
Safety of toys —

Part 11:

**Chemical toys (sets) other than
experimental sets**

Sécurité des jouets —

*Partie 11: Jouets chimiques (coffrets) autres que les coffrets
d'expériences*

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

ISO 8124-11:2019

<https://standards.iteh.ai/catalog/standards/sist/9fccfd2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 8124-11:2019

<https://standards.iteh.ai/catalog/standards/sist/9fccdf2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Plaster of Paris (gypsum) moulding sets	3
4.1 Marking.....	3
4.2 First aid information.....	3
4.3 Safety rules.....	3
5 Oven-hardening plasticised PVC modelling clay sets	3
5.1 Chemical substances.....	3
5.2 Marking.....	4
5.3 First aid information.....	4
5.4 Safety rules.....	4
6 Moulding sets	5
6.1 Polystyrene granules sets.....	5
6.1.1 Chemical substances.....	5
6.1.2 Marking.....	5
6.1.3 First aid information.....	5
6.1.4 Safety rules.....	5
6.2 Embedding sets.....	6
6.2.1 General.....	6
6.2.2 Packaging.....	6
6.2.3 Marking.....	6
6.2.4 First aid information.....	6
6.2.5 Safety rules.....	6
7 Adhesives, paints, lacquers, varnishes, thinners and cleaning agents (solvents) supplied or recommended in model sets	6
7.1 General.....	6
7.2 Adhesives.....	7
7.2.1 Water-based adhesives.....	7
7.2.2 Solvent-based adhesives.....	9
7.3 Water-based paints or lacquers.....	12
7.3.1 General.....	12
7.3.2 Packaging.....	13
7.3.3 Marking.....	13
7.3.4 First aid information.....	13
7.3.5 Safety rules.....	13
7.4 Solvent-based paints, lacquers, thinners and cleaning solvents.....	14
7.4.1 General.....	14
7.4.2 Packaging.....	14
7.4.3 Marking.....	15
7.4.4 First aid information.....	15
7.4.5 Safety rules.....	15
8 Marking	15
8.1 General.....	15
8.2 Marking of the primary packaging.....	15
8.2.1 General.....	16
8.2.2 Manufacturer's identification.....	16
8.2.3 Warning phrases.....	16
8.3 Marking of individual containers and any packaging.....	16

9	Instructions for use	16
9.1	General	16
9.2	Contents list	16
9.3	Advice for adult supervision	17
9.4	Safety rules	17
9.5	Instructions for carrying out the activities	17
9.6	Spills and disposal of chemicals	18
10	Test methods	18
10.1	General	18
10.2	Determination of plasticisers in oven-hardening polyvinyl chloride (PVC) modelling clay sets	18
10.2.1	Principle	18
10.2.2	Standards and reagents	18
10.2.3	Apparatus	19
10.2.4	Preparation of standard solutions	21
10.2.5	Sampling	22
10.2.6	Sample preparation	22
10.2.7	Procedure	22
10.2.8	Evaluation of results	24
10.2.9	Test report	25
10.3	Determination of the emission of benzene, toluene and xylenes from oven-hardening plasticised PVC modelling clay sets and polystyrene granules sets	26
10.3.1	Principle	26
10.3.2	Standards and reagents	26
10.3.3	Apparatus	26
10.3.4	Preparation of standard solutions	28
10.3.5	Sampling	28
10.3.6	Sample preparation	28
10.3.7	Procedure	29
10.3.8	Evaluation of results	29
10.3.9	Test report	29
10.3.10	Critical control points	29
10.4	Determination of styrene content in polystyrene granules	30
10.4.1	Principle	30
10.4.2	Standards and reagents	30
10.4.3	Apparatus	30
10.4.4	Preparation of standard solutions	31
10.4.5	Sampling	31
10.4.6	Sample preparation	31
10.4.7	Procedure	31
10.4.8	Evaluation of results	32
10.4.9	Test report	32
10.5	Determination of organic solvents	32
10.5.1	General	32
10.5.2	Principle	33
10.5.3	Standards and reagents	34
10.5.4	Apparatus	35
10.5.5	Preparation of the standard solutions	37
10.5.6	Sampling	44
10.5.7	Sample preparation	44
10.5.8	Procedure	45
10.5.9	Evaluation of results	49
10.5.10	Test report	50
10.6	Combined approach for the determination of plasticisers in solvent-based adhesives and in solvent-based paints or lacquers, film-forming agents in paints and lacquers and modifiers in solvent-based paints or lacquers	50
10.6.1	Principle	50
10.6.2	Determination of total extract	51

10.6.3	Identification of nitrocellulose	52
10.6.4	Determination of plasticisers.....	54
10.6.5	Determination of film-forming agents.....	54
10.6.6	Determination of the modifiers	59
10.6.7	Test report.....	60
Annex A (normative) Environmental, health and safety precautions for using the methods of analysis		61
Annex B (informative) Organic solvents		62
Annex C (informative) Validation of test methods		64
Annex D (informative) Rationale.....		65
Bibliography.....		67

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 8124-11:2019](https://standards.iteh.ai/catalog/standards/sist/9fccdf2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019)

<https://standards.iteh.ai/catalog/standards/sist/9fccdf2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 181, *Safety of toys*.

A list of all parts in the ISO 8124 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is intended to reduce the risks and health hazards to children when chemical toys are used as intended or in a foreseeable way, bearing in mind the behaviour of children.

When using these chemical toys, potential risks should be kept to a minimum by the inclusion of appropriate information drawing attention to possible hazards, risks and other problems.

The Chemical Abstract Service Registry Numbers (CAS) and European Inventory of Existing Chemical Substances Numbers (EINECS) given in various tables are provided for information purposes only.

Products covered by this document may be subject to legal requirements specific to the jurisdiction in which they are sold and conformity with the requirements in this document cannot be relied on to ensure compliance with those requirements.

iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO 8124-11:2019

<https://standards.iteh.ai/catalog/standards/sist/9fcdfd2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 8124-11:2019

<https://standards.iteh.ai/catalog/standards/sist/9fccfd2-ca11-4400-bfac-25c0ce8ba4ab/iso-8124-11-2019>

Safety of toys —

Part 11: Chemical toys (sets) other than experimental sets

1 Scope

This document specifies requirements and test methods for the substances and materials used in chemical toys (sets) other than experimental sets. These substances and mixtures are:

- those classified as dangerous by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)^[1];
- 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 GHS; and
- any other chemical substance(s) and mixture(s) delivered with the chemical toy.

Additionally, requirements are specified for markings, warnings, safety rules, contents lists, instructions for use and first aid information.

This document applies to:

- plaster of Paris (gypsum) moulding sets;
- oven-hardening plasticised PVC modelling clay sets;
- polystyrene granules sets;
- embedding sets;
- adhesives, paints, lacquers, varnishes, thinners and cleaning agents (solvents) supplied or recommended in model sets.

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.

ISO 3104, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 22854, *Liquid petroleum products — Determination of hydrocarbon types and oxygenates in automotive-motor gasoline and in ethanol (E85) automotive fuel — Multidimensional gas chromatography method*

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:

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

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

[SOURCE: ISO 8124-2:2014, 3.1]

3.2
experimental set
chemical toy (3.1) in which the experimental and explorative character in playing with single chemical substances and mixtures is guided by strict instructions that dominate over the creative ideas of the user

3.3
plaster of Paris (gypsum) moulding set
toy containing moulds into which a mixture of water and gypsum is poured and allowed to harden

Note 1 to entry: The gypsum consists predominantly of calcium sulfate hemihydrate $\text{CaSO}_4 \cdot 0,5 \text{H}_2\text{O}$.

Note 2 to entry: Plaster of Paris (gypsum) moulding sets are used, for example, for preparing figures and plates.

3.4
oven-hardening plasticised PVC modelling clay set
toy to be used for creating all kinds of figures, brooches and fashion jewellery, prepared by hardening in the oven at temperatures of 100 °C to 130 °C

3.5
polystyrene granules set
toy to be used in substitution of ceramic materials to create decorative articles or models by fusion of a polymer by heating in an oven up to a maximum of 180 °C

3.6
embedding set
toy to be used to preserve certain products in a transparent material

3.7
model set
product used to assemble and coat models which are supplied with or recommend *adhesives* (3.8), *paints or lacquers* (3.9 and 3.10), *varnishes* (3.11), *thinners and cleaning agents* (3.12)

Note 1 to entry: Examples for these models include motorcars, aeroplanes, houses and ships.

3.8
adhesive
non-metallic substance capable of joining materials by surface bonding (adhesion) and the bond possessing adequate internal strength (cohesion)

3.9
water-based paint or lacquer
water-based pigmented material which, when applied in a liquid form to a surface, eventually forms a dry adherent film or coating

3.10
solvent-based paint or lacquer
solvent-based pigmented material which, when applied in a liquid form to a surface, eventually forms a dry adherent film or coating

3.11**varnish**

low-viscosity lacquer

3.12**thinners and cleaning agents****solvents**

products which are intended to obtain the required viscosity of paints and lacquers and to clean tools and brushes

4 Plaster of Paris (gypsum) moulding sets**4.1 Marking**

See [D.2](#) and [D.3](#).

The primary packaging shall, in addition to the marking required in [Clause 9](#), bear the following:

“Warning! Not suitable for children under (*) years. For use under adult supervision. Read the instructions before use, follow them and keep them for reference.”

(*) The age is to be specified by the manufacturer, authorized representative or importer. It shall not be below 5 years.

4.2 First aid information

The instructions for use shall, in addition to the general first aid information in [9.2 d](#)), contain the following:

- “In case of eye contact: Wash out eye with plenty of water, holding eye open. Seek immediate medical advice.”
- “If swallowed: Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.”

4.3 Safety rules

The instructions for use shall, in addition to the rules required in [9.4](#), contain the following safety rules:

- “Do not place the material in the mouth.”
- “Do not inhale dust or powder.”
- “Do not apply to the body.”

5 Oven-hardening plasticised PVC modelling clay sets**5.1 Chemical substances**

See [D.4](#).

These modelling clay sets shall consist of PVC (polyvinylchloride) and plasticisers and may contain modifiers, fillers (e.g. China clay) and colourants. Only plasticisers given in [Table 1](#) shall be used.

The mass fraction of plasticisers in the mixture shall not exceed 30 %.

The vinyl chloride monomer content shall be below 1 mg/kg.

Table 1 — Plasticisers in oven-hardening plasticised PVC modelling clay sets

Chemical substance	CAS number
Adipic acid polyesters	various
Alkylsulfonic acid esters (C ₁₂ to C ₂₀) of phenol	91082-17-6
Di(isononyl) cyclohexane-1,2-dicarboxylate (DINCH)	166412-78-8
Tributyl acetylacrylate	77-90-7
Tris(2-ethylhexyl) acetylacrylate	144-15-0

During heating of these materials at the maximum permitted temperature and duration, the limits given in [Table 2](#) shall not be exceeded for the emission of the listed toxic substances when tested according to [10.3](#).

Table 2 — Limits for the emission of substances from oven-hardening plasticised PVC modelling clay sets and polystyrene granules sets during heating

Substance	Limit mg/kg
Benzene	5
Toluene	15
Xylenes	25

5.2 Marking

See [D.2](#) and [D.3](#).

The primary packaging shall, in addition to the marking required in [Clause 9](#), bear the following warning:

“Warning! Not suitable for children under (*) years. For use under adult supervision. Read the instructions before use, follow them and keep them for reference.”

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

5.3 First aid information

The instructions for use shall, in addition to the general first aid information in [9.2 d\)](#), contain the following:

- “In case of accidental overheating and inhalation of poisonous gases: Remove person to fresh air and seek immediate medical advice.”

5.4 Safety rules

The instructions for use shall, in addition to the rules required in [9.4](#), contain the following safety rules:

- “Do not place the material in the mouth.”
- “Do not exceed a hardening temperature of 130 °C or harmful gases may be produced.”
- “Do not exceed a hardening time of 30 minutes.”
- “The hardening process is not part of the function of the toy and should be carried out by the supervising adult.”
- “Use a domestic oven thermometer, e.g. bimetal, to measure the temperature.”

- “Do not use a glass thermometer.”
- “Do not heat the material and cook food at the same time in a domestic oven.”
- “Do not use a microwave oven.”

6 Moulding sets

6.1 Polystyrene granules sets

6.1.1 Chemical substances

These sets shall contain uncoloured and coloured polystyrene granules in accordance with [Table 3](#).

Table 3 — Polystyrene

Chemical substance	CAS number	EINECS number
Polystyrene with monomer content of styrene \leq 500 mg/kg	9003-53-6	—

6.1.2 Marking

See [D.2](#) and [D.3](#).

The primary packaging shall, in addition to the marking required in [Clause 9](#), bear the following warnings:

“Warning! Not suitable for children under (*) years. For use under adult supervision. Read the instructions before use, follow them and keep them for reference.”

(*) The age is to be specified by the manufacturer, authorized representative or importer. It shall not be below 10 years.

6.1.3 First aid information

The instructions for use shall, in addition to the general first aid information in [9.2 d\)](#), contain the following:

- “In case of accidental overheating and inhalation of poisonous gases: Remove person to fresh air and seek immediate medical advice.”

6.1.4 Safety rules

The instructions for use shall, in addition to the rules required in [9.4](#), contain the following safety rules:

- “Do not exceed a melting temperature of 180 °C.”
- “The melting process is not part of the function of the toy and should be carried out by the supervising adult.”
- “Use a domestic oven thermometer, e.g. bimetal, to measure the temperature.”
- “Do not swallow material.”
- “Do not heat the material and cook food at the same time in a domestic oven.”
- “Do not use a glass thermometer.”
- “Do not exceed the maximum recommended processing period.”
- “Do not use a microwave oven.”

6.2 Embedding sets

6.2.1 General

See [D.5](#).

Only preservatives permitted in foodstuffs and/or cosmetics, except those preservatives which are only allowed in cosmetic products that are rinsed off after use, shall be used.

NOTE 1 Examples of information on preservatives permitted in cosmetics in Europe and the United States are provided in References [\[4\]](#) and [\[5\]](#).

Other substances classified as dangerous substances (see Reference [\[1\]](#)) shall not be used in embedding sets.

NOTE 2 Substances such as gelatine or agar could be utilized with suitable preservation.

6.2.2 Packaging

See [D.2](#).

The name(s) of any preservative(s) used shall be indicated on the primary packaging.

6.2.3 Marking

See [D.3](#).

The packaging shall, in addition to the marking required in [Clause 9](#), bear the following warnings:

“Warning! Not suitable for children under (*) years. For use under adult supervision. Read the instructions before use, follow them and keep them for reference.”

(*) The age is to be specified by the manufacturer, authorized representative or importer. It shall not be below 5 years.

6.2.4 First aid information

The instructions for use shall, in addition to the general first aid information in [9.2 d\)](#), contain the following:

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

6.2.5 Safety rules

The instructions for use shall, in addition to the rules required in [9.4](#), contain the following safety rule:

- “Do not place the preserved material in the mouth.”

7 Adhesives, paints, lacquers, varnishes, thinners and cleaning agents (solvents) supplied or recommended in model sets

7.1 General

Adhesives, paints, lacquers, varnishes, thinners and cleaning agents (solvents) supplied in model sets shall conform with the requirements in [Clause 7](#). The instructions included in the set shall mention only adhesives, paints, lacquers, varnishes, thinners and cleaning agents (solvents) that conform with the requirements in [Clause 7](#).

7.2 Adhesives

7.2.1 Water-based adhesives

7.2.1.1 General

See [D.5](#).

Water-based adhesives shall consist of water and basic materials. Only basic materials given in [Table 4](#) shall be used. Additionally, water-based adhesives may contain special materials given in [Table 5](#) or [Table 7](#), preservatives, fillers and modifiers.

Only preservatives permitted in foodstuffs and/or cosmetics, except those preservatives which are only allowed in cosmetic products that are rinsed off after use, shall be used.

NOTE Examples of information on preservatives permitted in cosmetics in Europe and the United States are provided in References [\[4\]](#) and [\[5\]](#).

Table 4 — Basic materials for water-based adhesives and water-based paints or lacquers

Chemical substance	CAS number	EINECS number
Acrylic homo and copolymers	—	—
Hydrophilic polyurethane containing neither free isocyanate groups nor aromatic amino-compounds	—	—
Polymers and copolymers of monomers permitted for materials intended to come into contact with foodstuffs	—	—
Polyvinyl homo and copolymers	—	—
Poly(vinyl alcohol)	9002-89-5	209-183-3
Polyvinylpyrrolidone homo and copolymers	—	—

The basic materials shall be appropriate for food contact. The migration solvent shall be water, grade 3 according to ISO 3696. The contact time shall be approximately 60 min at approximately 40 °C.

7.2.1.2 Liquid adhesives for paper and wood

7.2.1.2.1 General

Special materials for adhesives for paper and wood shall be in accordance with [Table 5](#).

Table 5 — Special materials for adhesives for paper and wood and water-based paints and lacquers

Chemical substance	CAS number	EINECS number
Cellulose ethers (e.g. carboxymethylcellulose, methylcellulose)	9004-67-5	—
Dextrin	9004-53-9	232-675-4
Gum arabic	9000-01-5	232-519-5
Starch or modified starch	9005-25-8	232-679-6

Special additives for adhesives for paper and wood shall be in accordance with [Table 6](#).