

CEN/TC 52

Date: 2019-05

prEN 71-4:2019

CEN/TC 52

Secretariat: DS

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

ICS:

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Descriptors:

SIST EN 71-4:2021

<https://standards.iteh.ai/catalog/standards/sist/049ad5a8-c58f-4017-8e8c-bdc3881014ab/sist-en-71-4-2021>

Document type: European Standard
Document subtype:
Document stage: Publication
Document language: E

Y:\STD_MGT\STDDEL\PRODUCTION\Standards\00052\147\41_e_stf.doc STD Version 2.4a

Contents	Page
European foreword.....	4
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
4.1.1 Inclusion in the chemistry set	8
4.1.2 Inclusion for experiments (as mentioned in the instructions but not supplied in the chemistry set)	9
4.1.3 Requirements for packaging in containers	9
4.2 Crystal growing sets	14
4.3 Carbon dioxide generating experimental sets	17
5 Equipment	19
5.1 General requirements	19
5.2 Containers and glassware	19
5.2.1 Test tubes	19
5.2.2 Other glassware	19
5.2.3 Containers for reagents, substances and mixtures	20
5.2.4 Packaging and closures	20
5.2.5 Empty containers	21
5.2.6 Test method for borosilicate glass	21
5.3 Equipment for the transfer of liquid	22
5.4 Test tube stand and test tube holder (see 5.1)	22
5.5 Eye protection (see 5.1)	23
6 Marking	23
6.1 General requirements	23
6.2 Marking of individual containers, packaging and glassware	23
6.3 Marking of the primary packaging	24
7 Contents list with warnings and first aid information (see 5.1)	25
8 Instructions for use (see 5.1)	26
8.1 General instructions	26
8.2 Advice for supervising adults	26
8.3 Safety rules	27
8.3.1 Chemistry sets	27
8.3.2 Crystal growing sets	28
8.3.3 Carbon dioxide generating experimental sets	29
Annex A (normative) Test methods for closures of reagent containers	30
A.1 Closure test A	30
A.2 Closure test B	30

A.3	Closure test C	30
	Annex B (informative) Rationale	31
B.1	Classification of substances and mixtures	31
B.2	Crystal growing sets	31
B.3	Carbon dioxide generating experimental sets	31
	Annex C (informative) Environmental considerations	32
	Annex D (informative) Significant technical changes between this document and the previous version	33
	Annex ZA (informative) Relationship between this document and the Essential Requirements of Directive 2009/48/EC aimed to be covered	34
	Bibliography	35

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 71-4:2021

<https://standards.iteh.ai/catalog/standards/sist/049ad5a8-c58f-4017-8e8c-bdc3881014ab/sist-en-71-4-2021>

prEN 71-4:2019 (E)**European foreword**

This document (prEN 71-4:2019) has been prepared by Technical Committee CEN/TC 52 “Safety of toys”, the secretariat of which is held by DS.

This document will be submitted to the enquiry.

This document will supersede EN 71-4:2013.

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

This document is intended to be read in conjunction with EN 71-1:2014+A1:2018.

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*

NOTE 1 In addition to the above parts of EN 71, the following guidance documents have been published: CEN/TR 15071, *Safety of toys — National translations of warnings and instructions for use in EN 71*, and CEN/TR 15371 (*all parts*), *Safety of toys — Interpretations*.

NOTE 2 Words in *italics* are defined in Clause 3 (Terms and definitions).

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 2009/48/EC.

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

Introduction

This document 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 document 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 document 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 71-4:2021

<https://standards.iteh.ai/catalog/standards/sist/049ad5a8-c58f-4017-8e8c-bdc3881014ab/sist-en-71-4-2021>

1 Scope

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

This document 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 [1].

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

This document does not apply to combined sets, e.g. a combination of a *chemistry set* and a *crystal growing set*. It also 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”, are used in the “REACH Regulation”, Regulation (EC) No. 1907/2006 [2]. According to the Globally Harmonized 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) [1], 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 document, only the term “mixture” is used.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 71-1:2014+A1:2018, *Safety of toys - Part 1: Mechanical and physical properties*

EN 71-5:2015, *Safety of toys - Part 5: Chemical toys (sets) other than experimental sets*

EN 862:2016, *Packaging - Child-resistant packaging - Requirements and testing procedures for non-reclosable packages for non-pharmaceutical products*

EN ISO 868:2003, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

EN ISO 8317:2015, *Child-resistant packaging - Requirements and testing procedures for reclosable packages (ISO 8317:2015)*

ISO 7619-1:2010, *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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

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 71-1:2014+A1:2018 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.

prEN 71-4:2019 (E)**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****4.1.1 Inclusion in the chemistry set**

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.

Furthermore, colorants and colouring materials which are not specified in Table 2 may 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.

NOTE 1 The classification is detailed in Regulation (EC) No. 1272/2008 (Annex I, Part 3: Health Hazards).

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

Besides the chemical substances, mixtures and indicators given in Table 1 and Table 2 and colorants and colouring materials, only food additives and their mixtures according to Regulation (EC) 1333/2008 [5] may be supplied in chemistry sets, if pure food additives are not classified as hazardous substances [1] or mixtures are not classified as hazardous mixtures [1].

NOTE 2 Samples of rocks, stones, minerals on which to perform experiments in order to distinguish their composition are sometimes supplied with the set.

4.1.2 Inclusion for experiments (as mentioned in the instructions but not supplied in the chemistry set)

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*.

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 instructions for use may suggest the use of other substances that are not classified as hazardous substances [1] (e.g. sucrose or table sugar) or mixtures that are not classified as hazardous mixtures [1].

4.1.3 Requirements for packaging in containers

The substances and mixtures in Table 1 and 2 in a *chemistry set* or in a *supplementary set* of a *chemistry set* shall be supplied in containers (see 5.2.3) which are provided with closures (see 5.2.4.1).

(standards.iteh.ai)

SIST EN 71-4:2021

<https://standards.iteh.ai/catalog/standards/sist/049ad5a8-c58f-4017-8e8c-bdc3881014ab/sist-en-71-4-2021>

Table 1 — Maximum amounts of chemical substances and mixtures 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
Aluminium potassium sulfate	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	GHS05	Danger	10138-04-2	233-382-4	-
Ammonium sodium hydrogen phosphate	5 g	-	-	13011-54-6	235-860-8	-
Calcium carbonate	100 g	-	-	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, GHS07	Danger	1305-62-0	215-137-3	-
Calcium nitrate	5 g	GHS03, GHS05, GHS07	Danger	10124-37-5	233-332-1	-
Calcium oxide ^a	10 g	GHS05, GHS07	Danger	1305-78-8	215-138-9	-
Calcium sulfate	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, GHS09	Warning	1317-38-0	215-269-1	029-016-00-6
Copper (II) sulfate	15 g	GHS05, GHS07, GHS09	Danger	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	-