INTERNATIONAL STANDARD

ISO 10349-1

Second edition
2002-11-01

Photography — Photographic-grade chemicals — Test methods —

Part 1: General

Photographie — Produits chimiques de qualité photographique — Méthodes d'essai —

Partie 1: Généralités

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10349 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10349-1 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 10349-1:1992), which has been technically revised.

ISO 10349 consists of the following parts, under the general title *Photography — Photographic-grade chemicals — Test methods*:

— *Part 1: General*

— *Part 2: Determination of matter insoluble in water*

— *Part 3: Determination of matter insoluble in ammonium hydroxide solution*

— *Part 4: Determination of residue after ignition*

— *Part 5: Determination of heavy metals and iron content*

— *Part 6: Determination of halide content*

— *Part 7: Determination of alkalinity or acidity*

— *Part 8: Determination of volatile matter*

— *Part 9: Reaction to ammoniacal silver nitrate*

— *Part 10: Determination of sulfide content*

— *Part 11: Determination of specific gravity*

— *Part 12: Determination of density*

— *Part 13: Determination of pH*

Annex A of this part of ISO 10349 is for information only.

Introduction

This part of ISO 10349 and subsequent parts deal with photographic-grade chemicals and their test methods which are cited in other International Standards for photographic-grade chemicals. Although the ultimate criterion for suitability of a photographic-grade chemical is its successful performance in an appropriate use test, the shorter, more economical test methods described in subsequent parts of ISO 10349, used with those tests included in the specific chemical standards, are generally adequate.

Over the past few years, great improvements have been made in instrumentation for various analyses. Where such techniques have equivalent or greater precision, they may be used in place of the tests described in the appropriate part of ISO 10349 or in the International Standards for photographic-grade chemicals. Correlation of such alternative procedures with the given method is the responsibility of the user.

Although ISO 10349 is intended for use by individuals with a knowledge of analytical techniques, this may not always be the case. Care has been taken to provide warnings for particularly hazardous materials. General hazard warnings for chemicals used in ISO 10349 and other associated International Standards are given in the text as a symbol code as a reminder in those steps detailing handling operations. More detailed information regarding hazards, handling and use of these chemicals may be available from the manufacturer.

An index of the most current version of the International Standards dealing with photographic-grade chemicals and test methods is given in annex A. This annex will be updated on a regular basis upon the issue of any revision or addition to ISO 10349 or the chemical specification standards.

Photography — Photographic-grade chemicals — Test methods —

Part 1: General

1 Scope

This part of ISO 10349 specifies criteria for reagents and materials, and addresses a number of general and common aspects involved in performing the tests given in subsequent parts of ISO 10349.

Annex A provides an index of the latest versions of International Standards on photographic-grade chemical specifications.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10349. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10349 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 385-1:1984, *Laboratory glassware — Burettes — Part 1: General requirements*

ISO 648:1977, *Laboratory glassware — One-mark pipettes*

ISO 835-1:1981, *Laboratory glassware — Graduated pipettes — Part 1: General requirements*

ISO 835-2:1981, *Laboratory glassware — Graduated pipettes — Part 2: Pipettes for which no waiting time is specified*

ISO 835-3:1981, *Laboratory glassware — Graduated pipettes — Part 3: Pipettes for which a waiting time of 15 s is specified*

ISO 835-4:1981, *Laboratory glassware — Graduated pipettes — Part 4: Blow-out pipettes*

ISO 1042:1998, *Laboratory glassware — One-mark volumetric flasks*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 4788:1980, *Laboratory glassware — Graduated measuring cylinders*

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques*

ISO 5667-3:1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*

ISO 6353-1:1982, *Reagents for chemical analysis — Part 1: General test methods*

ISO 6353-2:1983, *Reagents for chemical analysis — Part 2: Specifications — First series*

ISO 6353-3:1987, *Reagents for chemical analysis — Part 3: Specifications — Second series*

3 Term and definition

For the purposes of this part of ISO 10349, the following term and definition apply.

3.1
photographic-grade chemicals
chemicals commonly used in processing sensitized photographic materials, and more particularly those for which the quality level is so specified as not to affect the fundamental performance of the photographic material

4 Safety and operational precautions

4.1 Hazard warnings

Some of the chemicals specified in the test procedures given in subsequent parts of ISO 10349 are caustic, toxic, or otherwise hazardous. Safe laboratory practice for the handling of chemicals requires the use of safety glasses or goggles and, in some cases, other protective apparel such as rubber gloves, face masks and aprons. Specific danger notices are given in the test and footnotes for particularly dangerous materials, but normal precautions are required during the performance of any chemical procedure at all times.

The first time that a hazardous material is noted in the test procedures, the hazard will be indicated by the word **"DANGER"** followed by a symbol consisting of angle brackets "〈 〉" containing a letter which designates the specific hazard. A double bracket "〈〈 〉〉" will be used for particularly perilous situations. In subsequent statements involving handling of these hazardous materials, only the hazard symbol consisting of the brackets and letter(s) will be displayed. Furthermore, for a given material, the hazard symbol will be used only once in a single paragraph.

Hazard warning symbols will not be used for common organic solvents when used in quantities of less than 1 litre, unless they are particularly hazardous.

Detailed warnings for handling chemicals and their diluted solutions are beyond the scope of this part of ISO 10349.

Employers shall provide training and health and safety information in conformance with legal requirements.

The hazard code system used in this part of ISO 10349 is intended to provide information to the users and is not meant for compliance with any legal requirements for labelling, as these vary from country to country.

It is strongly recommended that anyone using these chemicals obtain pertinent information from the manufacturer about the hazards, handling, use and disposal of these chemicals.

4.2 Hazard information code system

〈B〉 Harmful if inhaled. Avoid breathing dust, vapour, mist or gas. Use only with adequate ventilation.

〈C〉 Harmful if contact occurs. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling.

〈F〉 Will burn. Keep away from heat, sparks and open flame. Use with adequate ventilation.

〈O〉 Oxidizer. Contact with other material may cause fire. Do not store near combustible materials.

〈S〉 Harmful if swallowed. Wash thoroughly after handling. If swallowed, obtain medical attention immediately.

〈〈S〉〉 May be fatal if swallowed. If swallowed, obtain medical attention immediately.

4.3 Critical safety precautions

WARNING — All pipette operations shall be performed with a pipette bulb or plunger pipette.

Safety glasses shall be worn for all laboratory work.

5 Requirements for reagents

5.1 Handling and labelling

Reagents shall be handled in conformity with health and safety precautions as shown on containers or as given in other sources of such information. Proper labelling of prepared reagents includes the chemical name, date of preparation, expiration date, restandardization date, name of preparer and adequate health and safety precautions. The discharge of reagents shall comply with applicable environmental regulations.

5.2 Purity

Reagents used in the test procedures shall be certified reagent-grade chemicals and shall meet appropriate standards or be chemicals of a purity acceptable for the analysis, in accordance with all parts of ISO 6353.

5.3 Water

Whenever water is specified without other qualifiers in the test procedures, only distilled water or water of equal purity shall be used, in accordance with ISO 3696.

5.4 Strength of solutions

5.4.1 Solutions referred to in all instructions shall be of full strength unless dilution is specified.

5.4.2 When a standardized solution is required, its concentration is expressed as molarity (mol/l). The number of significant figures to which the molarity is known, shall be sufficient to ensure that the reagent does not limit the reliability of the test method.

5.4.3 When a standardized solution is not required, its concentration is expressed in grams per litre (g/l) to the appropriate number of significant figures.

5.4.4 When a solution is to be diluted, its dilution is indicated by (X + Y), meaning that X volumes of reagent, or concentrated solution, are to be diluted with Y volumes of water (5.3).

6 Glassware

6.1 All glassware subject to heating shall be of heat-resistant borosilicate glass[1)].

6.2 Pipettes and other volumetric glassware shall meet the volume requirements of Class A glassware as specified in ISO 385-1, ISO 648, ISO 835-1, ISO 835-2, ISO 835-3, ISO 835-4, ISO 1042 and ISO 4788.

1) Pyrex® is an example of suitable glassware available commercially. This information is given for the convenience of the users of this part of ISO 10349 and does not constitute an endorsement by ISO of this product.

7 Sampling of solids and liquids

7.1 Sample size

A sample size sufficient to run all tests, including any retained samples as defined by the sampling plan, shall be taken from each shipment of the raw material. This sample shall be homogeneous and typical of the bulk material.

7.2 Sampling method

The representative sampling of bulk solids or liquids is not a trivial matter and appropriate precautions shall be taken, in accordance with ISO 5667-1, ISO 5667-2 and ISO 5667-3. Agreement between the vendor and the user on a common sampling method is recommended to achieve meaningful results.

8 Masses and volumes

8.1 General

All masses or volumes specified in the general test procedures given in subsequent parts of ISO 10349 for either sample test portions or other chemicals are expressed in one of the following ways.

8.2 Portions defined by mass

a) A definite quantity is weighed with the precision specified, as illustrated in the following examples.

   EXAMPLE 1 “Weigh 5,000 g ± 0,001 g of …”

   EXAMPLE 2 “Weigh, to the nearest 0,001 g, 5,000 g of …”

b) An appropriate quantity is taken and weighed with the precision specified, as illustrated in the following examples.

   EXAMPLE 3 “Weigh, to the nearest 0,001 g, 1,5 g to 1,6 g of …”

   EXAMPLE 4 “Weigh a test portion of 3,9 g to 4,1 g to the nearest 0,001 g …”

   EXAMPLE 5 “Weigh approximately 10 g to the nearest 0,001 g …”

   In general, the expression “Weigh approximately … g of …”, unqualified with respect to precision, should be interpreted as signifying that the mass to be taken shall be within ± 10 % of the specified mass.

c) The quantity is stated with an actual or implied degree of precision required, illustrated by the following examples where the required degree of precision is 0,1 g.

   EXAMPLE 6 “Weigh 10 g ± 0,1 g of …” (actual).

   EXAMPLE 7 “Weigh 10 g of …” (implied).

   If the required degree of precision is implied as in the second example, it will be taken as ± 1 unit of the rightmost digit printed or a minimum precision of ± 2 %.

8.3 Portions defined by volume

8.3.1 For instructions prescribing the use of volumetric glassware (for example, volumetric pipettes or volumetric flasks), the requirements specified in 6.2 apply.

8.3.2 If apparatus having a known precision other than that specified in 6.2 is required, its precision should be stated in the apparatus clause. This clause number should be enclosed in parentheses and follow the first citation of the apparatus in the text of the procedure.

8.3.3 All other references to volume imply a required degree of precision equal to $\pm$ 1 unit of the rightmost digit printed or a minimum precision of $\pm$ 1 %.

9 Common laboratory procedures

9.1 General

Many specifications use common procedures for which the following general procedures have been written. Specification information is stated in defined formats that are provided in the chemical specification standards and information in those standards overrides any default or recommendation values given here.

9.2 Dried weighing bottle usage

When a weighing bottle is required, the bottle shall have been cleaned, dried in an oven for the indicated time at the indicated temperature, cooled in a desiccator and weighed to the indicated precision. Conditions for drying the test portion in the weighing bottle shall be the same unless explicity indicated otherwise:

"Into a weighing bottle (temperature, time, weight precision) …"

and

"Dry the test portion and reweigh …" (implies prior stated condition)

or

"Dry the test portion and reweigh (temperature, time, weight precision) …" (for a different condition).

EXAMPLE 110 °C, 2 h, 0,000 1 g.

9.3 Porous crucible filtrations

When a porous crucible is used for filtration and determination of the weight of the residue is required, the crucible shall have a sintered glass bottom of nominal porosity as indicated. It shall have been cleaned, dried in an oven for the indicated time at the indicated temperature and weighed to the indicated precision. Conditions for drying the residue shall be the same unless explicitly indicated otherwise:

"Filter through a dry porous crucible (porosity, temperature, time, weight precision) …"

and

"Dry the residue and reweigh …" (implies prior stated condition)

or

"Dry the residue and reweigh (temperature, time, weight precision) …" (for a different condition).

EXAMPLE 10 μm to 15 μm, 105 °C, 4 h, 0,001 g.

9.4 High-temperature ignition crucible usage

When a crucible is used for ignition of a test portion, it shall be cleaned with dilute hydrochloric acid (1 + 3), rinsed with water, heated to the temperature specified for the ignition conditions (normally for 30 min), cooled in a desiccator and weighed to the indicated precision.

NOTE This solution can be prepared from hydrochloric acid, $\rho \approx$ 1,18 g/ml (DANGER: ⟨B⟩ ⟨C⟩).

Ignition of the test portion shall be carried out at the specified temperature and the weight again determined to the indicated precision. The ignition time of the test portion shall be stated in the text.

“Weigh 2,0 g of the test portion and ignite it in a platinum crucible (temperature, time, weight precision).”

EXAMPLE 530 °C, 2 h, 0,001 g.

Annex A
(informative)

International Standards on the specification of photographic-grade chemicals

A.1 Alphabetical listing of photographic-grade chemicals

ISO No.	Description	Publication year
3298	Acetic acid, glacial	1994
3620	Aluminium potassium sulfate dodecahydrate	1994
3622	Ammonium thiocyanate	1996
3619	Ammonium thiosulfate solution	1994
3618	Benzotriazole	1994
3628	Boric acid	1994
423	Hydroquinone	1994
422	*p*-Methylaminophenol sulfate	1994
3299	1-Phenyl-3-pyrazolidinone (Phenidone)®	1994
420	Potassium bromide	1994
3623	Potassium carbonate, anhydrous	1994
3624	Potassium ferricyanide	1994
3625	Potassium hydroxide	1994
3629	Potassium metabisulfite	2000
5990	Potassium sulfite, 650 g/l aqueous solution	2000
3626	Potassium thiocyanate	1996
3943	Sodium acetate, anhydrous	1993
424	Sodium carbonate, anhydrous and monohydrate	1994
3617	Sodium hydroxide	1994
3627	Sodium metabisulfite, anhydrous	2001
418	Sodium sulfite, anhydrous	2001
3621	Sodium tetraborate decahydrate	1994
10636	Sodium thiosulfate, anhydrous and pentahydrate	1994

A.2 Numerical listing of photographic-grade chemicals

ISO No.	Description	Publication year
418	Sodium sulfite, anhydrous	2001
420	Potassium bromide	1994
422	*p*-Methylaminophenol sulfate	1994
423	Hydroquinone	1994
424	Sodium carbonate, anhydrous and monohydrate	1994
3298	Acetic acid, glacial	1994
3299	1-Phenyl-3-pyrazolidinone (Phenidone)®	1994
3617	Sodium hydroxide	1994
3618	Benzotriazole	1994
3619	Ammonium thiosulfate solution	1994
3620	Aluminium potassium sulfate dodecahydrate	1994
3621	Sodium tetraborate decahydrate	1994
3622	Ammonium thiocyanate	1996
3623	Potassium carbonate, anhydrous	1994
3624	Potassium ferricyanide	1994
3625	Potassium hydroxide	1994
3626	Potassium thiocyanate	1996
3627	Sodium metabisulfite, anhydrous	2001
3628	Boric acid	1994
3629	Potassium metabisulfite	2000
3943	Sodium acetate, anhydrous	1993
5990	Potassium sulfite, 650 g/l aqueous solution	2000
10636	Sodium thiosulfate, anhydrous and pentahydrate	1994

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