 g	—	—	7778-18-9	231-900-3	—
Charcoal ^b	100 g	—	—	7440-44-0	231-153-3	—
Citric acid	20 g	GHS07	Warning	77-92-9	201-069-1	—
Copper sheet	100 g	—	—	7440-50-8	231-159-6	—
Copper (II) oxide	10 g	GHS07	Warning	1317-38-0	215-269-1	—
Copper (II) sulfate	15 g	GHS07, GHS09	Warning	7758-98-7	231-847-6	029-004-00-0
Disodium disulfite	10 g	GHS05, GHS07	Danger	7681-57-4	231-673-0	016-063-00-2
Glycerol (containing at least 15 % water)	25 g	—	—	56-81-5	200-289-5	—

EN 71-4:2013 (E)

Table 1
(2 of 3)

Chemical substance/mixture	Max. amount per set	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Hexamethylene-tetramine ^b (solid fuel)	10 g	GHS02, GHS07	Warning	100-97-0	202-905-8	612-101-00-2
Iron fillings/iron powder ^b	100 g	GHS02	Warning	7439-89-6	231-096-4	–
Iron (III) chloride	10 g	GHS05, GHS07	Danger	7705-08-0	231-729-4	–
Iron (II) sulfate	10 g	GHS07	Warning	7720-78-7	231-753-5	026-003-00-7
Lactose	100 g	–	–	63-42-3	200-559-2	–
Lead-free solder	100 g	–	–	–	–	–
Magnesium strip	3 g	GHS02	Warning	–	–	–
Magnesium sulfate	25 g	–	–	7487-88-9	231-298-2	–
Manganese (IV) dioxide	5 g	GHS07	Warning	1313-13-9	215-202-6	025-001-00-3
Manganese (II) sulfate	15 g	GHS08, GHS09	Warning	7785-87-7	232-089-9	025-003-00-4
Ninhydrin	1 g	GHS07	Warning	485-47-2	207-618-1	–
Pepsin A	10 g	GHS07, GHS08	Danger	9001-75-6	232-629-3	647-008-00-6
Potassium bromide	15 g	GHS07	Warning	7758-02-3	231-830-3	–
Potassium hexacyanoferrate (III) ^b	10 g	–	–	13746-66-2	237-323-3	–
Potassium hexacyanoferrate (II) ^b	10 g	–	–	13943-58-3	237-722-2	–
Potassium iodide	10 g	–	–	7681-11-0	231-659-4	–
Potassium permanganate ^c	15 g	GHS03, GHS07, GHS09	Danger	7722-64-7	231-760-3	025-002-00-9
Potassium permanganate: sodium sulphate mixture (1:2) (mass fraction)	10 g	GHS03, GHS07, GHS09	Danger	–	–	–
Silver nitrate (0,01 g/ml mass concentration aqueous solution)	10 ml	GHS07, GHS09	Warning	7761-88-8	231-853-9	047-001-00-2
Sodium acetate	20 g	–	–	127-09-3	204-823-8	–
Sodium carbonate	50 g	GHS07	Warning	497-19-8	207-838-8	011-005-00-2