

---

---

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

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

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

[ISO 5990:2000](https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000)

<https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000>



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

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

ISO 5990:2000

<https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000>

© ISO 2000

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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

## Contents

Page

Foreword.....	iv
Introduction.....	v
1 Scope .....	1
2 Normative references .....	1
3 General.....	1
3.1 Physical properties.....	1
3.2 Hazardous properties.....	1
3.3 Storage.....	1
4 Requirements .....	2
5 Reagents and glassware.....	2
6 Sampling.....	2
7 Test methods.....	2
7.1 Assay .....	2
7.2 Mass fraction of heavy metals.....	5
7.3 Mass fraction of iron.....	5
7.4 Reaction to ammoniacal silver nitrate.....	5
7.5 Specific gravity or density .....	5
7.6 pH value .....	6
7.7 Mass fraction of thiosulfate (as $S_2O_3^{2-}$ ).....	6
7.8 Appearance of solution.....	7

## 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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This third edition cancels and replaces the second edition (ISO 5990:1996), of which it constitutes a technical revision.

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

[ISO 5990:2000](https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000)

<https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000>

## Introduction

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 ISO 10349-1.

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 and, in some cases, other protective apparel such as rubber gloves, face masks or aprons. Normal precautions for the safe performance of any chemical procedure must be exercised at all times, but specific details have been provided for hazardous materials. Hazard warnings designated by a letter enclosed in angle brackets “ $\langle \rangle$ ” 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.

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 to be the minimum requirements necessary to ensure 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 that 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.

Efforts have been made to employ tests that are capable of being run in any normally equipped laboratory and, wherever possible, to avoid tests that 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 the case of disagreement in results, the method called for in the specification should prevail. Where a requirement states “to pass test”, however, alternative methods should not be used.

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

ISO 5990:2000

<https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000>

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

## 1 Scope

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

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 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 ( $K_2SO_3$ ), 650 g/l aqueous solution, is 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.

**Table 1 — Summary of requirements**

Test	Limit	Subclause	International Standard in which test method is given
Assay	Minimum: 44,5 % Maximum: 46,0 %	7.1	ISO 5990
Mass fraction of heavy metals (as Pb)	Maximum: 0,002 %	7.2	ISO 10349-5
Mass fraction of iron (Fe)	Maximum: 0,002 %	7.3	ISO 10349-5
Reaction to ammoniacal silver nitrate	To pass test	7.4	ISO 10349-9
Specific gravity or density:			
specific gravity	Minimum: 1,445 Maximum: 1,460	7.5.1	ISO 10349-11
density	Minimum: 1,441 g/ml Maximum: 1,457 g/ml	7.5.2	ISO 10349-12
pH value of (1 + 9) solution	8,0 to 10,0	7.6	ISO 5990
Mass fraction of thiosulfate (as S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> )	Maximum: 0,006 %	7.7	ISO 5990
Appearance of solution	Clear and free from insoluble matter except for a slight flocculence	7.8	ISO 5990

## 5 Reagents and glassware

ISO 5990:2000

<https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1729789431e0/iso-5990-2000>

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.

## 7 Test methods

### 7.1 Assay

#### 7.1.1 Specification

The mass fraction of potassium sulfite shall be between 44,5 % and 46,0 %.

#### 7.1.2 Reagents

##### 7.1.2.1 Hydrochloric acid (HCl), $\rho \approx 1,18$ g/ml (DANGER: (B)(C))<sup>1)</sup>.

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



**7.1.2.2 Potassium iodide (KI).**

**7.1.2.3 Iodine,**  $c(I_2) = 0,05 \text{ mol/l}$  ( $12,7 \text{ g/l}$ )<sup>2) 3)</sup>.

Weigh, to the nearest 0,001 g, 12,7 g of freshly sublimed iodine (DANGER: <C><O>) into a tared weighing flask. Add 36 g of potassium iodide (7.1.2.2) and 100 ml of water. After solution is complete, add three drops of hydrochloric acid (7.1.2.1) (DANGER: <B><C>), 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

$$c = \frac{m}{254}$$

**7.1.2.4 Sodium thiosulfate,**  $c(Na_2S_2O_3) = 0,100 \text{ mol/l}$  ( $15,8 \text{ g/l}$ )<sup>2)</sup>.

NOTE This solution is not required for the direct-titration method (7.1.4.3).

**7.1.2.5 Salicylic acid,**  $c(HOC_6H_4COOH) = 1 \%$  ( $10 \text{ g/l}$ ).

**7.1.2.6 Starch indicator,** 5 g/l solution.

Stir 5 g of soluble starch into 100 ml of 1 % salicylic acid solution (7.1.2.5). Add 300 ml of this solution to 400 ml of boiling water. Boil until the starch dissolves and dilute to 1 litre with water.

### 7.1.3 Apparatus

iTeh STANDARD PREVIEW

**7.1.3.1 Burette,** of capacity 50 ml. (standards.iteh.ai)

**7.1.3.2 Pipette,** of capacity 25 ml.

**7.1.3.3 Pipette,** of capacity 50 ml. <https://standards.iteh.ai/catalog/standards/sist/96fea0f8-1b0f-439c-bda1-1798b863b3e0/iso-5990-2000>

**7.1.3.4 Magnetic stirrer and bar,** for the direct-titration method (7.1.4.3).

### 7.1.4 Procedure

#### 7.1.4.1 Introduction

Use either the back-titration method (7.1.4.2) or the direct-titration method (7.1.4.3).

#### 7.1.4.2 Back-titration method

Using a pipette (7.1.3.2), transfer 25,00 ml of the iodine solution (7.1.2.3) to 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 (7.1.2.1) (DANGER: <B><C>) and, using a burette (7.1.3.1), titrate with the sodium thiosulfate solution (7.1.2.4), adding 2 ml of the starch indicator (7.1.2.6) just before the endpoint.

#### 7.1.4.3 Direct-titration method

Weigh, to the nearest 0,000 1 g, a test portion of 0,90 g. Using a pipette (7.1.3.3), transfer 50,00 ml of the iodine solution (7.1.2.3) to a completely dry 250 ml beaker that contains a magnetic stirring bar (7.1.3.4). While stirring the

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

3) It is recommended that self-prepared iodine solutions be standardized before use.