

INTERNATIONAL
STANDARD

ISO
10136-5

First edition
1993-07-01

ANSI Internat Doc Sec

Glass and glassware — Analysis of extract solutions —

Part 5:

Determination of iron(III) oxide by molecular absorption spectrometry and flame atomic absorption spectrometry

Verre et verrerie — Analyse des solutions d'attaque —

Partie 5: Dosage de l'oxyde de fer(III) par spectrométrie d'absorption moléculaire et par spectrométrie d'absorption atomique dans la flamme



Reference number
ISO 10136-5:1993(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 10136-5 was prepared by Technical Committee ISO/TC 48, *Laboratory glassware and related apparatus*, Sub-Committee SC 5, *Quality of glassware*.

ISO 10136 consists of the following parts, under the general title *Glass and glassware — Analysis of extract solutions*:

- *Part 1: Determination of silicon dioxide by molecular absorption spectrometry*
- *Part 2: Determination of sodium oxide and potassium oxide by flame spectrometric methods*
- *Part 3: Determination of calcium oxide and magnesium oxide by flame atomic absorption spectrometry*
- *Part 4: Determination of aluminium oxide by molecular absorption spectrometry*
- *Part 5: Determination of iron(III) oxide by molecular absorption spectrometry and flame atomic absorption spectrometry*
- *Part 6: Determination of boron(III) oxide by molecular absorption spectrometry*

Annex A of this part of ISO 10136 is for information only.

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Printed in Switzerland

Introduction

All silicate glasses contain some iron, although in very low concentrations, and in certain usages some of this iron can be released into the contents of a glass container. There may be serious consequences, for instance when solutions are sterilized by autoclaving after they have been poured into a container, or when solutions are stored (even at ambient temperatures) for long periods of time. Iron may be released into the extract solutions produced during hydrolytic resistance tests and, because the concentration will be very low, a very sensitive test method is required for its determination.

Technical Committee 2, Chemical Durability and Analysis, of the International Commission on Glass (ICG), investigated the problem (see [6] in annex A) and considered flame-emission, flame atomic absorption and two molecular absorption spectrometric methods, using *ortho*-phenanthroline and bathophenanthroline. As a result of these deliberations, it was considered that the bathophenanthroline method probably offered the greatest sensitivity and freedom from interferences. Nine laboratories participated in the round-robin study to develop recommended procedures using both molecular absorption and flame atomic absorption spectrometry.

The results of investigations on turbidities, especially in grain test solutions, showed that acidification to dissolve possible hydroxides and/or carbonates is necessary prior to the analytical determination. This is achieved by using spectroscopic buffer solutions, which are normally strongly acidic, or by addition of acids.