



National Institute of Standards & Technology

Certificate

Standard Reference Material 278

Obsidian Rock

This Standard Reference Material (SRM) is intended for use in evaluating the accuracy of analytical methods and instruments used in the analysis of geological type materials. SRM 278 is a finely powdered obsidian rock, which was obtained from Clear Lake, Newberry Crater, Oregon.

Certified Values of Constituents

The concentrations of the constituents were determined by methods that are widely used in the field of geological analysis and have a demonstrated accuracy. The values given are "certified" values, i.e., those values that were determined by either a definitive method, reference method, or by two or more independent methods, and "information" values that were determined by single or non-reference methods. The certified values are given in Table 1.

Table 1. Certified Values of Constituents

<u>Constituent¹</u>	<u>Content², wt %</u>	<u>Constituent¹</u>	<u>Content²,mg/Kg</u>
Al ₂ O ₃ ^d	14.15 ± 0.15	Cu ^e	5.9 ± 0.2
CaO ^e	0.983 ± 0.002	Ni ^e	3.6 ± 0.3
FeO ⁱ	1.36 ± 0.02	Rb ^{a,e}	127.5 ± 0.3
Fe ₂ O ₃ ^{i,f}	2.04 ± 0.02	Sr ^e	63.5 ± 0.1
(Total Fe as Fe ₂ O ₃)			
K ₂ O ^{a,d,e}	4.16 ± 0.02	Th ^{e,f}	12.4 ± 0.3
MnO ^{b,f}	0.052 ± 0.002	Tl ^e	0.54 ± 0.04
Na ₂ O ^{a,d,f}	4.84 ± 0.05	U ^e	4.58 ± 0.04
P ₂ O ₅ ^{b,d}	0.036 ± 0.003	Pb ^e	16.4 ± 0.2
SiO ₂	73.05 ± 0.13		
TiO ₂ ^{b,g}	0.245 ± 0.007		

¹Methods of Analysis: codes are identified in table 2.

²The estimated uncertainties of the certified values are based on judgment and represent an evaluation of the combined effects of method imprecision, possible systematic errors among methods and material variability of 250 mg or more. (No attempt was made to derive exact statistical measures of imprecision because several methods were involved in the determination of most constituents.)

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 value or any technical data presented in this certificate.

Gaithersburg, MD 20899
March 27, 1992
(Revision of certificate dated 8-19-81)

William P. Reed, Chief
Standard Reference Materials Program

(over)

The overall direction and coordination of the technical measurements leading to certification were performed in the Inorganic Analytical Research Division by E.L. Garner.

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

The constituents given in Table 2 are *not certified* but are included for information only.

Table 2. Information Values

<u>Constituent¹</u>	<u>Content, wt %</u>	<u>Constituent¹</u>	<u>Content, mg/Kg</u>
C (Total Carbon) ^j	(0.05)	Ba ^f	(1140)
CO ₂ ^d	(0.01)	B ^g	(25)
F ^h	(0.05)	Ce ^f	(62.2)
MgO ^d	(0.23)	Co ^f	(1.5)
		Cr ^f	(6.1)
		Cs ^f	(5.5)
		Eu ^f	(0.84)
		Gd ^g	(5.3)
		Hf ^f	(8.4)
		Lu ^f	(0.73)
		Sb ^f	(1.5)
		Sc ^f	(5.1)
		Sm ^{f,g}	(5.7)
		Ta ^f	(1.2)
		Tb ^f	(1.0)
		Yb ^f	(4.5)
		Zn ^f	(55)

¹Methods of Analysis:

^aAtomic Absorption

^bColorimetry

^cEmission Spectrometry

^dGravimetry

^eIsotope Dilution Mass Spectrometry

^fNeutron Activation Analysis

^gPrompt-gamma Activation Analysis

^hSpecific Ion Electrode Potentiometry

ⁱTitrimetry

^jVolumetry

Supplemental Information

Preparation

The material was processed by the Colorado School of Mines, Colorado. Approximately 350 lbs of obsidian rock were crushed, ground, and sieved to <200 mesh. The material was mixed in a cone blender to ensure homogeneity. For homogeneity, testing and certification, samples were randomly chosen and analyzed for both major and minor constituents. The inhomogeneity of this material is considered to be $\leq 2\%$ relative.

Analysis

SRM 278, a natural glass, is hygroscopic and contains water that cannot be driven off by drying at low temperatures. This material will pick up additional water on exposure to the atmosphere. Thus, exposure time should be kept to a minimum. Furthermore, the sample should be ignited to a constant weight in a muffle furnace or over a small flame at a temperature between 350-600 °C prior to analysis. This procedure will ensure the accurate and precise determination of SiO₂, K₂O, Na₂O, Al₂O₃ and possibly other major constituents.

The analysts and laboratories cooperating in the analytical program for certification were:

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