

National Bureau of Standards

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 I.

Table I. Certified Values of Constituents

Constituent ¹	Content ² (wt %)	Constituent ¹	Content ² wt (μg/g)
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} (Total Fe as Fe ₂ O ₃)	2.04 ± 0.02	Sr ^e	63.5 ± 0.1
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 ^d	73.05 ± 0.13		
TiO ₂ ^{b,g}	0.245 ± 0.007		

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

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.)

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

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by T. E. Gills.

Washington, D.C. 20234
 August 19, 1981

George A. Uriano, Chief
 Office of Standard Reference Materials

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Supplemental Information

Preparation

The material was processed by the Colorado School of Mines, Golden, 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. 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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The constituents given in Table 2 are *not certified* but are included for information only.

Table 2. Information Values

<u>Constituent</u> ¹	<u>Content wt %</u>	<u>Constituent</u> ¹	<u>Content wt (μg/g)</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)