



# National Institute of Standards & Technology

## Certificate of Analysis

Standard Reference Materials 76a, 77a, and 78a

### Burnt Refractories

(In Cooperation with the American Society for Testing and Materials)

These Standard Reference Materials (SRMs) are in the form of fine powder (<0.15 mm) and are intended for use in checking chemical methods of analysis and in calibration with instrumental methods of analysis.

SRM No./ Constituent	76a	77a	78a
	Percent by Weight		
SiO <sub>2</sub>	54.9	35.0	19.4
Al <sub>2</sub> O <sub>3</sub>	38.7	60.2	71.7
Fe <sub>2</sub> O <sub>3</sub>	1.6 <sub>0</sub>	1.0 <sub>0</sub>	1.2
TiO <sub>2</sub>	2.0 <sub>3</sub>	2.6 <sub>6</sub>	3.2 <sub>2</sub>
MgO	0.52	0.38	0.70
CaO	0.22	0.05	0.11
K <sub>2</sub> O	1.33	0.09 <sub>0</sub>	1.22
Na <sub>2</sub> O	0.07	0.037	0.078
P <sub>2</sub> O <sub>5</sub>	0.12 <sub>0</sub>	0.092	1.3
Li <sub>2</sub> O	0.042	0.02 <sub>5</sub>	0.12
SrO	0.037	0.009	0.25
Loss on Ignition	(0.34) <sup>b</sup>	(0.22)	(0.42)

<sup>a</sup> Based on samples dried at 105 °C for one hour.

<sup>b</sup> A figure in parenthesis is not certified but is given for additional information on the composition.

**CERTIFICATION:** The value listed for a certified constituent is the *present best estimate* of the "true" value based on the results of the analytical program. The value is not expected to deviate from the "true" value by more than  $\pm 1$  in the last significant figure reported. For a subscript figure, the deviation is not expected to be more than  $\pm 5$ . Based on the results of the homogeneity testing, maximum variations within and among samples are estimated to be less than the uncertainty figures given above.

*This Certificate of Analysis has undergone editorial revision to reflect program and organizational changes at NIST and at the Department of Commerce. No attempt was made to reevaluate the certificate values or any technical data presented in this certificate.*

Gaithersburg, MD 20899  
March 20, 1992  
(Revision of certificate dated 5-8-85)

William P. Reed, Chief  
Standard Reference Materials Program

(over)

PLANNING, PREPARATION, TESTING AND ANALYSIS: These replacements for the original Burnt Refractory SRMs were especially prepared and provided to NIST by Harbison-Walker Refractories Company, Garber Research Center, Pittsburgh, PA, through the efforts of Dr. R.K. Scott.

Carefully selected raw materials were batched to form extruded dobies. The dobies were air dried, oven dried at 120 °C, and then fired at 1427 °C for ten hours in kilns. The fired dobies were crushed and ground and converted to the fine powder product by air classification. Ninety-five percent (95%) of the classified material was  $-45\ \mu\text{m}$  (-325 mesh). The final products were mixed in a blender. At NIST, each of the materials was reblended and resieved.

Homogeneity testing by chemical analyses was performed at NIST by K.M. Sappenfield on selected samples representative of each lot of material for the key constituents,  $\text{SiO}_2$  and  $\text{Fe}_2\text{O}_3$ .

Standard Deviation of a Single Determination (in wt. %), n=7

Constituent	76a	77a	78a
$\text{SiO}_2$	0.09	0.06	0.08
$\text{Fe}_2\text{O}_3$	0.03 <sub>7</sub>	0.03 <sub>4</sub>	0.03 <sub>8</sub>

Cooperative analyses for certification were performed in the analytical laboratories at Harbison-Walker Refractories Company, Pittsburgh, PA, R.K. Scott and J. Ryan; and at Pennsylvania State University, College of Earth and Mineral Sciences, University Park, PA, N.H. Suhr, J.C. Devine, and J.B. Bodkin.

Analyses were performed in the NIST Inorganic Analytical Research Division by R.K. Bell, O. Menis, T.C. Rains, T.A. Rush, K.M. Sappenfield, M.A. Waguespack, and S.A. Wicks.

The overall responsibility for the technical measurements at NIST was under the direction of W.R. Shields, I.L. Barnes, and O. Menis. The final coordination of the technical measurements was under the direction of J.I. Shultz, Research Associate, ASTM/NIST Research Associate Program.

The technical and support aspects involved in the preparation, certification, and issuance of these SRMs were coordinated through the Standard Reference Materials Program by R.E. Michaelis. Revision of this certificate was coordinated through the Standard Reference Materials Program by J.S. Kane.