INTERNATIONAL STANDARD

ISO 10136-6

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Glass and glassware — Analysis of extract solutions —

Part 6:
Determination of boron(III) oxide by molecular absorption spectrometry

Verre et verrerie — Analyse des solutions d'attaque —

Partie 6: Dosage de l'oxyde de bore(III) par spectrométrie d'absorption moléculaire

Reference number
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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 10136-6 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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Introduction

The amounts of boron(III) oxide (B_2O_3) extracted from glass and glassware during hydrolytic resistance tests are normally very small, even from heat-resisting borosilicate glass 3.3 used for making laboratory ware. Therefore, neither macro-titration methods nor flame atomic absorption spectrometry are suitable for its determination, so recourse shall be made to colorimetric techniques using measurement by molecular absorption spectrometry. Boron(III) oxide forms coloured complexes with a number of organic reagents, but those most commonly used are curcumin, 1,1'-dianthrimide, carminic acid, quinalizarin, and for some years azomethine H.

Technical Committee 2, Chemical Durability and Analysis, of the International Commission on Glass (ICG), examined the determination of boron(III) oxide using all of these reagents (see [7] in annex A) and recommended the procedure using azomethine H, after consideration of all of the results and comments received. In a round-robin examination involving eleven laboratories, the participants were provided with a homogeneous extract solution obtained from ordinary borosilicate glass containers using an autoclave process according to ISO 4802. The results obtained were considered to be very satisfactory.

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.