

		VG-A99 n = 22	Std Dev	Preferred values	Dev %	VG-2 n = 8	Std Dev	Preferred values	Dev %	VG-568 n = 24	Std Dev	Preferred values	Dev %
Na2O	wt. %	2.78	0.13	2.66	4.37	2.68	0.05	2.62	2.29	3.68	0.08	3.75	-1.91
K2O	wt. %	0.85	0.01	0.82	3.42	0.20	0.01	0.19	5.16	4.91	0.04	4.89	0.43
FeO t	wt. %	13.34	0.20	13.30	0.32	11.84	0.24	11.84	-0.02	1.06	0.07	1.14	-7.32
SiO2	wt. %	50.79	0.22	50.94	-0.30	50.63	0.12	50.81	-0.36	76.92	0.38	76.71	0.27
S*	ppm	167.6	0.02	152.6	9.80	1457.6	0.03	1425.7	2.24	32.11	0.01	-	-
MgO	wt. %	5.02	0.06	5.10	-1.48	6.87	0.08	6.95	-1.22	0.02	0.01	bdl.	-
CaO	wt. %	9.16	0.06	9.30	-1.47	10.98	0.03	11.12	-1.24	0.42	0.02	0.42	0.66
MnO	wt. %	0.20	0.04	0.20	-0.68	0.21	0.03	0.22	-2.77	0.03	0.02	0.03	-3.94
Al2O3	wt. %	12.24	0.14	12.49	-1.97	13.81	0.06	14.06	-1.76	12.01	0.11	12.06	-0.39
Cl *	ppm	210.7	0.01	212.63	-0.89	323.8	0.00	290.00	11.64	960.0	0.01	1093.56	-12.21
F*	ppm	718.1	0.06	-	-	299.3	0.03	-	-	1869.7	0.07	1684.00	11.03
P2O5	wt. %	0.39	0.03	0.38	2.34	0.19	0.02	0.20	-6.40	0.01	0.02	bdl.	-
TiO2	wt. %	4.09	0.02	4.06	0.74	1.88	0.04	1.85	1.35	0.09	0.01	0.09	-3.27

* = values in italics are average values taken from the GeoRem webpage

All other values are from the Smithsonian Datasheet

Supplementary table 2. LA-ICP-MS analytical conditions and reference materials

Element	Mass number	Dwell time (ms)	Corrected interference	Primary standard	SRM NIST-612 glass		PANT ² glass (N=57)		JB-2 ² PNPP (N=6)		BHVO-2 PNPP (N=10)		TDB-1 PNPP (N=14)		KL2-G Glass (N=10)		GOR132-G Glass (N=4)																		
					GEOREM	Matrix correction	Average	2SD	GEOREM	95%CL	ref	Average	2SD	GEOREM	95%CL	Average	2SD	GEOREM	95%CL	Average	2SD	GEOREM	95%CL												
Li	7	1			NIST-612	37	1.006	69	(5)	7.80	(0.48)	8.08	(0.15)	ref	4.30	(0.47)	4.50	(0.09)	ref	14.65	(1.11)	16.80		5.62	(0.25)	5.10	(0.50)	ref	9.44	(0.45)	8.90	(1.20)	ref		
Be	9	1			NIST-612																														
B	11	1			NIST-612	34.3	1.064	21	(3)	36	(2)	30.0	(0.7)	ref	5.8	(2.2)	3.0	(0.3)	inf	13.6	(1.4)	16324	(719)	inf	17187	(607)	17437	(594)	ref	6038	(211)	6159	(297)	ref	
Na	23	1			NIST-612	101654	0.995	44299	(2915)	14923	(494)	15241	(223)	ref	15316	(2013)	14645	(156)	ref	14912	(1051)	16324	(719)	inf	17187	(607)	17437	(594)	ref	6038	(211)	6159	(297)	ref	
Mg	24	1			NIST-612	68	0.872	81	(83)	27323	(1244)	26716	(211)	ref	42459	(1954)	43765	(253)	ref	33474	(1183)	34980	(1228)	inf	43496	(1314)	44268	(543)	ref	131223	(5128)	133504	(1206)	ref	
Al	27	1			NIST-612	10747	1.043	51964	(7746)	80929	(1666)	77398	(529)	ref	75376	(2668)	71151	(318)	ref	72988	(4731)	71469	(1916)	inf	72439	(4350)	70410	(1059)	ref	54094	(2075)	58234	(1059)	ref	
Si	29	1			NIST-612	337043	0.996	344187	(9963)	289407	(11202)	248411	(841)	ref	291145	(23909)	231863	(654)	ref	299508	(26077)	233750	(1338)	inf	240690	(8539)	235153	(1402)	ref	226554	(6771)	212713	(1870)	ref	
P	31	1			NIST-612	46.6	0.958	37.8	(6.2)	400.4	(11.5)	423	(10)	ref	1175	(172)	1172	(22)	ref	1070	(160)	873	(131)	inf	1058	(84)	1012	(113)	ref	136	(8)	157	(52)	ref	
S	32	1			NIST-612	39	1.754	38261	(2454)	3635	(130)	3506	(49)	ref	4181	(598)	4258	(31)	ref	7063	(468)	7470	(83)	inf	4254	(248)	3984	(83)	ref	265	(24)	256	(28)	ref	
Ca	43	1			NIST-612	85049	1.040	2035	(412)	70398	(0)	70412	(586)	ref	81476	(0)	81476	(429)	ref	68402	(573)	69326	(317)	inf	79207	(4129)	77902	(1429)	ref	57536	(1112)	60392	(858)	ref	
Ca	45	1		SiO ⁺	NIST-612	39.9	1.144	2.6	(1.6)	57.8	(2.2)	54.1	(0.8)	ref	33.1	(1.6)	31.8	(0.3)	ref	38.3	(3.7)	37.2	(4.1)	inf	32.8	(2.3)	31.8	(0.9)	ref	34.3	(2.4)	36.5	(1.2)	ref	
Ti	47	1			NIST-612	44	0.945	1822	(159)	7082	(192)	7002	(54)	ref	14057	(299)	16386	(108)	ref	14292	(349)	14400	(240)	inf	15455	(872)	15360	(540)	ref	1678	(37)	1836	(78)	ref	
V	51	1			NIST-612	38.8	0.892	0.05	(0.15)	578.58	(36.2)	572.4	(8.3)	ref	309	(26)	318.2	(2.3)	ref	453	(41)	492		inf	310	(11)	309	(38)	ref	213	(4)	214	(17)	ref	
Cr	52	1			NIST-612	36.4	0.923	0.71	(1.6)	24.14	(2.1)	26.65	(0.7)	ref	279	(25)	287.2	(3.1)	ref	236	(15)	272.9		inf	277	(10)	294	(27)	ref	2382	(111)	2528	(183)	ref	
Mn	55	1			NIST-612	38.7	0.947	898	(62)	1707	(91)	1650	(22)	ref	1295	(92)	1309	(15)	ref	1505	(105)	1549		inf	1300	(36)	1278	(70)	ref	1195	(30)	1193	(54)	ref	
Fe	57	1			NIST-612	51	1.915	40704	(2212)	100370	(5999)	99900	(839)	ref	83621	(6654)	86659	(630)	ref	99671	(7524)	101752		inf	83180	(1795)	83171	(777)	ref	79140	(992)	78507	(777)	ref	
Co	59	1			NIST-612	35.5	0.956	0.11	(0.05)	35.9	(2.8)	37.57	(0.7)	ref	42.9	(4.0)	44.89	(0.3)	ref	42.6	(2.8)	44	(5)	inf	42.0	(1.8)	41	(2)	ref	100.1	(1.0)	93	(6)	ref	
Ni	60	1			NIST-612	38.8	0.908	0.14	(0.71)	12.7	(1.3)	14.77	(0.5)	ref	108	(12)	119.8	(1.2)	ref	83	(7)	96	(10)	inf	101	(6)	112	(5)	ref	1190	(48)	1187	(58)	ref	
Cu	63	1			NIST-612	37.8	1.020	6.3	(3.0)	217.4	(12.0)	222.1	(3.6)	ref	123	(15)	129.3	(1.4)	ref	303	(34)	343	(13)	inf	83	(4)	88	(9)	ref	216	(9)	205	(21)	ref	
Zn	66	1			NIST-612	37.8	1.005	5.8	(3.2)	215.9	(9.7)	222.1	(3.6)	ref	125	(15)	129.3	(1.4)	ref	317	(42)	343	(13)	inf	85	(5)	88	(9)	ref	222	(7)	205	(21)	ref	
Ga	71	1			NIST-612	39.1	1.135	407	(39)	121	(9)	110.4	(3)	ref	101	(10)	103.9	(1.0)	ref	158	(14)	163.5	(15.0)	inf	118	(8)	110	(10.0)	ref	67	(4)	76.8	(12.5)	ref	
Ge	75	1			NIST-612	36.9	1.071	44	(3)	16	(1)	16.62	(0)	ref	21	(3)	21.37	(0.2)	ref	21	(1)	21.1		inf	21	(1)	20	(1.2)	ref	11.3	(0.4)	10.4	(0.9)	ref	
Se	77	40		Sm ⁺⁺ , Gd ⁺⁺	NIST-612	16.3	1.040	0		0.15	(0.06)	0.15	(0.02)	inf	0.16	(0.05)	0.18	(0.04)	inf	0.36	(0.11)	0.38	(0.08)	inf	0.03	(0.05)	0.07	inf	0.05	(0.01)	0.03	(0.0)	inf		
Sr	86	1			NIST-612	78.4	1.058	0.6	(0)	178	(2)	178.2	(1.5)	ref	398	(7)	394.1	(1.7)	ref	222	(4)	232		inf	359	(16)	356	(8.0)	ref	14	(0.4)	15.3	(0.6)	ref	
Y	89	1			NIST-612	38.3	1.236	157	(28)	22.8	(1.3)	23.56	(0.4)	ref	26.0	(1.8)	25.9	(0.3)	ref	34.4	(4.7)	33	(9)	inf	25.9	(2.4)	25	(1)	ref	12.5	(1.8)	13	(1)	ref	
Zr	90	1			NIST-612	37.9	1.202	2782	(450)	47.3	(2.8)	48.25	(10.0)	ref	175.2	(10.0)	171.2	(1.3)	ref	169.0	(18.8)	175	(37)	inf	162.2	(11.1)	152	(5)	ref	9.3	(0.6)	9.9	(0)	ref	
Nb	93	1			NIST-612	38.9	1.063	313	(24)	0.52	(0.05)	0.565	(0.03)	ref	17.75	(0.61)	18.1	(0.2)	ref	11.97	(0.59)	12.7		inf	15.66	(0.86)	15	(0.5)	ref	0.06	(0.01)	0.073	(0.0)	ref	
Ag	107	40		ZrO ⁺	NIST-612	22	1.049	0.17	(0.14)	0.075	(0.005)	0.064	inf	0.051	(0.012)	0.045	(0.001)	inf	0.165	(0.015)			inf	0.104	(0.012)	0.15	inf	0.063	(0.019)	0.04	inf	0.04	inf		
Ag	109	40		NbO ⁺	NIST-612	22	1.049	0.15	(0.15)	0.075	(0.014)	0.064	inf	0.051	(0.014)	0.045	(0.001)	inf	0.161	(0.014)			inf	0.103	(0.013)	0.15	inf	0.062	(0.016)	0.04	inf	0.04	inf		
Sn	118	1			NIST-612	38.6	0.838	20.9	(2.0)	0.81	(0.14)	0.835	(0.05)	ref	1.89	(0.19)	1.776	(0.06)	ref	2.63	(0.37)	2.1		inf	1.60	(0.06)	1.54	(0.29)	ref	1.07	(0.13)	0.34	(0.09)	inf	
Cs	133	1			NIST-612	42.7	1.016	5.4	(0.8)	0.82	(0.05)	0.8	(0.02)	ref	0.10	(0.01)	0.100	(0.002)	ref	0.47	(0.05)	0.480		inf	0.12	(0.01)	0.115	(0.009)	ref	7.92	(0.18)	7.45	(0.63)	ref	
Ba	138	1			NIST-612	39.3	1.025	3.1	(0.3)	218.4	(7.9)	218.1	(2.7)	ref	133.9	(4.6)	130.9	(1.0)	ref	234.2	(11.6)	220.5	(18.4)	inf	120.8	(4.7)	123	(5.0)	ref	0.8	(0.1)	0.82	(0.06)	ref	
La	139	1			NIST-612	40.2	0.971	244	(34)	2.28	(0.09)	2.28	(0.04)	ref	15.12	(0.37)	15.20	(0.08)	ref	15.89	(0.55)	15.71	(3.71)	inf	13.30	(0.92)	13.10	(0.20)	ref	0.08	(0.01)	0.08	(0.00)	ref	
Ce	140	1			NIST-612	38.4	1.022	462	(41)	6.61	(0.34)	6.55	(0.09)	ref	37.79	(1.88)	37.53	(0.19)	ref	39.08	(2.66)	40.03	(4.40)	inf	33.33	(1.40)	32.40	(0.70)	ref	0.39	(0.05)	0.39	(0.02)	ref	
Pr	141	1			NIST-612	37.9	1.092	49.9	(6)	1.16	(0.05)	1.13	(0.02)	ref	5.24	(0.12)	5.34	(0.03)	ref	5.26	(0.20)	5.30		inf	4.73	(0.17)	4.60	(0.10)	ref	0.09	(0.01)	0.09	(0.00)	ref	
Nd	146	1			NIST-612	35.5	1.118	184	(25)	6.48	(0.23)	6.39	(0.06)	ref	24.75	(0.85)	24.27	(0.25)	ref	24.08	(0.88)	23.27	(1.56)	inf	22.27	(1.05)	21.60	(0.40)	ref	0.65	(0.04)	0.69	(0.02)	ref	
Sm	149	1			NIST-612	37.7	1.122	34.6	(5.2)	2.14	(0.16)	2.27	(0.02)	ref	6.14	(0.31)	6.02	(0.06)	ref	6.15	(0.29)	6.09	(0.37)	inf	5.44	(0.38)	5.54	(0.09)	ref	0.46	(0.04)	0.51	(0.02)	ref	
Eu	153	1			NIST-612	35.6	1.116	0.6	(0.1)	0.83	(0.03)	0.84	(0.01)	ref	2.08	(0.09)	2.04	(0.01)	ref	2.00	(0.07)	1.95	(0.08)	inf	1.98	(0.15)	1.92	(0.04)	ref	0.25	(0.02)	0.26	(0.01)	ref	
Gd	157	1			NIST-612	37.3	1.201	31.9	(5.0)	3.29	(0.16)	3.12	(0.05)	ref	6.33	(0.45)	6.21	(0.04)	ref	6.76	(0.51)	6.09	(1.03)	inf	6.16	(0.45)	5.92	(0.20)	ref	1.12	(0.07)	1.19	(0.04)	ref	
Tb	159	1			NIST-612	37.6	1.200	5.0	(0.8)	0.57	(0.04)	0.59	(0.01)	ref	0.94	(0.07)	0.94	(0.01)	ref	1.07	(0.10)	1.15	(0.22												