BS EN 71-4:2013

BSI Standards Publication

Safety of toys

Part 4: Experimental sets for chemistry and related activities

raising standards worldwide™

National foreword

This British Standard is the UK implementation of EN 71-4:2013. It supersedes BS EN 71-4:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CW/15, Safety of toys.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 75300 8

ICS 71.040.99; 97.200.50

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2013.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 71-4

February 2013

ICS 97.200.50

Supersedes EN 71-4:2009

English Version

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.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 71-4:2013: E

Contents

Page

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*

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.

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.

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 sets[1)]

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:

— “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	–

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

Table 1
(3 of 3)

Chemical substance/mixture	Max. amount per set	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Sodium chloride	100 g	–	–	7647-14-5	231-598-3	–
Sodium hydrogen carbonate	50 g	–	–	144-55-8	205-633-8	–
Sodium hydrogen sulphate	30 g	GHS05	Danger	7681-38-1	231-665-7	016-046-00-X
Sodium silicate solution (SiO_2:Na_2O > 2)	100 ml	GHS05	Danger	–	–	–
Sodium sulfate	100 g	–	–	7757-82-6	231-820-9	–
Sodium thiosulfate	50 g	–	–	7772-98-7	231-867-5	–
Sulfur	15 g	GHS07	Warning	7704-34-9	231-722-6	016-094-00-1
Tannin	15 g	–	–	1401-55-4	215-753-2	–
Tartaric acid	20 g	GHS07	Warning	87-69-4	201-766-0	–
Tin (II) chloride	15 g	GHS07	Warning	7772-99-8	231-868-0	–
Tincture of iodine[b] (0,025 g/ml mass concentration ethanolic solution)[d]	10 ml	GHS02,	Danger	7553-56-2	231-442-4	053-001-003
Urea[b]	10 g	–	–	57-13-6	200-315-5	–
Zinc powder (stabilised)/zinc pellets	20 g	GHS09	Warning	7440-66-6	231-175-3	030-001-01-9
Zinc sulfate (heptahydrate)	20 g	GHS05, GHS07, GHS09	Danger	7446-20-0	231-793-3	–

If not mentioned otherwise, the maximum amounts of the solid substances in Table 1 refer to the anhydrous chemicals. Equivalent amounts of the hydrated chemicals may replace the anhydrous substances.

[a] Only one of these substances shall be provided in each set.

[b] Generally, IUPAC chemical nomenclature is used with the exceptions of these substances.

[c] Only to be provided in *chemistry sets* intended for children over the age of 12 years.

[d] Denatured alcohol (ethanol).

If indicators are supplied in solution, their solid contents shall not exceed the amounts and concentrations specified in Table 2.

NOTE 3 Non-bleeding indicators in books, pads or rolls are not of toxicological concern and are sometimes supplied without any quantity limitations for the relevant indicator(s).

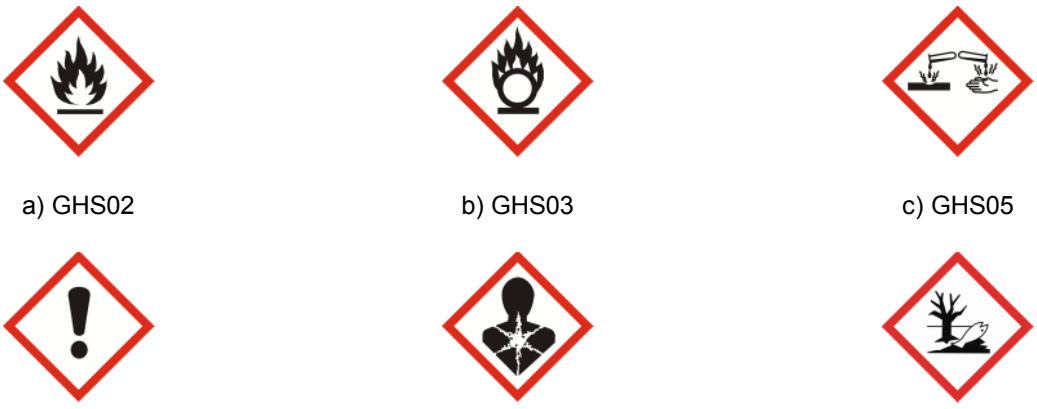
Table 2 — Maximum amounts and concentrations of indicators for chemistry sets and labelling

Chemical substance/mixture	Max. amount per set	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Eosin	1 g	GHS07	Warning	17372-87-1	241-409-6	–
Iodine (0,025 g/ml mass concentration in an aqueous solution (0,025 g/ml mass concentration) of potassium iodide)	10 ml	–	–	7553-56-2	231-442-4	053-001-00-3
Litmus blue	1 g	–	–	–	–	–
Litmus red	1 g	–	–	1393-92-6	215-739-6	–
Luminol (5 % (mass fraction) mixture with sodium sulfate)	3 g	–	–	521-31-3	208-309-4	–
Methyl orange (15 % (mass fraction) mixture with sodium sulfate)	3 g	GHS07	Warning	547-58-0	208-925-3	–
Methylene blue	1 g	GHS07	Warning	61-73-4	200-515-2	–
Phenol red	1 g	GHS07	Warning	143-74-8	205-609-7	–
Thymol blue	1 g	–	–	76-61-9	200-973-3	–
Bleeding universal indicator paper	1 pad	–	–	–	–	–
If not mentioned otherwise, the maximum amounts of the solid substances in Table 2 refer to the anhydrous chemicals. Equivalent amounts of the hydrated chemicals may replace the anhydrous substances.						

Table 3 — Maximum concentration of reagents not supplied with the chemistry set and labelling

Reagent	Maximum concentration mol/l	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Ammonia solution	2	GHS07	Warning	1336-21-6	215-647-6	007-001-01-2
Hydrochloric acid	2	GHS07	Warning	7647-01-0	231-595-7	017-002-01-X
Hydrogen peroxide[a]	1	-	-	7722-84-1	231-765-0	008-003-00-9
Sodium hydroxide solution	1	GHS05	Danger	1310-73-2	215-185-5	011-002-00-6
Additional units (e.g. percentage) may also be used on the packaging, instructions for use etc.						

[a] The concentration of hydrogen peroxide is equivalent to a 3 % (volume fraction) solution.



a) GHS02 b) GHS03 c) GHS05

d) GHS07 e) GHS08 f) GHS09

These pictograms are taken from Regulation (EC) No. 1272/2008 of the European Parliament and the Council of 16 December 2008 (also named GHS or CLP) on the classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No. 1907/2006. The dimensions and colours of these pictograms should comply with the requirements of Annex I to this regulation [2].

Figure 1 — GHS pictograms

4.2 Crystal growing sets

Only the chemical substances given in Table 4 may be supplied in *crystal growing sets* or in a *supplementary set* for a *crystal growing set* up to the amounts specified in that table.

A *crystal growing set* shall only contain substances which cannot react between each other.

The quality of the chemicals used in *crystal growing sets* should be appropriate for the experiments described; in particular, the chemicals should not contain impurities or substances which allow undefined and dangerous reactions to occur.

The substances and mixtures in a *crystal growing set* or in a *supplementary set* for a *crystal growing set* shall be supplied in child-resistant packaging (see 5.2.4.2).

Only colourants and colouring materials which do not fulfil the criteria of any of the following hazard classes

- "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),

shall be supplied in *crystal growing sets*. Colourants which are permitted for use in food or cosmetics may be provided.

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

If substances are supplied as mixtures or if substances/mixtures are supplied in solution, their solid contents shall not exceed the amounts specified in Table 4.

Samples of materials on which to grow the crystals may be supplied with the set (e.g. plaster of Paris (gypsum), different stones, different minerals) without limits to their quantities. For gypsum, applicable requirements are specified in EN 71-5 (i.e. labelling etc.).

Table 4 — Maximum amounts of chemical substances for crystal growing sets and labelling
(1 of 2)

Chemical substance	Max. amount per set g	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Ammonium chloride[a]	30	GHS07	Warning	12125-02-9	235-186-4	017-014-00-8
Ammonium dihydrogen orthophosphate (Ammonium biphosphate)	600	-	-	7722-76-1	231-764-5	–
Aluminium potassium sulfate	600	-	-	7784-24-9	233-141-3	–
Citric acid[b]	50	GHS07	Warning	77-92-9	201-069-1	–
Copper (II) sulfate	50	GHS07, GHS09	Warning	7758-98-7	231-847-6	029-004-00-0
Iron (II) sulfate	50	GHS07	Warning	7782-63-0	231-753-5	026-003-00-7
Magnesium sulfate	100	-	-	10034-99-8	231-298-2	–
Potassium dihydrogen phosphate	600	-	-	7778-77-0	231-913-4	–
Potassium hexacyanoferrate (III)	100	-	-	13746-66-2	237-323-3	–
Potassium sodium tartrate	600	-	-	6381-59-5	205-698-2	–
Sodium acetate	100	-	-	127-09-3	204-823-8	–
Sodium hydrogen carbonate	600	-	-	144-55-8	205-633-8	–
Sodium silicate[b]	50	GHS05	Danger	1344-09-8		–
Sodium sulfate	100	-	-	7757-82-6	231-820-9	–
Sodium thiosulfate	600	-	-	7772-98-7	231-867-5	–
Strontium aluminate	5	GHS 07	Warning	e.g. 12004-37-4	e.g. 234-455-3	–
Tartaric acid[b]	50	GHS07	Warning	87-69-4	201-766-0	–

Table 4
(2 of 2)

Chemical substance	Max. amount per set g	GHS Pictograms (see Figure 1)	Signal word	CAS number	EINECS number	INDEX number
Trisodium citrate	600	-	-	6132-04-3	200-675-3	–
Zinc sulfide[c]	5	-	-	e.g. 1314-98-3	e.g. 215-251-3	–
The maximum amounts specified in Table 4 refer to anhydrous chemicals. Equivalent amounts of the hydrated chemicals may replace the anhydrous substances.						
[a] Shall be supplied as an aqueous solution. [b] Shall not be supplied in a set with sodium hydrogen carbonate. [c] Shall not be supplied in a set with any acid, e.g. citric acid.						

4.3 Carbon dioxide generating experimental sets

Only the chemical substances given in Table 5 may be supplied in *carbon dioxide generating experimental sets* whose function relies on the generation of carbon dioxide. The amounts supplied in a single set shall not exceed those specified in Table 5. If mixtures of these substances are supplied in solid form, the single mixture shall consist of stoichiometric equivalent amounts of acidic and CO_2-generating substances.

The quality of the chemicals used in *carbon dioxide generating experimental sets* should be appropriate for the experiments described; in particular, the chemicals should not contain impurities or substances which allow undefined and dangerous reactions to occur.

The substances in a *carbon dioxide generating experimental set* shall be supplied in child-resistant packaging (see 5.2.4.3).

Carbon dioxide generating experimental sets may contain gypsum or colourants. For gypsum, applicable requirements are specified in EN 71-5 (i.e. labelling etc.). Only colourants and colouring materials which do not fulfil the criteria of any of the following hazard classes

— “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),

shall be supplied in *carbon dioxide generating experimental sets*. Colourants that are permitted for use in food or cosmetics may be provided.

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

If substances are supplied as mixtures or if substances/mixtures are supplied in solution, their solid contents shall not exceed the amounts specified in Table 5.

Table 5 — Maximum amounts of chemical substances for carbon dioxide generating experimental sets and labelling

Chemical substance	**Max. amount per set** g	**GHS Pictograms (see Figure 1)**	**Signal word**	**CAS number**	**EINECS number**	**INDEX number**
Citric acid[a]	100	GHS07	Warning	77-92-9	201-069-1	–
Disodium hydrogen phosphate	20	–	–	7558-79-4	231-448-7	–
Malic acid[a]	60	GHS07	Warning	6915-15-7	230-022-8	–
Potassium hydrogen carbonate	50	–	–	298-14-6	206-059-0	–
Potassium dihydrogen phosphate	100	–	–	7778-77-0	231-913-4	–
Sodium dihydrogen phosphate	70	–	–	7558-80-7	231-449-2	–
Sodium hydrogen carbonate	100	–	–	144-55-8	205-633-8	–
Tartaric acid[a]	60	GHS07	Warning	87-69-4	201-766-0	–
The maximum amounts specified in Table 5 refer to anhydrous chemicals. Equivalent amounts of the hydrated chemicals may replace the anhydrous substances.						
[a] Only one of these substances shall be provided in each set.						

5 Equipment

5.1 General requirements

Experimental sets, excluding *supplementary sets*, shall be supplied with instructions for use (see Clause 8); a contents list with warnings and first aid information (see Clause 7); the equipment necessary for carrying out the experiments described in the instructions for use; and, if required, eye protection (see 5.5) and/or a test tube stand (see 5.4).

Supplementary sets shall be supplied with instructions for use (see Clause 8) and a contents list with warnings and first aid information, as specified in Clause 7.

All the experiments described in the instructions for use shall be evaluated by the manufacturer. In particular, it shall not be possible for substances to be formed in amounts that are injurious to health.

Any known hazards arising from the use of the set, especially during the experiments, should be detailed (e.g. handling of chemicals, handling of glassware, retarded boiling point, back flow of barrier water into overheated glassware, evolution of gases and handling of burners and other heating sources).

5.2 Containers and glassware

5.2.1 Test tubes

5.2.1.1 Sets in which test tubes are heated

In *experimental sets* where the instructions for use include chemical experiments in which test tubes are heated, all test tubes shall be made of borosilicate glass in order to be heat resistant.

Glass test tubes which are intended to be heated shall have dimensions greater than 110 mm in length and greater than 15 mm in internal diameter.

Glass test tubes which are not intended to be heated, for example, those used as containers, shall have dimensions not greater than 90 mm in length and not greater than 12 mm in internal diameter unless they are made of borosilicate glass.

When necessary, borosilicate glass shall be identified by the test method described in 5.2.6.

5.2.1.2 Sets in which test tubes are not heated

In *experimental sets* where the instructions for use do not include chemical experiments in which glass test tubes are heated, any glass tubes not made of borosilicate glass shall be labelled in accordance with 6.2.

5.2.2 Other glassware

In *experimental sets* where the instructions for use include experiments in which laboratory glassware is heated, all glassware intended to be heated shall be made of borosilicate glass in order to be heat resistant. This requirement does not apply to glass tubing intended to be heated for the purpose of bending.

Unless made of borosilicate glass, glassware which is not intended to be heated but which by its appearance or shape could be construed as being suitable for heating shall be labelled in accordance with 6.2.

When necessary, borosilicate glass shall be identified by the test method described in 5.2.6.

5.2.3 Containers for reagents, substances and mixtures

Containers for reagents shall differ in size and shape from laboratory glassware to avoid them being mistaken as glassware for use in experiments.

All containers for reagents, substances and mixtures shall be shock-resistant. They shall not break or crack when subjected to the drop test specified in EN 71-1.

5.2.4 Packaging and closures

5.2.4.1 Chemistry sets

All substances and mixtures shall be supplied in child-resistant containers. Closures for child-resistant containers shall comply with one of the following requirements:

a) they shall comply with EN ISO 8317;

b) they shall require two independent movements to be opened: a vertical force downwards and a torque in the clockwise or anticlockwise direction (e.g. bayonet joint). When tested in accordance with A.1 (closure test A), the closure shall not open; or

c) they shall consist of a snap-in stopper and shall require an external tool to be opened. The closure shall only be opened by a specifically designed tool. When tested in accordance with A.2 (closure test B), the closure shall not open.

Closures for containers intended to be used for liquids shall not break, crack or leak when tested in accordance with A.3 (closure test C).

NOTE Compliance with these requirements is intended to prevent younger children accessing materials contained in such containers.

5.2.4.2 Crystal growing sets

The following crystal growing substances shall be supplied in packaging that complies with 5.2.4.1:

— ammonium chloride,

— citric acid,

— copper (II) sulfate,

— iron (II) sulfate,

— sodium silicate,

— strontium aluminate,

— tartaric acid.

All other crystal growing substances in Table 4 shall be supplied either:

a) in containers which are provided with closures that comply with 5.2.4.1; or

b) in non-reclosable, child-resistant packaging which complies with EN 862.

The containers and/or packaging in which the substances are supplied shall not contain more than 200 g.

5.2.4.3 Carbon dioxide generating experimental sets

The following carbon dioxide generating substances shall be supplied in packaging that complies with 5.2.4.1:

— citric acid,

— tartaric acid,

— malic acid.

All other carbon dioxide generating substances in Table 5 shall be supplied either:

a) in containers which are provided with closures that comply with 5.2.4.1; or

b) in non-reclosable, child-resistant packaging which complies with EN 862.

5.2.5 Empty containers

Empty containers intended for storage of reagents shall have a maximum volume in accordance with Table 6.

Table 6 — Maximum volume of the empty containers for reagents (see Table 3)

Reagent	Maximum volume of the empty container ml
Ammonia solution	50
Hydrochloric acid	100
Hydrogen peroxide	100
Sodium hydroxide solution	100

5.2.6 Test method for borosilicate glass

5.2.6.1 General

Several methods exist to distinguish borosilicate glass, e.g. determination of density and refractive index. A density method is given here.

5.2.6.2 Apparatus and reagent

5.2.6.2.1 25-ml pycnometer

5.2.6.2.2 Water bath, capable of maintaining a temperature of (20 ± 1) °C.

5.2.6.2.3 Deionised water

5.2.6.2.4 Analytical balance, accuracy 0,1 mg.

5.2.6.3 Procedure

Weigh the pycnometer (m_0). Make sure that the fraction from the glass sample is clean. Place it in the pycnometer and re-weigh the pycnometer (m_2). Then fill up the pycnometer with water and place it in a water bath until the contents equilibrate at 20 °C. Top up the pycnometer with water. Remove the pycnometer from the water bath, dry exterior and weigh (m_3). Empty the pycnometer. Fill up the pycnometer with water and place in water bath until the contents equilibrate at 20 °C. Top up the pycnometer with water, dry and weigh. Record the weight (m_1).

$$\rho_{Glass} = \frac{(m_2 - m_0)}{(m_1 - m_3 + m_2 - m_0)} \cdot \rho Water(20°C)$$

where

ρ_{Glass} is the density of the glass sample in g/cm3;

$\rho_{Water(20°C)}$ is the density of water at 20 °C ($\rho_{Water(20°C)} = 0{,}9882\, g/cm^3$);

m_0 is the mass of the empty pycnometer, in g;

m_1 is the mass of the pycnometer filled with water, in g;

m_2 is the mass of the pycnometer with the glass sample, in g;

m_3 is the mass of the pycnometer with glass sample and water, in g.

NOTE Reference densities for certain types of glass are:

— (2,40 ± 0,05) g/cm³ for sheet window glass;

— (2,48 ± 0,05) g/cm³ for soft soda glass;

— (2,25 ± 0,05) g/cm³ for borosilicate glass;

— (2,21 ± 0,05) g/cm³ for fused silica glass.

5.3 Equipment for the transfer of liquid

Mouth-actuated pipettes shall not be supplied. Where the transfer of liquid is required, a mechanical means which does not allow any aspiration by the mouth shall be provided (e.g. dropper with a permanently fitted teat).

5.4 Test tube stand and test tube holder (see 5.1)

The test tube stand shall not overturn when a test tube positioned in an outermost hole is filled with 5 ml of water and the stand is tilted to an angle of 15° from horizontal.

Experimental sets shall contain a functional test tube holder if the described experiments require the heating of test tubes.

5.5 Eye protection (see 5.1)

Eye protection shall be provided with:

— *chemistry sets*;

— *crystal growing sets* containing substances which are required to be marked with the GHS pictogram GHS05 according to Table 4 (see 6.2 b)).

NOTE Eye protection provided with *experimental sets* is Personal Protective Equipment. It is therefore subject to the requirements of Directive 89/686/EEC [5].

If eye protection shall be provided and the set does not contain eye protection for the supervising adult, the primary packaging shall be marked in accordance with 6.3.2.

6 Marking

6.1 General requirements

Markings shall be clearly visible, easily legible and understandable and accurate, indelible and in the national language(s) of the country of sale.

Only for the marking according to 6.3.2, and if required 6.3.3, the uppercase letter size is specified as follows:

a) Letters of a minimum height of 7 mm shall be used for the term "Warning(s)".

b) Letters of a minimum height of 3 mm shall be used for the "Warning" phrases. The "Warning" phrases shall be clearly legible.

6.2 Marking of individual containers, packaging and glassware

Individual containers and packaging shall be marked with the following information:

a) The name and product identifier (INDEX number, if available, otherwise EINECS or CAS number) of the chemical substance or the chemical substances contained in the mixture as specified in Table 1, Table 2, Table 3, Table 4 or Table 5 and the name and the telephone number of the manufacturer, authorised representative or importer.

NOTE 1 In addition, the containers can be labelled with the common names of the chemical substances and mixtures that they contain.

b) If specified in Table 1, Table 2, Table 3, Table 4 or Table 5, the GHS pictogram(s) and signal word appropriate to the chemical substance, mixture or reagent.

NOTE 2 GHS pictogram and signal word marking is required for all dangerous substances and dangerous mixtures supplied in *experimental sets* even if a derogation from labelling is permitted by EU legislation (e.g. for small quantities of certain dangerous substances).

NOTE 3 For more information regarding marking of containers see Regulation (EC) No. 1272/2008 [2].

c) Unless made of borosilicate glass, glassware not intended for heating shall be marked:

"Not to be heated".

6.3 Marking of the primary packaging

6.3.1 The primary packaging of *experimental sets* shall bear the name, registered trade name or registered trade mark of the manufacturer or his authorised representative or the importer, together with his address and telephone number.

NOTE Primary packaging is referred to as consumer packaging in Directive 2009/48/EC or as outer packaging in Regulation (EC) 1272/2008 [2].

The name and address may be abbreviated provided that the abbreviation enables the manufacturer, his authorised representative or the importer to be identified.

6.3.2 The primary packaging shall additionally bear the following warnings:

— "Warning. Not suitable for children under (*) years. For use under adult supervision.

— Contains some chemicals which present a hazard to health.

— Read the instructions before use, follow them and keep them for reference.

— Do not allow chemicals to come into contact with any part of the body, particularly the mouth and eyes.

— Keep small children and animals away from experiments.

— Keep the experimental set out of reach of children under (*) years old."

and where appropriate (see 5.5):

— "Eye protection for supervising adults is not included".

(*) The age is to be specified by the manufacturer, authorised representative or importer. It shall not be below 8 years. For *chemistry sets* containing potassium permanganate the age shall be not less than 12 years.

The words “some chemicals” and “chemicals” may be adjusted, if only one substance/mixture/solution is included in the set.

6.3.3 *Supplementary sets* shall additionally be marked with the following warning on the primary packaging:

"Warning. This supplementary set does not contain all the equipment and chemicals necessary for performing tests. For carrying out experiments a complete experimental set is required.”

The word “chemicals” may be adjusted, if only one substance/mixture/solution is included in the set.

7 Contents list with warnings and first aid information (see 5.1)

The contents list shall contain the following information:

a) a list of the chemicals supplied;

b) the H-and P-phrases specified in Regulation (EC) No. 1272/2008 (with subsequent amendments and adaptations) as required for each particular substance or mixture;

NOTE H- and P-phrase information is required for all dangerous substances and dangerous mixtures supplied in *experimental sets* even if a derogation from labelling is permitted by EU legislation (e.g. for small quantities of certain dangerous substances).

c) the manufacturer provides an empty space in which the telephone number of the local poison centre (central office for first aid information) or hospital should be entered in case of intake by accident of dangerous substances;

d) general first aid information as follows:

— "In case of eye contact: Wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.

— If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.

— In case of inhalation: Remove person to fresh air.

— In case of skin contact and burns: Wash affected area with plenty of water for at least 10 minutes.

— In case of doubt, seek medical advice without delay. Take the chemical and its container with you.

— In case of injury always seek medical advice.";

e) specific first aid information when appropriate.

8 Instructions for use (see 5.1)

8.1 General instructions

The instructions for use shall be given in the national language(s) of the country of sale.

The marking specified in 6.3 shall be repeated on the outer page of the front cover of the instructions for use.

The first page(s) of the instructions for use shall contain a list of its contents. This list shall refer to the information required in 8.2 and 8.3.

Detailed information on how to perform each experiment shall be given.

When appropriate, GHS pictograms and the H-and P-phrases specified in Regulation (EC) No. 1272/2008 (with subsequent amendments and adaptations) and information on first aid in the event of foreseeable accidents shall be given with the description of the experiment.

Information on disposal of used chemicals including substances and mixtures not supplied with the toy, but needed for the described experiments, shall be given. The necessity of disposing of, e.g. foodstuffs used for experimenting, shall be underlined. Further information on environmental aspects is given in Annex C.

The instructions for disposal of substances shall take account of national regulations for the disposal of such chemicals.

The opening pages of the instructions for use shall provide the following information:

a) advice for supervising adults (see 8.2);

b) the information required in Clause 7;

c) safety rules (see 8.3).

8.2 Advice for supervising adults

The advice for adults shall contain the following information:

a) Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.

b) The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.

c) This *experimental set* is for use only by children over (*) years.

d) Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.

e) The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.

   If the *experimental set* does not contain acids, alkalis and/or flammable liquids the second sentence in 8.2 e) shall be omitted or adjusted accordingly.

f) The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should be provided;

   NOTE For *carbon dioxide generating experimental sets* the third sentence in 8.2 f) can be omitted.

g) Instructions for the use of the burner, if provided.

If the *experimental set* contains packaging of chemical substances from Table 4 or Table 5 which complies with EN 864, the following advice shall be given:

h) Substances in non-reclosable packaging should be used up (completely) during the course of one experiment, i.e. after opening the package.

(*) The age is to be specified by the manufacturer, authorised representative or importer. It shall not be below 8 years. For *chemistry sets* containing potassium permanganate the age shall be not less than 12 years.

8.3 Safety rules

8.3.1 Chemistry sets

The following safety rules shall be given for *chemistry sets*:

- "Read these instructions before use, follow them and keep them for reference.
- Keep young children, animals and those not wearing eye protection away from the experimental area.
- Always wear eye protection.
- Store this experimental set out of reach of children under (*) years of age.
- Clean all equipment after use.
- Make sure that all containers are fully closed and properly stored after use.
- Ensure that all empty containers are disposed of properly.
- Wash hands after carrying out experiments.
- Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.
- Do not eat or drink in the experimental area.
- Do not allow chemicals to come into contact with the eyes or mouth."

and, if foodstuffs are required by any experiment or in the instructions for use:

- "Do not replace foodstuffs in original container. Dispose of immediately."

(*) The age is to be specified by the manufacturer, authorised representative or importer. It shall not be below 8 years. For *chemistry sets* containing potassium permanganate, the age shall be not less than 12 years.

8.3.2 Crystal growing sets

The following safety rules shall be given for *crystal growing sets*:

- "Read these instructions before use, follow them and keep them for reference.
- Keep young children and animals away from the experimental area.
- Store this experimental set and the final crystal(s) out of reach of children under (*) years of age.
- Clean all equipment after use.

— Ensure that all empty containers and/or non-reclosable packaging are disposed of properly.

— Wash hands after carrying out experiments.

— Do not eat or drink in the experimental area.

— Do not allow chemicals to come into contact with the eyes or mouth.

— Do not apply any substances or solutions to the body.

— Do not grow crystals where food or drink is handled or in bedrooms.

— Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.

— Take care while handling with hot water and hot solutions.

— Ensure that during growing of the crystal the container with the liquid is out of reach of children under (*) years of age."

(*) The age is to be specified by the manufacturer, authorised representative or importer. It shall not be below 8 years.

NOTE The term “container”, “and/or” and “non-reclosable packaging” can be adjusted to the equipment of the set or omitted where applicable.

If the *crystal growing set* contains containers that comply with 5.2.4.1 the following safety rule shall also be given:

— "Make sure that all containers are fully closed and properly stored after use."

If the *crystal growing set* contains substances which are required to be marked with the GHS pictogram GHS05 according to Table 4 (see 6.2 b)), the following safety rule shall also be given:

— "Always wear eye protection."

8.3.3 Carbon dioxide generating experimental sets

The following safety rules shall be given for *carbon dioxide generating experimental sets*:

— "Read these instructions before use, follow them and keep them for reference.

— Keep young children and animals away from the experimental area.

— Store this experimental set out of reach of children under (*) years of age.

— Clean all equipment after use.

— Ensure that all empty containers and/or non-reclosable packaging are disposed of properly.

— Wash hands after carrying out experiments.

— Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.

— Do not eat or drink in the experimental area.

— Do not allow chemicals to come into contact with the eyes or mouth."

(*) The age is to be specified by the manufacturer, authorised representative or importer. It shall not be below 8 years.

NOTE The term “container”, “and/or” and “non-reclosable packaging” can be adjusted to the equipment of the set or omitted where applicable.

If the *carbon dioxide generating experimental set* contains containers that comply with 5.2.4.1 the following safety rule shall also be given:

— "Make sure that all containers are fully closed and properly stored after use."

Annex A
(normative)

Test methods for closures of reagent containers

A.1 Closure test A

Open the closure and re-close it ten times. Apply an upward vertical force of (70 ± 2) N on the cap. Examine whether the cap is still closed.

Apply a downward vertical force of (30 ± 2) N on the cap. Apply a maximum torque of (0,5 ± 0,05) Nm in a clockwise and then anticlockwise direction. Examine whether the cap is still closed.

A.2 Closure test B

Open the closure by using the external tool and re-close it ten times. Remove the external tool. The stopper shall be in the locked position. Apply a downward vertical force of (30 ± 2) N on the cap. Rotate the cap in a clockwise and then anticlockwise direction with a maximum of (0,5 ± 0,05) Nm for a maximum of a full turn each way. Examine whether the cap is still closed.

Apply an upward vertical force of (70 ± 2) N on the cap. Examine whether the cap is still closed. Attach the external tool and apply a force of 10 N on the tool in the most onerous direction. Examine whether the cap is still closed.

A.3 Closure test C

Fill the container with water. The filling volume shall be ¾ of the container volume. Attach the closure. Drop the filled container including its closure with its closure facing downwards five times from a height of (850 ± 50) mm on to a 4 mm thick steel plate, which has a 2 mm thick coating of Shore A hardness (75 ± 5) as measured according to EN ISO 868 or ISO 7619-1, and which is placed on a non-flexible horizontal surface.

Check visually for any breaks, cracks or leakages of the closure.

Annex B
(informative)

Rationale

B.1 Classification of substances and mixtures

Substances and mixtures in the various tables of the standard are classified according to Regulation (EC) No. 1272/2008 [2].

For those substances which have been classified and labelled according to chemical supplier's self-classification (which is based on Regulation (EC) No. 1272/2008 [2]), the standard generally specifies a precautionary classification corresponding to self-classification being used by one or more chemical suppliers/manufacturers.

The precautionary classifications and labelling requirements in this standard were considered reasonable for educational purposes and to ensure harmonised labelling and safety requirements.

The criterion for the hazard classification of colourants and colouring materials in *experimental sets* is more stringent than the classification of several of the allowed chemical substances. This was considered necessary because colourants and colouring materials are not specified in this standard and because there is a good range of appropriate colourants (e.g. food colours or colouring tablets) available on the market.

B.2 Crystal growing sets

Because of their similarity to *chemistry sets*, *crystal growing sets* have been specifically included within the scope of this standard in order to specify safety requirements that have been applicable to *chemistry sets* for many years. These safety requirements have been adapted to acknowledge the larger quantities of a small number of chemicals that are required to grow crystals and to address the long lasting period while the crystals are growing. The standard requires that specific safety information be provided to supervising adults to make them aware of the risks associated with unattended, super-saturated crystal growing solutions.

B.3 Carbon dioxide generating experimental sets

The inclusion of *carbon dioxide generating experimental sets* takes into account the particular interest in volcanoes or similar natural phenomenon. Even if these sets deal with mineralogical, geological and geographic aspects, the only chemical experiment is to generate carbon dioxide. In contrast, *experimental sets* for chemical experiments within the fields of mineralogy (*chemistry sets*) contain chemical substances in order to do different chemical reactions (e.g. to identify different types of minerals, stones or gemstones). The generation of carbon dioxide allows many dynamic play possibilities and the specification of safety requirements limits the hazards that may result from these experiments. As the focus of this standard is on setting safety requirements for toys that involve carrying out chemical experiments, other carbon dioxide using toys like racing cars etc. are excluded from the scope.

The focus is on experiments showing the characteristics of the included substances and their reaction product (carbon dioxide).

Annex C
(informative)

Environmental considerations

Every product affects the environment in the course of its life cycle from raw material acquisition through production, distribution and use, to disposal. The environmental impacts are consequences of the consumption of energy and resources and the generation of waste as well as the emission of substances into air, water and soil. The magnitude of the environmental impacts during the various life cycle changes depends on a number of choices made in the design of the product. These relate to aspects such as choice of materials, production methods, and the possibility of maintenance and recycling. Manufacturers and distributors should consider the environmental impact of their product, for example by:

— minimising the use of environmentally harmful substances;

— selecting the best available technology and techniques to reduce consumption of energy and materials;

— considering the use of recycled materials for product and packaging;

— encouraging responsible end of life disposal by the user including guidance on separation and identification of any recyclable components and packaging;

— using materials, components, and manufacturing facilities, which have declared documented environmental policies.

Annex D
(informative)

Significant technical changes between this European Standard and the previous version

Clause/Paragraph/Table/Figure	Change
General	The standard has been revised to reflect new particular safety requirements in Directive 2009/48/EC, in comparison to 88/378/EEC, and the labelling requirements for chemical substances of Regulation (EC) No 1272/2008, as it would apply to single supplied substances.
1	The scope has been extended to cover *crystal growing sets* and *carbon dioxide generating experimental sets*.
3	Terms and definitions of “chemical toy”, “experimental set”, “crystal growing set” and “carbon dioxide generating experimental set” and "cosmetic kit" have been added and the definition of chemistry set has been adjusted.
4.1	Clove oil has been removed in Table 1. In Table 1, Table 2 and Table 3 the danger symbols have been replaced by the corresponding GHS pictograms and the signal words and index numbers have been added. Colorants and colouring materials may under certain conditions be included in a chemistry set in addition to the substances specified in Tables 1 and 2.
4.2	Requirements for *crystal growing sets* including an allowed substance list (Table 4) have been added.
4.3	Requirements for *carbon dioxide generating experimental sets* including an allowed substance list (Table 5) have been added.
5.2.4	Requirements for the packaging of crystal-growing substances and carbon dioxide generating substances have been added.
5.5	The test method for eye protection has been removed. Eye protection shall be provided for *experimental sets* containing substances which have to be marked with the GHS pictogram GHS05 and for *chemistry sets*. A reference to Directive 89/686/EEC has been added.
6	The marking requirements have been adjusted to Directive 2009/48/EC and Regulation (EC) No 1272/2008.
7	The requirements for the content list have been revised (e.g. Risk/Safety-phrases have been replaced by the H-and-P-phrases). The general first aid information has been slightly adjusted.
8.3	The safety rules for *chemistry sets* have been revised and safety rules for *crystal growing sets* and *carbon dioxide generating experimental sets* have been added.
NOTE The technical changes referred include the significant technical changes from the revised European Standard but is not an exhaustive list of all modifications from the previous version.	

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2009/48/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys.

Clause(s)/sub-clause(s) of this Part of EN 71	**Particular Safety Requirements of Directive 2009/48/EC, Annex II**	**Qualifying remarks/Notes**
5.2.1.1; 5.2.2; 5.2.3; 5.2.4; 5.4	I. 1	
4	II. 2, 3 and 4	
6.2	III. 2	
4	III. 3 and 11	
Clause(s)/sub-clause(s) of this Part of EN 71	**Provisions of Directive 2009/48/EC**	**Qualifying remarks/Notes**
6.1; 6.3.2	Article 11. 2	
6; 7; 8	Annex V. B 4	

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

[2] Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on the classification, labelling and packaging of substances and mixtures

[3] Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations

[4] Regulation (EC) No. 1907/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EEC and 2000/21/EC

[5] Council Directive 89/686/EEC of 21 December 1989 on the approximation of the laws of the Member States relating to personal protective equipment

[6] Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards and other standards-related publications, information and services. It presents the UK view on standards in Europe and at the international level.

BSI is incorporated by Royal Charter. British Standards and other standardisation products are published by BSI Standards Limited.

Revisions

British Standards and PASs are periodically updated by amendment or revision. Users of British Standards and PASs should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using British Standards would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Similary for PASs, please notify BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

BSI offers BSI Subscribing Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of British Standards and PASs.

Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001
Email: plus@bsigroup.com

Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website **www.bsigroup.com/shop.** In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

In response to orders for international standards, BSI will supply the British Standard implementation of the relevant international standard, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005
Email: knowledgecentre@bsigroup.com

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards and PASs via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about British Standards is available on the BSI website at **www.bsi-group.com/standards**

Copyright

BSI

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™