U. S. Department of Commerce
Malcolm Baldrige
Secretary
National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 688

Basalt 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 688 is a finely powdered basalt rock that was obtained from a Cenozoic basalt flow near Jackpot, Nevada.

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

Constituent [1]	Content [2] wt (%)	Constituent [1]	Content [2] wt (μg/g)
Al_2O_3 [c,g]	17.36 ± 0.09	Cr [b,e]	332 ± 9
FeO [g]	7.64 ± 0.03	Rb [d]	1.91 ± 0.01
Fe_2O_3 [e,g] (Total Fe as Fe_2O_3)	10.35 ± 0.04	Sr [d]	169.2 ± 0.7
K_2O [b,d]	0.187 ± 0.008	Th [d]	0.33 ± 0.02
MnO [a,b,e]	0.167 ± 0.002	Pb [d]	3.3 ± 0.2
Na_2O [b,c,e]	2.15 ± 0.03		
P_2O_5 [a,c]	0.134 ± 0.003		
SiO_2 [c]	48.4 ± 0.1		
TiO_2 [a,b]	1.17 ± 0.01		

1. Methods of Analysis
   [a] Colorimetry
   [b] Emission spectrometry
   [c] Gravimetry
   [d] Isotope dilution mass spectrometry
   [e] Neutron activation analysis
   [f] Specific ion electrode potentiometry
   [g] Titrimetry
2. The 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 18, 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 600 pounds of basalt rock were crushed, ground, and sieved to <200 mesh. The material was mixed in a cone blender to ensure homogeneity. The inhomogeneity was tested by taking random samples and analyzing for both major and minor constituents and was found to be $\leq 2\%$ relative.

Analysis

SRM 688 may pick up additional water on exposure to the atmosphere. Thus, exposure time should be kept to a minimum. Before analysis, it is recommended that the material be dried at 105 °C for 24 hours. Typical weight loss upon drying is approximately 0.2 percent.

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

I. L. Barnes, M. J. Blackman, E. L. Garner, J. W. Gramlich, L. A. Machlan, L. J. Moore, and R. Zeisler of the Inorganic Analytical Research Division, National Bureau of Standards.

J. B. Bodkin, J. C DeVine, and N. H. Suhr of the Mineral Constitution Laboratories, The Pennsylvania State University, University Park, Pa.

S. S. Goldich of the Department of Geology, Northern Illinois University, Dekalb, Ill.

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

Table 2 Information Values

Constituent[1]	Content wt %	Constituent[1]	Content wt (μg/g)
CaO [c]	(12.17)	Ce [e]	(13.3)
CO_2 [f]	(0.05)	Co [e]	(49.7)
F [f]	(0.02)	Eu [e]	(1.07)
MgO [c]	(8.4)	Hf [e]	(1.6)
		Lu [e]	(0.34)
		Sc [e]	(38.1)
		Ba [b]	(200)
		V [b]	(250)
		Cu [b]	(96)
		Ni [b]	(150)
		Sm [e]	(2.79)
		Tb [e]	(0.448)
		U [d]	(0.37)
		Yb [e]	(2.09)
		Zn [e]	(58.0)