INTERNATIONAL STANDARD

ISO 3625

Second edition
1994-05-01

Photography — Processing chemicals — Specifications for potassium hydroxide

Photographie — Produits chimiques pour traitement — Spécifications relatives à l'hydroxyde de potassium

Reference number
ISO 3625:1994(E)

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.

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.

International Standard ISO 3625 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 3625:1976), which has been technically revised.

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Introduction

0.1 This International Standard is one of a series that establishes criteria of purity for chemicals used in processing photographic materials. General test methods and procedures cited in this International Standard are compiled in parts 1, 5, 6 and 7 of ISO 10349.

This International Standard is intended for use by individuals with a working knowledge of analytical techniques, which may not always be the case. Some of the procedures utilize caustic, toxic or otherwise hazardous chemicals. Safe laboratory practice for the handling of chemicals requires the use of safety glasses or goggles, rubber gloves and other protective apparel such as face masks or aprons where appropriate. Normal precautions required in the performance of any chemical procedure are to be exercised at all times but care has been taken to provide warnings for hazardous materials. Hazard warnings designated by a letter enclosed in angle brackets, < >, are used as a reminder in those steps detailing handling operations and are defined in ISO 10349-1. More detailed information regarding hazards, handling and use of these chemicals may be available from the manufacturer.

0.2 This International Standard provides chemical and physical requirements for the suitability of a photographic-grade chemical. The tests correlate with undesirable photographic effects. Purity requirements are set as low as possible consistent with these photographic effects. These criteria are considered the minimum requirements necessary to assure sufficient purity for use in photographic processing solutions, except that if the purity of a commonly available grade of chemical exceeds photographic processing requirements and if there is no economic penalty in its use, the purity requirements have been set to take advantage of the availability of the higher-quality material. Every effort has been made to keep the number of requirements to a minimum. Inert impurities are limited to amounts which will not unduly reduce the assay. All tests are performed on samples "as received" to reflect the condition of materials furnished for use. Although the ultimate criterion for suitability of such a chemical is its successful performance in an appropriate use test, the shorter, more economical test methods describes in this International Standard are generally adequate.

Assay procedures have been included in all cases where a satisfactory method is available. An effective assay requirement serves not only as a safeguard of chemical purity but also as a valuable complement to the identity test. Identity tests have been included whenever a possibility exists that another chemical or mixture of chemicals could pass the other tests.

All requirements listed in clause 4 are mandatory. The physical appearance of the material and any footnotes are for general information only and are not part of the requirements.

0.3 Efforts have been made to employ tests which are capable of being run in any normally equipped laboratory and, wherever possible, to avoid tests which require highly specialized equipment or techniques. Instrumental methods have been specified only as alternative methods or alone in those cases where no other satisfactory method is available.

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 this International Standard. Correlation of such alternative procedures with the given method is the responsibility of the user. In case of disagreement in results, the method called for in the specification shall prevail. Where a requirement states "to pass test", however, alternative methods shall not be used.

Photography — Processing chemicals — Specifications for potassium hydroxide

1 Scope

This International Standard establishes criteria for the purity of photographic-grade potassium hydroxide (DANGER: << C >>)[1] and describes the tests to be used to determine the purity.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10349-1:1992, *Photography — Photographic-grade chemicals — Test methods — Part 1: General.*

ISO 10349-5:1992, *Photography — Photographic-grade chemicals — Test methods — Part 5: Determination of heavy metals and iron content.*

ISO 10349-6:1992, *Photography — Photographic-grade chemicals — Test methods — Part 6: Determination of halide content.*

ISO 10349-7:1992, *Photography — Photographic-grade chemicals — Test methods — Part 7: Determination of alkalinity or acidity.*

3 General

3.1 Physical properties

Potassium hydroxide, KOH, comes in the form of white sticks, pellets, flakes, granules or powder. It has a relative molecular mass of 56,11.

3.2 Hazardous properties

Potassium hydroxide is corrosive (DANGER: << C >>). Avoid contact with eyes, skin, and clothing. Avoid breathing dust. Refer to the Manufacturer's Material Safety Data Sheet (MSDS) for additional information.

3.3 Handling and storage

Potassium hydroxide should be stored in a properly labelled and tightly sealed plastic container. Potassium hydroxide readily absorbs moisture with the liberation of heat. Potassium hydroxide reacts violently with acids.

4 Requirements

A summary of the requirements is shown in table 1.

5 Reagents and glassware

All reagents, materials and glassware shall conform to the requirements specified in ISO 10349-1 unless otherwise noted. The hazard warning symbols used as a reminder in those steps detailing handling operations are defined in ISO 10349-1. These symbols are used to provide information to the user and are not meant to provide conformance with hazardous labelling requirements as these vary from country to country.

1) Hazard warning codes are defined in ISO 10349-1:1992, clause 4.

Table 1 — Summary of requirements

Test	Limit	Subclause	International Standard in which test method is given
Assay (as KOH)	85,0 % (*m/m*) min.	7.1	ISO 3625
Heavy metals (as Pb)	0,003 % (*m/m*) max.	7.2	ISO 10349-5
Iron (Fe)	0,000 5 % (*m/m*) max.	7.3	ISO 10349-5
Halides (as Cl^-)	0,3 % (*m/m*) max.	7.4	ISO 10349-6
Carbonate (as CO_3^{2-})	1,3 % (*m/m*) max.	7.5	ISO 3625
Appearance of solution	Clear and free from insoluble matter except for a slight flocculence	7.6	ISO 3625

NOTE — *m/m* = mass/mass

6 Sampling

See ISO 10349-1.

7 Test methods

7.1 Assay

7.1.1 Specification

Content of KOH shall be 85,0 % (*m/m*) min.

7.1.2 Reagents

7.1.2.1 Hydrochloric acid, HCl, standard volumetric solution of 1,0 mol/l (36,46 g/l)[2)3)].

7.1.2.2 Phenolphthalein indicator.

Dissolve 0,1 g of phenolphthalein in 50 ml of methanol or ethanol, then dilute to 100 ml with water.

7.1.2.3 Barium chloride solution, 100 g/l.

Dissolve 117 g of barium chloride dihydrate, $BaCl_2 \cdot 2H_2O$, in 500 ml of water, then dilute to 1 litre with water. Neutralize with 0,1 mol/l hydrochloric acid or 0,1 mol/l sodium hydroxide using phenolphthalein indicator (7.1.2.2).

7.1.2.4 Carbon-dioxide-free water.

Repeat the preparation of carbon-dioxide-free water as specified in ISO 10349-7.

7.1.3 Apparatus

Usual laboratory apparatus and, in particular, the following.

7.1.3.1 One-mark volumetric flask, of 500 ml capacity.

7.1.3.2 Burette, of 50 ml capacity.

7.1.3.3 Pipette, of 50 ml capacity.

7.1.4 Procedure

Weigh, to the nearest 0,01 g, a test portion of 19 g to 21 g and transfer to a beaker containing 250 ml of carbon-dioxide-free water (7.1.2.4). After the solid has dissolved and the solution cooled to room temperature, transfer the solution to a 500 ml volumetric flask and rinse several times with carbon-dioxide-free water (7.1.2.4). Dilute to volume with carbon-dioxide-free water. Pipette a 50 ml aliquot of the sample solution into a 500 ml glass stoppered conical flask and dilute with 200 ml of carbon-dioxide-free water. Add 5 ml of barium chloride solution (7.1.2.3). Stopper the flask and shake. Allow the mixture to stand for 5 min. Add 3 drops of phenolphthalein indicator (7.1.2.2) and titrate with hydrochloric acid (7.1.2.1) to the first disappearance of the pink colour. Retain this solution for use in the carbonate test (7.5).

2) Commercially available analysed reagent is recommended. If solutions are to be prepared, see any quantitative analytical chemistry text.

3) The solution can be prepared from hydrochloric acid, ρ = 1,18 g/ml (approximately) (DANGER: < C >< B >).

7.1.5 Expression of results

The assay, expressed as a percentage by mass of KOH, is given by

$$56{,}11 \cdot c \cdot V / m$$

where

c is the actual concentration, in moles per litre, of the hydrochloric acid solution (7.1.2.1);

V is the volume, in millilitres, of hydrochloric acid (7.1.2.1) used to reach the titration endpoint;

m is the mass, in grams, of the initial test portion;

56,11 is the conversion factor of the equivalent mass of potassium hydroxide per mole of hydrochloric acid (i.e. 56,11) × the sample ratio (i.e. 10) × the conversion factor for millilitres to litres (i.e. 0,001) × 100 (for percentage).

7.2 Heavy metals content

7.2.1 Specification

Maximum content of heavy metals shall be 0,003 % (*m/m*).

7.2.2 Procedure

NOTE 1 The standard for the iron test (7.3) is prepared in the same way as the heavy metals standard.

Determine the percentage of heavy metals in accordance with ISO 10349-5. Use a test portion of 0,90 g to 1,10 g prepared in accordance with ISO 10349-5:1992, 7.3. Use 3 ml of heavy metals standard prepared in accordance with ISO 10349-5:1992, 8.1.2.

7.3 Iron content

7.3.1 Specification

Maximum content of iron shall be 0,000 5 % (*m/m*).

7.3.2 Procedure

Determine the percentage of iron in accordance with ISO 10349-5. Use a test portion of 1,90 g to 2,10 g prepared in accordance with ISO 10349-5:1992, 7.3. Use 1 ml of iron standard prepared in accordance with ISO 10349-5:1992, 8.1.2.

7.4 Halides (as Cl^-)

7.4.1 Specification

Maximum content of halides shall be 0,3 % (*m/m*).

7.4.2 Procedure

Determine the percentage of halides (expressed as Cl^-) in accordance with ISO 10349-6.

7.5 Carbonate (as CO_3^{2-})

7.5.1 Specification

Maximum content of carbonate shall be 1,3 % (*m/m*).

7.5.2 Reagents

7.5.2.1 Hydrochloric acid, HCl, standard volumetric solution of 0,1 mol/l (3,646 g/l).

Dilute 100 ml of 1,0 mol/l hydrochloric acid (7.1.2.1) to 1 litre with carbon-dioxide-free water.

7.5.2.2 Methyl orange indicator.

Dissolve 0,1 g of methyl orange in 100 ml of water.

7.5.3 Apparatus

Usual laboratory apparatus and, in particular, the following.

7.5.3.1 Burette, of 50 ml capacity.

7.5.4 Procedure

Add two drops of methyl orange indicator (7.5.2.2) to the solution from the assay titration in 7.1 and continue the titration with the hydrochloric acid (7.5.2.1) to a permanent pink colour. The additional acid used represents carbonate.

7.5.5 Expression of results

The carbonate content, expressed as a percentage by mass, is given by the formula

$$60{,}00 \cdot c' \cdot V' / m$$

where

c' is the actual concentration, in moles per litre, of the hydrochloric acid solution (7.5.2.1);

V' is the volume, in millilitres, of the hydrochloric acid (7.5.2.1) used to reach the titration endpoint;

m is the mass, in grams, of the initial test portion;

60,00 is the conversion factor of the equivalent mass of carbonate (CO_3^{2-}) per mole of additional hydrochloric acid (i.e. 60,00) × the sample ratio (i.e. 10) × the conversion factor for millilitres to litres (i.e. 0,001) × 100 (for percentage).

7.6 Appearance of solution

7.6.1 Specification

The solution shall be clear and free from insoluble matter except for a slight flocculence.

7.6.2 Procedure

Dissolve a test portion of 10,0 g in 50 ml of water and dilute to 100 ml with water. Let this solution stand for 30 min at ambient temperature (20 °C to 27 °C). Observe the solution for colour and clarity.

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