



# Certificate of Analysis

## Standard Reference Material<sup>®</sup> 1830

### Soda-Lime Float Glass (0.1 % Al<sub>2</sub>O<sub>3</sub>)

(In Cooperation with ASTM)

This Standard Reference Material (SRM) is intended for use in checking chemical methods of analysis and in calibrating instrumental methods of analysis. A unit of SRM 1830 consists of three platelets each measuring 38 mm square. The certified values are listed in Table 1 and represent the present best estimate of the “true value” based on the results of the cooperative program for certification. All values are reported as mass fractions [1].

The uncertainties listed are expressed as “combined uncertainties” calculated according to the ISO and NIST Guides [2]. Each uncertainty is based on the 95 % confidence limit of the “true value”, and is intended to represent the combined effect of uncertainty components associated with various analytical factors such as method imprecision, possible systematic errors among methods, and material variability.

Table 1. Certified Mass Fractions

Constituent	Mass Fraction (in %)		
SiO <sub>2</sub>	73.07 <sup>(a,l)</sup>	±	0.04
Na <sub>2</sub> O	13.75 <sup>(a,m,c,f)</sup>	±	0.06
CaO	8.56 <sup>(a,m,g,k)</sup>	±	0.06
MgO	3.90 <sup>(a,m,i,k)</sup>	±	0.04
SO <sub>3</sub>	0.26 <sup>(a,b)</sup>	±	0.01
Al <sub>2</sub> O <sub>3</sub>	0.12 <sup>(a,m,c,d,j)</sup>	±	0.02
Fe <sub>2</sub> O <sub>3</sub> (total iron as)	0.121 <sup>(a,m,h)</sup>	±	0.003
FeO	0.032 <sup>(a)</sup>	±	0.004
K <sub>2</sub> O	0.04 <sup>(a,c,m,e)</sup>	±	0.01
TiO <sub>2</sub>	0.011 <sup>(a,d,h)</sup>	±	0.001

**Methods Used:** The primary procedures used in the analysis of this SRM are those recommended for referee analysis in ASTM C 169 Standard Methods for Chemical Analysis of Soda-Lime and Borosilicate Glass. All methods used in the certification of SRM 1830 are cited in Table 1.

<sup>(a)</sup> ASTM C 169 referee analysis	<sup>(l)</sup> Magnesium Uranyl Acetate	<sup>(k)</sup> Complexometric
<sup>(b)</sup> Combustion	<sup>(m)</sup> KMnO <sub>4</sub> Titration	<sup>(l)</sup> Gravimetric (Single-Dehydration)
<sup>(c)</sup> Flame Emission	<sup>(h)</sup> X-ray Fluorescence	<sup>(m)</sup> Atomic Absorption
<sup>(d)</sup> Spectrophotometry	<sup>(i)</sup> Gravimetric (8-Hydroxyquinoline)	<sup>(n)</sup> Gravimetric (Double Precipitate)
<sup>(e)</sup> Butyl Alcohol, HClO <sub>4</sub>	<sup>(j)</sup> Gravimetric (Single Precipitation)	

**Expiration of Certification:** The certification of SRM 1830 is valid indefinitely, within the measurement uncertainty specified, provided the SRM is handled in accordance with instructions given in this certificate (see “Instructions for Use”). Accordingly, periodic recertification of this SRM is not required. However, the certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

The technical and support aspects involved in the original preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by W.P. Reed and R.K. Kirby.

Carlos A. Gonzalez, Chief  
Chemical Sciences Division

Gaithersburg, MD 20899  
Certificate Issue Date: 04 December 2012  
Certificate Revision History on Last Page

Robert L. Watters, Jr., Director  
Office of Reference Materials

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

**Maintenance of SRM Certification:** NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

## INSTRUCTIONS FOR USE

**CAUTION:** (1) Before using the SRM in checking chemical analysis, it must be ground in agate to -200 mesh. (2) Before measuring with X-ray fluorescence, at least 30  $\mu\text{m}$  of the surface should be removed by polishing because this glass was made by a float process and may have a thin film of tin on one surface.

**Homogeneity<sup>(1)</sup>:** This material was tested for homogeneity at NIST by P.A Pella and R.L. Myklebust of the NIST division formally known as Analytical Chemistry Division using X-ray fluorescence spectrometry. Three to five replicate measurements were made on at least 10 elements in each of 15 samples chosen at random from the lot of material. The results did not indicate any significant difference between the samples (for instance, the relative standard deviation for calcium was found to be less than 0.1 %) other than that caused by the thin film of tin.

The material for this SRM was prepared and furnished to NIST by Libbey-Owens-Ford Company, Toledo, OH.

Development of this SRM is part of the program of ASTM Subcommittee C14.91 on Standard Reference Materials, H.E. Hagy, Chairman. The overall direction and coordination of the cooperative analyses leading to certification originally and in revision to include iron oxide were performed by G.D. Bowling, Chairman of ASTM Subcommittee C14.02 on Chemical Properties and Analysis of Glass and Glass Products.

Cooperative analyses for certification were performed in the following laboratories:

Anchor Hocking Corp., Lancaster, OH  
Broadway Glass Co., Inc., Brockway, PA  
Corning Glass Works, Corning, NY  
Emhart Industries, Inc., Windsor, CT  
Ford Motor Co., Lincoln Park, MI  
Libbey-Owens-Ford Co., Toledo, OH

Monarch Analytical Laboratories, Inc., Toledo, OH  
Owens-Corning Fiberglass Corp., Granville, OH  
Owens-Illinois, Inc., Toledo, OH and Vineland, NJ  
Pennsylvania State University, University Park, PA  
Schott Glass Technologies, Inc., Duryea, PA  
Sharp-Schurtz Co., Lancaster, PA  
Thatcher Glass Co., Elmira, NY

## REFERENCES

- [1] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*; NIST Special Publication 811; U.S. Government Printing Office: Washington, DC (2008); available at <http://www.nist.gov/pml/pubs/sp811/indexfull.cfm> (accessed Dec 2012).
- [2] JCGM 100:2008; *Evaluation of Measurement Data - Guide to the Expression of Uncertainty in Measurement* (ISO GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (2008); available at [http://www.bipm.org/utls/common/documents/jcgm/JCGM\\_100\\_2008\\_E.pdf](http://www.bipm.org/utls/common/documents/jcgm/JCGM_100_2008_E.pdf) (accessed Dec 2012); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at <http://www.nist.gov/pml/pubs/index.cfm> (accessed Dec 2012).

<b>Certificate Revision History:</b> 04 December 2012 (Updated unit description; editorial changes); 22 December 2008 (Editorial revision); 18 October 2005 (Removal of Table 2 and updated uncertainty values); 10 September 19991 (Iron oxide added); 18 July 1982 (Original certificate date).
---

*Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet at <http://www.nist.gov/srm>.*

<sup>(1)</sup> Certain commercial equipment, instruments or materials are identified in this certificate to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.