INTERNATIONAL STANDARD

ISO 5990

Second edition
1996-10-15

Photography — Processing chemicals — Specifications for potassium sulfite, 650 g/l aqueous solution

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Photographie — Produits chimiques de traitement — Spécifications relatives au sulfite de potassium en solution aqueuse à 650 g/l

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

Reference number
ISO 5990:1996(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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

International Standard ISO 5990 was prepared by Technical Committee ISO/TC 42, *Photography*.

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b5408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

This second edition cancels and replaces the first edition (ISO 5990:1983), which has been technically revised.

© ISO 1996

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

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, 9, 11 and 12 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-6f1e-4c41-b23c-cc6e2531d80a/iso-5990-1996

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 described 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

Photography — Processing chemicals — Specifications for potassium sulfite, 650 g/l aqueous solution

1 Scope

This International Standard establishes criteria for the purity of photographic-grade potassium sulfite, 650 g/l aqueous solution, and specifies the test methods to be used to determine the purity.

2 Normative references

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-ea6e2531d80a/iso-5990-1996

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 10349-9:1992, *Photography — Photographic-grade chemicals — Test methods — Part 9: Reaction to ammoniacal silver nitrate.*

ISO 10349-11:1992, *Photography — Photographic-grade chemicals — Test methods — Part 11: Determination of specific gravity.*

ISO 10349-12:1992, *Photography — Photographic-grade chemicals — Test methods — Part 12: Determination of density.*

3 General

3.1 Physical properties

Potassium sulfite (K_2SO_3) as a 650 g/l aqueous solution has the form of a clear, colourless or almost colourless liquid. Potassium sulfite has a relative molecular mass of 158,27.

3.2 Hazardous properties

Potassium sulfite, 650 g/l aqueous solution, is not hazardous when handled with normal precautions. Avoid contact with acids.

3.3 Storage

Potassium sulfite solution shall be stored in a closed container at room temperature.

4 Requirements

A summary of the requirements is shown in table 1.

5 Reagents and materials, including 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.

6 Sampling

See ISO 10349-1.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

7 Test procedures

7.1 Assay

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

7.1.1 Specification

Content of K_2SO_3 shall be between 44,5 % (*m/m*) min. and 46,0 % (*m/m*) max.

Table 1 — Summary of requirements

Test	Limit	Subclause	International Standard in which test method is given
Assay	44,5 % (*m/m*) min. 46,0 % (*m/m*) max.	7.1	ISO 5990
Heavy metals content (as Pb)	0,002 % (*m/m*) max.	7.2	ISO 10349-5
Iron content	0,002 % (*m/m*) max.	7.3	ISO 10349-5
Reaction to ammoniacal silver nitrate	To pass test	7.4	ISO 10349-9
Specific gravity or density:			
specific gravity	1,445 min. 1,460 max.	7.5.1	ISO 10349-11
density	1,441 g/ml min. 1,457 g/ml max.	7.5.2	ISO 10349-12
pH value of (1 + 9) solution	8,0 to 10,0	7.6	ISO 5990
Thiosulfate content (as $S_2O_3^{2-}$)	0,006 % (*m/m*) max.	7.7	ISO 5990
Appearance of solution	Clear and free from insoluble matter except for a slight flocculence	7.8	ISO 5990

NOTE — *m/m* = mass/mass

7.1.2 Reagents

7.1.2.1 Iodine (I_2), standard volumetric solution of 0,05 mol/l (12,7 g/l) [1) 2)].

Weigh, to the nearest 0,001 g, 12,7 g of freshly sublimed iodine (DANGER: ⟨C⟩⟨O⟩) [3)] into a tared weighing flask. Add 36 g of potassium iodide (KI) and 100 ml of water. After solution is complete, add three drops of hydrochloric acid (7.1.2.5) (DANGER: ⟨C⟩⟨B⟩), and dilute to 1 litre at 20 °C in a volumetric flask. From the mass of iodine, m, calculate the concentration, c, in moles per litre, from

$$c = m/254$$

7.1.2.2 Sodium thiosulfate ($Na_2S_2O_3$), standard volumetric solution of 0,100 mol/l (15,8 g/l) [1)].

7.1.2.3 Salicylic acid ($HOC_6H_4CO_2H$), 1 % (10 g/l) solution.

Prepare a solution of 1 g of salicylic acid in 100 ml of water.

7.1.2.4 Starch indicator, 5 g/l solution.

Stir 5 g of soluble starch with 100 ml of 1 % salicylic acid solution (7.1.2.3). Then add 300 ml to 400 ml of boiling water and boil until the starch dissolves. Finally dilute to 1 000 ml with water.

7.1.2.5 Hydrochloric acid (HCl), $\rho \approx 1{,}18$ g/ml (DANGER: ⟨C⟩⟨B⟩).

7.1.3 Apparatus

iTeh STANDARD PREVIEW
(standards.iteh.ai)

7.1.3.1 Burette, of 50 ml capacity.

7.1.3.2 Pipette, of 25 ml capacity.

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

7.1.3.3 Pipette, of 50 ml capacity.

7.1.3.4 Magnetic stirrer and bar

7.1.4 Procedure

Use either the back-titration method (7.1.4.1) or the direct-titration method (7.1.4.2).

7.1.4.1 Back-titration method

Using a pipette (7.1.3.2), deliver 25,00 ml of the iodine solution (7.1.2.1) into a glass stoppered flask. Weigh, to the nearest 0,000 1 g, a test portion of about 0,25 g and wash this into the flask. Add 5 ml of the hydrochloric acid (7.1.2.5) and titrate with the sodium thiosulfate (7.1.2.2) using the burette (7.1.3.1). Add 2 ml of the starch indicator (7.1.2.4) just before the endpoint.

7.1.4.2 Direct-titration method

Weigh, to the nearest 0,000 1 g, a test portion of about 0,90 g. Using a pipette (7.1.3.3), deliver 50,00 ml of the iodine solution (7.1.2.1) into a completely dry 250 ml beaker that contains a magnetic stirring bar (7.1.3.4). While stirring the iodine solution in the beaker, wash the test sample into the centre of the beaker. Avoid contact of the sample with the sides of the beaker.

---

1) Commercially available analysed reagent solutions are recommended.

2) If solutions are to be prepared, see any quantitative analytical chemistry text. It is recommended that self-prepared iodine solutions be standardized before use.

3) Hazard warning codes are defined in ISO 10349-1.

If the iodine is not decolorized after the sample addition, discard the trial and restart the procedure. If necessary, increase the test portion by 0,10 g.

Wash down the side walls of the beaker using about 2 ml of the starch indicator (7.1.2.4). Immediately titrate with the iodine solution (7.1.2.1) to the first permanent light-purple colour. Wash any iodine solution remaining on the burette tip into the solution with deionized water.

If the titration exceeds 10 ml, repeat the test as this can result in test results lower than the actual assay. Adjust the sample appropriately.

7.1.5 Calculations

7.1.5.1 Back-titration method

The assay, expressed as a percentage by mass of K_2SO_3, is given by

$$7{,}914(c_1 \cdot 50 - c_2 \cdot V_2)/m$$

where

c_1 is the actual concentration, in moles per litre, of the iodine solution (7.1.2.1);

c_2 is the actual concentration, in moles per litre, of the sodium thiosulfate (7.1.2.2);

V_2 is the volume, in millilitres, of the sodium thiosulfate used for titration;

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

50 is twice the volume, in millilitres, of I_2 solution added (7.1.4.1);

7,914 is the conversion factor obtained from the mass of potassium sulfite equivalent to 1 mole of iodine (79,14) × the conversion factor for millilitres to litres (i.e. 0,001) × 100 (for percentage).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

7.1.5.2 Direct-titration method

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/613408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

The assay, expressed as a percentage by mass of K_2SO_3, is given by

$$15{,}827 \cdot c_1(50 + V_1)/m$$

where

c_1 is the actual concentration, in moles per litre, of the iodine solution (7.1.2.1);

V_1 is the volume, in millilitres, of the iodine solution used for the titration;

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

50 is the volume, in millilitres, of I_2 solution added (7.1.4.2);

15,827 is the conversion factor obtained from the mass of potassium sulfite equivalent to 1 mole of iodine (15,827) × 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 0,002 % (*m*/*m*).

7.2.2 Procedure

NOTE — 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 1,90 g to 2,10 g, prepared in accordance with ISO 10349-5:1992, 7.3. Use 4 ml of the 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 0,002 % (*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 4 ml of the iron standard prepared in accordance with ISO 10349-5:1992, 8.1.2.

7.4 Reaction to ammoniacal silver nitrate

7.4.1 Specification

To pass test.

7.4.2 Procedure

Determine the reaction to ammoniacal silver nitrate in accordance with ISO 10349-9.

7.5 Specific gravity or density

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Either the specific gravity or density is required for conformance.

7.5.1 Specific gravity

ISO 5990:1996
https://standards.iteh.ai/catalog/standards/sist/6b3408df-681e-4c41-b25c-cc6e2531d80a/iso-5990-1996

7.5.1.1 Specification

The specific gravity shall be between 1,445 min. and 1,460 max.

7.5.1.2 Procedure

Determine the specific gravity in accordance with ISO 10349-11, using a hydrometer which includes the range 1,4 to 1,5.

7.5.2 Density

7.5.2.1 Specification

The density shall be between 1,441 g/ml min. and 1,457 g/ml max.

7.5.2.2 Procedure

Determine the density in accordance with ISO 10349-12.

7.6 pH value

7.6.1 Specification

The pH shall be between 8,0 and 10,0.