

Table of rock standards used for bulk chemical analysis.

Compiled October 2017.

SRM	BIR-1*	688**	BHVO-2*	BCR-2*	AGV-2*	QLO-1**	278**	George's
Source	USGS	NIST	USGS	USGS	USGS	USGS	NIST	Apatite
Material	Basalt	Basalt	Basalt	Basalt	Andesite	Latite	Obsidian	Apatite
SiO ₂	47.79	48.14	49.60	54.00	59.14	65.51	72.97	
TiO ₂	0.96	1.16	2.73	2.27	1.05	0.62	0.25	
Al ₂ O ₃	15.51	17.34	13.44	13.48	17.03	16.19	14.15	
Fe ₂ O ₃ (t)	11.40	10.26	12.39	13.77	6.78	4.35	2.04	
MnO	0.173	0.166	0.169	0.197	0.10	0.093	0.052	
MgO	9.69	8.46	7.26	3.60	1.80	1.00	0.23	
CaO	13.29	12.17	11.40	7.11	5.15	3.17	0.98	
Na ₂ O	1.83	2.12	2.22	3.12	4.20	4.21	4.84	
K ₂ O	0.03	0.19	0.51	1.77	1.80	3.60	4.16	
P ₂ O ₅	0.03	0.133	0.269	0.359	0.483	0.254	0.036	
C						0.0027	0.05	
F	0.0055	0.02	0.040	0.047	0.04	0.028	0.046	
S	0.007		0.016	0.032	0.0024	0.003		
Cl	0.0044	0.0034	0.011	0.0096	0.0068	0.022	0.062	
Total	100.72	100.16	100.05	99.77	97.59	99.05	99.86	
Trace elements, ppm								
Li	3.20	6.8	4.5	9.13	10.8	26.1	46.8	
Be	0.102	1.58	1.08	2.17	2.21	2.00	1.9	
B	0.25	1.4	2.95	4.4	6.45	36	25	
Sc	43.2	37.6	31.8	33.5	13.1	8.83	5.11	
V	321	247	318	418	118.5	52.6	9	
Cr	393	324	287	15.9	16.2	2.8	6.0	
Co	52.2	49.1	44.9	37.3	15.5	7.26	1.54	
Ni	169	152	120	12.6	18.9	5.6	3.6	
Cu	121	93.0	129	19.7	51.5	27.3	5.9	
Zn	70.4	63.6	104	130	86.7	62.7	51.3	
Ga	15.5	17.1	21.4	22.1	20.4	17.1	13	
Ge	1.46		1.62	1.46	1.20	1.34		
As	0.17	2.28	0.7	0.86	0.67	3.05	4.62	
Se	0.019		0.18	0.082		0.013	2.39	
Br	0.065	0.4	0.3	0.17	0.13	1.58	2.52	
Rb	0.21	1.92	9.26	46.0	67.8	72.9	127.5	
Sr	108.6	169.6	394	337	660	334	63.8	
Y	15.6	19.4	25.9	36.1	19.1	24.1	38.5	
Zr	14.8	55.8	171.2	186.5	232	184.5	285.8	
Nb	0.55	5.21	18.1	12.4	14.1	10.4	19.9	
Mo	0.068	0.39	4.07	250.6	2	2.60	3.61	
Ru	0.00037		0.000125	0.000033				
Rh	0.00034		0.0007	0.0002				
Pd	0.006		0.0027	0.00036		0.0000001		
Ag	0.041		0.089	0.09	0.09	0.000064		
Cd	0.077	1.1	0.152	0.69	0.184	0.05	0.18	
In	0.058		0.117	0.7	0.048	0.18		
Sn	0.70	1.63	1.78	2.28	1.83	2.45	4.28	
Sb	0.46	0.19	0.10	0.30	0.46	2.00	1.49	
Te	0.0057		0.014	0.004	0.0029			
I	0.014		0.02	0.017	0.007			
Cs	0.0065	0.017	0.100	1.16	1.17	1.72	5.43	
Ba	6.75	180.3	130.9	684	1134	1377	931	
La	0.564	5.14	15.2	25.08	38.21	26.8	31.4	2040
Ce	1.92	11.91	37.2	53.1	69.4	52.7	62.9	4695

SRM	BIR-1*	688**	BHVO-2*	BCR-2*	AGV-2*	QLO-1**	278**	George's
Pr	0.372	1.80	5.29	6.83	8.17	6.32	7.42	640
Nd	2.30	8.32	23.8	28.3	30.5	24.2	28.7	2835
Sm	1.113	2.41	6.14	6.55	5.56	4.78	5.69	483.5
Eu	0.520	0.991	2.04	1.99	1.55	1.36	0.803	71.2
Gd	1.90	2.90	6.21	6.67	4.54	4.45	5.56	484.5
Tb	0.362	0.499	0.939	1.055	0.644	0.688	0.946	70.6
Dy	2.54	3.30	5.28	6.42	3.58	4.09	6.17	447
Ho	0.572	0.716	0.989	1.313	0.689	0.837	1.333	111
Er	1.68	2.058	2.49	3.63	1.83	2.34	3.95	277
Tm	0.256	0.314	0.335	0.534	0.262	0.359	0.64	42.2
Yb	1.65	2.05	1.95	3.39	1.65	2.35	4.39	215
Lu	0.248	0.312	0.275	0.505	0.251	0.367	0.713	24.1
Hf	0.58	1.56	4.47	4.97	5.14	4.67	8.24	
Ta	0.041	0.31	1.15	0.79	0.87	0.82	1.29	
W	0.027		0.251	0.465	0.553	0.58	1.9	
Re	0.00065		0.000543	0.0126	0.00029			
Os	0.00038		0.000111	0.000025	0.000004			
Ir	0.00018		0.00007	0.000018				
Pt	0.0046		0.0089	0.0012				
Au	0.0025	0.0059	0.0026	0.0013		0.0012	0.012	
Hg	0.0073		0.002	0.0012		0.007		
Tl	0.0021		0.022	0.27	0.28	0.23	0.54	
Pb	3.04	3.38	1.65	10.6	13.1	21.0	16.7	47
Bi	0.0051		0.0148	0.05	0.052	0.063	0.05	
Th	0.033	0.326	1.22	5.83	6.17	4.58	12.4	650
U	0.011	0.34	0.41	1.68	1.89	1.90	4.61	129

*Jochum, K.P., Weis, U., Schwager, B., Stoop, B., Wilson, S.A., Haug, G.H., Andreae, M.O., and Enzweiler, 2016, Reference Values Following ISO Guidelines for Frequently Requested Rock Reference Materials. Geostandards and Geoanalytical Research, v. 40, p. 333-350.

**A combination of Govindaraju, K., 1994, and an evaluation of more recent analyses present in the GeoRem database (<http://georem.mpch-mainz.gwdg.de/>), plus a few in-house analyses where other data were sparse or absent. Govindaraju, K., 1994, Compilation of working values and sample description for 383 geostandards. Geostandards and Geoanalytical Research, v. 18, p. 1-158.