



United States Geological Survey

Certificate of Analysis

Granodiorite, Silver Plume, Colorado, GSP-2

Material used in the preparation of GSP-2 was collected by the U.S. Geological Survey, from the Silver Plume Quarry, which is located approximately 800 meters west of Silver Plume, Colorado. This is same location used to provide material for GSP-1. GSP-2 is a medium grained hypidiomorphic-granular rock consisting essentially of quartz, plagioclase, microcline, biotite, and muscovite. Details of the collection, preparation, and testing are available (Wilson, S.A., 1998).

Element concentrations were determined in a round robin study involving 20 international laboratories. Recommended values are listed when analytical results provided by three independent laboratories using a minimum of three independent analytical procedures are in statistical agreement. Information values with standard deviations are listed when at least four independent laboratories using two independent analytical procedures have provided information. Information values without standard deviations represent information from a single laboratory or analytical procedure.

Recommended values

Element	Wt %	±	Oxide	Wt %	±
Al	7.88	0.11	Al ₂ O ₃	14.9	0.2
Ca	1.50	0.04	CaO	2.10	0.06
Fe _{tot}	3.43	0.11	Fe ₂ O _{3 tot}	4.90	0.16
K	4.48	0.12	K ₂ O	5.38	0.14
Mg	0.58	0.02	MgO	0.96	0.03
Na	2.06	0.07	Na ₂ O	2.78	0.09
P	0.13	0.01	P ₂ O ₅	0.29	0.02
Si	31.1	0.4	SiO ₂	66.6	0.8
Ti	0.40	0.01	TiO ₂	0.66	0.02

Element	µg/g	±	Element	µg/g	±
Ba	1340	44	Pb	42	3
Ce	410	30	Rb	245	7
Co	7.3	0.8	Sc	6.3	0.7
Cr	20	6	Sm	27	1
Cu	43	4	Sr	240	10
Eu	2.3	0.1	Th	105	8
Ga	22	2	U	2.40	0.19
La	180	12	V	52	4
Mn	320	20	Y	28	2
Nb	27	2	Yb	1.6	0.2
Nd	200	12	Zn	120	10
Ni	17	2	Zr	550	30

Information values

Element	$\mu\text{g/g}$	\pm	Element	$\mu\text{g/g}$	\pm
Be	1.5	0.2	Ho	1.0	0.1
Cs	1.2	0.1	Li	36	1
Dy	6.1		Lu	0.23	0.03
Er	2.2		Mo	2.1	0.6
F	3000		Pr	51	5
Gd	12	2	Tl	1.1	
Hf	14	1	Tm	0.29	0.02

Bibliography

Wilson, S.A., 1998, Data compilation for USGS reference material GSP-2, Granodiorite, Silver Plume, Colorado, U.S. Geological Survey Open-File Report (in progress).

Glossary

Wt %	Weight percent of element/oxide as received
$\mu\text{g/g}$	Micrograms of element per gram of sample, as received
\pm	One standard deviation

Denver, Colorado Dr. Linda Gunderson
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U.S. Geological Survey
Central Region Mineral Team

Ordering Information

USGS reference materials (RMs) may be obtained directly from Dr. Stephen A. Wilson at the address or numbers listed below. The price for each bottle of RM is \$80.00 (U.S.) **except** DGPM-1 which is \$175.00 (U.S.). This cost includes all shipping and handling charges using normal mail delivery. Urgent requests for RMs should be initiated by FAX or e-mail. If required, overnight delivery is available with these charges added to the final bill.

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URL: http://minerals.cr.usgs.gov/geo_chem_stand/grano.pdf