
**Fireworks — Test methods for
determination of specific chemical
substances —**

**Part 7:
Chlorates content by chemical
titration analysis**

*Artifices de divertissement — Méthodes d'essai pour la détermination
de substances chimiques spécifiques —*

Partie 7: Teneur en chlorates par analyse chimique par titrage

ISO 22863-7:2021

<https://standards.itech.ai/catalog/standards/iso/99b504aa-bc3b-4891-8c37-1288d123e5f2/iso-22863-7-2021>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 22863-7:2021

<https://standards.iteh.ai/catalog/standards/iso/99b504aa-bc3b-4891-8c37-1288d123e5f2/iso-22863-7-2021>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

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
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle of the method	1
5 Safety Requirements	1
6 Reagents	2
7 Apparatus	2
8 Preparations	3
9 Analysis	3
9.1 General.....	3
9.2 Qualitative analysis.....	3
9.2.1 Sample size.....	3
9.2.2 Digestion process.....	3
9.3 Quantitative analysis.....	3
9.3.1 Sample size.....	3
9.3.2 General requirement.....	3
9.3.3 Test procedure.....	3
9.3.4 Calculations.....	4
9.3.5 Accuracy.....	4
10 Test report	4

ISO 22863-7:2021

<https://standards.itech.ai/catalog/standards/iso/99b504aa-bc3b-4891-8c37-1288d123e5f2/iso-22863-7-2021>

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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 264, *Fireworks*.

A list of all the parts in the ISO 22863 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.

Fireworks — Test methods for determination of specific chemical substances —

Part 7: Chlorates content by chemical titration analysis

1 Scope

This document specifies the qualitative and quantitative analysis methods for the determination of the chlorates content in pyrotechnic compositions by chemical titration analysis, with the minimum detection limit (Cl O_3^{-1}) of 1 000 mg/kg.

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 22863-1, *Fireworks — Test methods for determination of specific chemical substances — Part 1: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22863-1 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/>

4 Principle of the method

Qualitative analysis: if any, the chlorates in the sample are dissolved in water, and then the presence of chlorates is detected by special coloration reaction of aniline hydrochloride under strong acidic conditions.

Quantitative analysis: After the sample is extracted by ethanol, the chlorate(s) is(are) dissolved in hot water and reacted totally with an excess of ammonium ferrous sulphate solution. The remaining content of ammonium ferrous sulphate in the sample test solution is then titrated by a potassium dichromate standard solution. The initial content of chlorate in the sample test solution is calculated from the difference between (1) the volume of consumed potassium dichromate standard solution in the sample solution titration and (2) the volume of consumed potassium dichromate in a blank titration of a solution that contains the same quantity of ammonium ferrous sulphate as added to the sample test solution.

5 Safety Requirements

Laboratory operations should comply with appropriate safety requirements: peculiarly, for flammable, explosive, highly toxic and other dangerous materials and samples as well as strong acids, strong alkali and other corrosive materials, operators should wear appropriate protection equipment and follow appropriate safety rules.

Special measures should be taken for contingencies or uncontrollable reactions.

6 Reagents

Unless otherwise stated, only confirmed as analytical reagent, distilled water or deionized water or equivalent purity water shall be used.

6.1 Hydrochloric acid ($\rho = 1,19$ g/ml)

6.2 Aniline Hydrochloride Solution: 5 g of aniline hydrochloride dissolved in 50 ml of hydrochloride acid (6.1)

6.3 Ethanol Solution (1 part Ethanol + 1 part water)

6.4 Barium chloride solution (15 g of barium chloride + 3 g of potassium hydroxide dissolved in 100 ml of water)

6.5 Sulfuric acid ($\rho = 1,84$ g/ml)

6.6 Phosphoric acid ($\rho = 1,87$ g/ml)

6.7 Ammonium Ferrous Sulphate Solution (39,2 g/l)

6.8 Mixed acid (20 ml) of sulfuric acid (6.5) and 5 ml of phosphoric acid (6.6) (slowly added in 50 ml of water, cooled before use)

6.9 Sodium di-aniline sulfonate solution 0,5 % (0,5 g of sodium di-aniline sulfonate dissolved in 100 ml of water, add 1 drop of sulfuric acid (6.5))

6.10 Potassium dichromate: pure (primary standard reagent quality)

6.11 Potassium dichromate standard titration solution: $c(1/6 \text{ K}_2\text{Cr}_2\text{O}_7) = 0,1$ mol/l, prepared as follows:

Place 4,9035 g of potassium dichromate in a 250 ml beaker, add the right amount of water until complete dissolution, and then place all into the 1 000 ml volume bottle, add water to the scale, mix evenly.

7 Apparatus

7.1 Analytical Balance: accuracy 0,1 mg

7.2 Filter Paper

7.3 Beaker: 200 ml

7.4 Electric hot plate: capable of reaching 300 °C

7.5 Sand core crucible: filter: aperture $3 \mu\text{m} \sim 4 \mu\text{m}$

7.6 Suction filter bottle: 500 ml

7.7 Volume bottle: 250 ml