INTERNATIONAL STANDARD

ISO 10136-1

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Glass and glassware — Analysis of extract solutions —

Part 1:
Determination of silicon dioxide by molecular absorption spectrometry

Verre et verrerie — Analyse des solutions d'attaque —

Partie 1: Dosage du dioxyde de silicium 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 10136-1 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 determination of silica (SiO_2) in durability extract solutions has not, hitherto, been included in classifications of glass or glassware according to chemical resistance. Indeed, in many applications the concentrations of silica found in such extract solutions, normally very low, are not significant and are of little interest. There are occasions where such releases could be important, for example from glassware used in the determination of small concentrations of silica in solutions or, in some cases, releases from medical and pharmaceutical ware. Then again, in examining the properties of new glass compositions it could be an advantage to know the full analysis of the durability extract solutions.

Technical Committee 2, Chemical Durability and Analysis, of the International Commission on Glass (ICG), investigated two procedures for determining silica (see [6] in annex A) by the molecular absorption spectrometric technique. Both were based on the formation of colour complexes in the presence of ammonium molybdate, one using the yellow colour of the complex formed, the other using the blue colour produced when a suitable reducing agent is added. In collaborative experimental work, twelve laboratories analysed silica in two synthetic solutions and in extract solutions produced by the test described in ISO 4802[3][4]. It was agreed that whilst determinations using the yellow complex were more consistent, they were also less sensitive and, since the concentrations of silica in extract solutions are normally very low, the blue complex method was preferred.

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.