***G&G* Data Depository: Average chemical composition of 59 Cu-bearing tourmaline samples from M**

Sample no.	1u	1t	2u	2t	3u	3t	4u	4t
Weight (ct)	4.26	4.85	4.63	2.49	4.13	2.72	1.59	2.35
Treatment	None	Heated	None	Heated	None	Heated	None	Heated
Color (daylight)	Lt. violet	Lt. bluish green	Lt., grayish, violetish blue	Lt., sl. grayish, bluish green	Very lt., grayish, blue	Lt. green-blue	Lt., sl. grayish, violetish blue	Lt., very str., greenish blue
Color (incandescent)	Lt. greenish gray	(No change)	Lt. greenish gray	(No change)	Lt. grayish green	(No change)	Sl. greenish gray	(No change)
Electron-microprobe analyses								
SiO_2 (wt.%)	36.64	36.69	36.63	36.69	36.65	36.63	36.65	36.60
TiO_2	0.01	nd	nd	0.01	0.02	nd	nd	0.01
B_2O_3 calc.	10.88	10.89	10.93	10.89	10.97	10.96	10.96	10.93
Al_2O_3	40.81	40.85	40.99	40.94	42.11	42.05	42.13	42.12
Bi_2O_3	0.01	0.02	nd	0.02	0.02	0.01	nd	0.01
FeO	nd	nd	nd	nd	nd	0.01	nd	nd
MnO	2.55	2.57	2.10	2.14	0.49	0.48	0.47	0.47
MgO	nd	nd	nd	0.01	nd	nd	0.02	nd
CuO[b]	0.14	0.12	0.11	0.12	0.15	0.23	0.20	0.09
CaO	0.02	nd	nd	0.05	0.09	0.23	0.01	0.01
PbO	nd	nd	nd	nd	nd	nd	0.01	nd
ZnO	0.01	nd	0.01	0.02	0.02	0.03	0.01	0.01
Li_2O calc.	1.71	1.70	1.87	1.76	1.94	1.94	1.91	1.88
Na_2O	2.26	2.22	2.34	2.24	2.33	2.24	2.31	2.13
K_2O	0.037	0.032	nd	nd	nd	nd	0.023	0.028
H_2O calc.	3.32	3.37	3.36	3.33	3.39	3.38	3.39	3.33
F	0.91	0.82	0.88	0.89	0.83	0.86	0.82	0.92
Subtotal	99.31	99.29	99.25	99.11	99.03	99.06	98.92	98.56
-O=F	0.38	0.34	0.37	0.38	0.35	0.36	0.34	0.39
Total	98.93	98.95	98.88	98.74	98.68	98.70	98.57	98.18
Ions per 31 (O,OH,F)								
Si	5.852	5.856	5.824	5.857	5.808	5.807	5.813	5.821
Ti	0.001	nd	nd	nd	0.003	nd	nd	0.001
Tet. sum	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
B calc.	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Al Z	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
Al Y	1.534	1.542	1.506	1.560	1.674	1.663	1.688	1.716
Bi^{3+}	nd	0.001	nd	0.001	0.001	0.000	nd	nd
Fe^{2+}	nd	nd	nd	nd	nd	0.001	nd	nd
Mn	0.345	0.347	0.282	0.289	0.065	0.065	0.063	0.063
Mg	nd	nd	nd	0.003	nd	nd	0.005	nd
Cu	0.017	0.014	0.013	0.014	0.018	0.027	0.024	0.011
Pb	nd	nd	nd	nd	nd	nd	0.001	nd
Zn	0.002	nd	0.002	0.002	0.003	0.003	0.001	0.002
Li calc.	1.101	1.094	1.195	1.130	1.235	1.238	1.218	1.205
Y sum	2.999	2.999	2.999	2.999	2.996	2.998	3.000	2.997

Ca	0.004	nd	nd	0.008	0.016	0.038	0.001	0.002
Na	0.699	0.688	0.723	0.693	0.717	0.690	0.711	0.658
K	0.007	0.006	0.002	0.002	nd	nd	0.005	0.006
X site vacancy	0.290	0.306	0.275	0.297	0.267	0.271	0.283	0.335
X sum	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
OH calc.	3.539	3.587	3.558	3.548	3.583	3.570	3.589	3.537
F	0.461	0.412	0.441	0.451	0.416	0.429	0.410	0.462
LA-ICP-MS analyses (ppm)								
Be	5.2	4.7	4.0	4.5	18.7	15.3	3.9	5.0
Mg	nd	nd	nd	nd	1.4	nd	nd	0.6
K	46.0	94.2	86.1	88.0	96.4	62.0	66.2	88.1
Ti	19.7	41.3	40.7	52.5	55.6	16.9	15.0	13.5
V	0.7	0.9	0.8	0.9	1.0	0.7	0.7	0.8
Cr	nd	1.2	1.8	1.9	5.0	3.3	2.4	5.6
Fe	nd	51.0	74.4	nd	210	nd	nd	51.8
Ni	1.1	nd	0.7	0.7	4.0	nd	nd	2.4
Cu	783	907	1087	1236	1570	1974	990	1047
CuO (wt.%)	0.10	0.11	0.14	0.15	0.20	0.25	0.12	0.13
Zn	0.6	2.9	0.9	1.5	1.9	0.5	0.6	0.3
Ga	312	320	299	326	334	276	345	326
Ge	4.6	4.6	4.0	4.3	6.2	5.9	4.6	4.5
Nb	0.7	0.8	0.7	0.8	1.7	3.7	1.0	1.0
Mo	nd	1.0	0.7	0.9	0.8	nd	nd	nd
Sn	1.3	3.4	3.2	3.5	4.6	3.0	2.3	2.3
Ta	nd	0.5	nd	nd	1.1	1.3	0.5	nd
Pb	6.7	6.4	5.1	5.8	24.6	32.3	5.9	4.9
Bi	209	41.4	26.3	26.8	302	441	48.8	39.7

[a] Sample 1-21 are pairs (before and after heat treatment) that were each cut from the same piece of rough. in Nampula, Mozambique. Average values are reported for 4–5 analyses by electron microprobe and two a Abbreviations: lt. = light, med. = medium, nd = not detected, sl. = slight, str. = strong.

[b] Electron-microprobe values for Cu are reported here for completeness, but the Cu data from LA-ICP-MS (copper content of the samples.

[c] The detection limit for Cu by electron microprobe is 0.009 wt.% CuO. LA-ICP-MS analysis of a different pa

[d] LA-ICP-MS analysis of a different part of this sample measured an average of 2745 ppm Cu (0.34 wt.% C

ozambique[a].

5u	5t	6u	6t	7u	7t	8u	8t	9u	9t
2.35	1.37	4.73	6.29	2.80	3.77	3.73	4.19	11.19	20.28
None	Heated	None	Heated	None	Heated	None	Heated	None	Heated
Med.-lt., sl. grayish, violet	Very lt. green-blue	Med.-lt., grayish, violetish blue	Lt., very str., bluish green	Lt., grayish, violetish blue	Lt., very sl. bluish green	Lt. purple	Lt. green-blue	Lt., grayish, violetish blue	Lt. bluish green
Gray to violetish gray	(No change)	Lt. greenish gray	(No change)	Lt. greenish gray	(No change)	(No obvious change)	(No change)	Greenish gray	(No change)
36.68	36.62	36.52	36.60	36.71	36.64	36.72	36.75	36.61	36.66
nd	nd	nd	nd	0.01	0.01	0.04	0.05	0.02	0.02
10.90	10.93	10.92	10.93	10.95	10.94	10.99	10.99	10.88	10.89
41.23	41.59	41.62	41.52	41.44	41.41	41.68	41.57	41.00	40.97
0.02	0.02	nd	0.04	nd	nd	0.03	0.03	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
2.20	2.01	1.95	2.05	2.23	2.30	1.83	1.48	2.89	2.88
nd	nd	nd	0.02	nd	nd	0.03	0.07	0.03	0.04
0.16	0.09	0.09	0.07	0.07	0.06	0.16	0.13	0.11	0.11
0.01	0.02	0.03	nd	nd	nd	0.15	0.38	nd	nd
nd	0.01	nd	nd	nd	nd	nd	nd	nd	nd
0.03	0.01	0.01	nd	0.01	0.01	0.03	0.05	0.02	0.01
1.70	1.72	1.72	1.74	1.73	1.73	1.80	1.89	1.59	1.60
2.10	2.13	2.10	2.25	2.26	2.24	2.27	2.29	1.95	2.01
nd	0.019	nd	nd	nd	0.094	0.031	nd	nd	nd
3.32	3.33	3.34	3.35	3.31	3.34	3.40	3.36	3.31	3.31
0.93	0.93	0.90	0.89	0.98	0.91	0.83	0.91	0.93	0.94
99.29	99.44	99.21	99.46	99.72	99.71	99.98	99.96	99.34	99.45
0.39	0.39	0.38	0.38	0.41	0.38	0.35	0.38	0.39	0.39
98.90	99.05	98.83	99.08	99.31	99.33	99.63	99.58	98.95	99.06
5.846	5.821	5.814	5.819	5.827	5.820	5.806	5.808	5.847	5.850
nd	nd	nd	nd	0.002	0.002	0.005	0.006	0.002	0.002
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
1.590	1.614	1.625	1.598	1.581	1.573	1.575	1.554	1.565	1.555
0.001	0.001	nd	0.002	nd	nd	0.001	0.001	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
0.298	0.271	0.263	0.275	0.300	0.309	0.245	0.199	0.391	0.390
nd	nd	nd	0.004	nd	nd	0.006	0.016	0.007	0.009
0.020	0.011	0.011	0.008	0.009	0.008	0.019	0.015	0.014	0.014
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
0.003	0.001	0.001	nd	0.001	0.001	0.003	0.006	0.002	0.001
1.088	1.102	1.098	1.112	1.106	1.106	1.146	1.203	1.019	1.029
3.000	2.999	2.998	2.999	2.996	2.996	2.995	2.994	2.998	2.998

0.002	0.003	0.005	nd	nd	nd	0.026	0.064	nd	nd
0.649	0.656	0.647	0.694	0.695	0.691	0.697	0.701	0.604	0.621
nd	0.004	nd	nd	nd	0.019	0.006	nd	nd	nd
0.349	0.337	0.346	0.306	0.304	0.290	0.271	0.234	0.396	0.378
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.533	3.532	3.546	3.551	3.508	3.541	3.584	3.546	3.530	3.527
0.466	0.468	0.453	0.448	0.491	0.458	0.416	0.453	0.469	0.473

3.7	4.2	2.9	3.0	3.6	3.1	15.7	18.7	3.4	3.2
1.0	0.4	1.1	nd	nd	nd	0.3	nd	nd	nd
105	88.7	106	106	109	105	75.2	76.8	107	112
61.4	55.0	72.6	78.3	178	171	96.6	159	113	124
1.0	0.9	1.0	1.1	1.3	1.2	0.9	1.2	1.2	1.2
3.5	2.2	2.1	1.2	0.8	1.8	3.8	2.8	2.1	2.8
53.1	nd	45.0	nd	73.6	78.5	32.0	nd	79.4	95.6
3.7	0.3	4.8	0.5	nd	0.4	1.0	1.3	0.9	1.5
1169	852	700	809	856	864	1966	1790	802	815
0.15	0.11	0.09	0.10	0.11	0.11	0.25	0.22	0.10	0.10
2.5	2.1	2.7	3.9	7.1	7.9	2.5	1.2	6.0	5.7
335	310	245	308	313	323	306	323	337	331
4.8	4.0	3.2	4.4	3.9	4.3	7.3	6.4	4.6	4.7
0.8	0.7	0.2	0.6	0.3	0.5	2.4	2.7	0.6	0.6
0.9	0.7	0.9	1.2	1.1	1.1	0.3	0.7	1.0	1.1
4.0	3.6	3.6	4.1	4.5	4.9	6.6	7.2	4.1	4.5
nd	0.3	nd	nd	nd	nd	1.1	1.1	0.2	nd
5.7	5.0	5.3	5.6	4.8	4.8	32.4	30.5	5.3	5.1
24.3	28.0	20.8	23.1	16.7	16.4	408	272	19.6	18.9

Samples 510-# and 511-# are reportedly unheated, and were purchased from a local dealer

analyses by LA-ICP-MS (not in same locations as the microprobe analysis points).

a more sensitive analytical technique) probably give a better representation of the actual

rt of this sample measured an average of 429 ppm Cu (0.05 wt.% CuO).

uO).

10u	10t	11u	11t	12u	12t	13u	13t	14u	14t
2.21	1.48	1.33	1.63	3.36	6.60	4.56	7.15	6.70	2.07
None	Heated	None	Heated	None	Heated	None	Heated	None	Heated
Lt., very sl. grayish, violetish blue	Lt. green-blue	Lt., sl. grayish, violet and blue	Lt. green-blue	Lt., very sl. grayish, blue	Lt., very str., greenish blue	Very lt. blue	Very lt. green-blue	Lt., sl. grayish, blue	Lt., very str., greenish blue
Lt. green (corner) to lt. gray	(No change)	Lt. green	(No change)	Lt. grayish green	(No change)	Lt. gray	(No change)	Lt. greenish gray	(No change)
36.69	36.61	36.66	36.74	36.68	36.64	36.61	36.69	36.68	36.70
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
10.95	10.94	10.95	10.98	10.95	10.96	10.90	10.91	10.93	10.95
41.51	41.47	41.57	41.54	41.87	42.18	41.92	41.96	42.32	42.28
nd	0.01	nd	nd	nd	nd	0.01	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1.81	1.87	2.03	2.05	0.54	0.41	0.65	0.59	0.14	0.18
0.03	0.03	0.05	0.05	nd	nd	nd	nd	nd	nd
0.07	0.09	0.21	0.22	0.07	0.08	0.06	0.09	0.06	0.07
0.20	0.15	0.27	0.44	0.25	0.17	nd	nd	nd	0.05
nd	nd	nd	0.02	nd	nd	nd	nd	nd	nd
0.02	0.02	0.01	0.01	nd	nd	0.02	0.02	0.01	0.01
1.81	1.80	1.71	1.77	1.98	1.94	1.86	1.84	1.90	1.92
2.19	2.29	1.91	1.97	2.29	2.18	2.07	1.95	2.02	2.07
0.021	0.024	nd	0.019	nd	nd	nd	0.022	nd	0.022
3.32	3.33	3.39	3.37	3.31	3.30	3.33	3.34	3.33	3.36
0.97	0.93	0.83	0.88	0.99	1.00	0.91	0.88	0.94	0.89
99.60	99.57	99.59	100.08	98.93	98.87	98.35	98.31	98.34	98.50
0.41	0.39	0.35	0.37	0.42	0.42	0.38	0.37	0.40	0.37
99.19	99.18	99.24	99.70	98.51	98.45	97.97	97.94	97.94	98.13
5.822	5.814	5.818	5.812	5.821	5.812	5.836	5.846	5.830	5.828
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
1.584	1.577	1.595	1.558	1.654	1.697	1.712	1.727	1.758	1.739
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
0.243	0.252	0.273	0.275	0.073	0.055	0.088	0.080	0.019	0.025
0.008	0.007	0.012	0.012	nd	nd	nd	nd	nd	nd
0.008	0.011	0.025	0.026	0.008	0.010	0.007	0.011	0.007	0.009
nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd
0.003	0.002	0.001	0.001	nd	0.001	0.002	0.003	0.001	0.001
1.153	1.150	1.093	1.127	1.264	1.237	1.190	1.180	1.214	1.225
2.999	2.999	3.000	3.000	2.999	2.999	2.999	3.000	3.000	3.000

0.035	0.026	0.046	0.075	0.042	0.029	nd	0.001	nd	0.009
0.674	0.704	0.589	0.605	0.704	0.669	0.640	0.603	0.624	0.638
0.004	0.005	nd	0.004	nd	nd	nd	0.004	nd	0.004
0.287	0.265	0.364	0.316	0.253	0.300	0.358	0.392	0.373	0.349
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.511	3.533	3.585	3.559	3.502	3.497	3.541	3.555	3.527	3.554
0.488	0.467	0.414	0.440	0.498	0.503	0.459	0.445	0.472	0.445

10.1	13.2	20.2	15.8	24.1	24.3	3.7	4.3	4.8	21.6
0.4	nd	nd	nd	nd	nd	nd	nd	nd	0.7
77.8	80.7	84.7	67.1	85.7	79.7	93.1	90.9	74.7	62.3
67.8	31.6	22.7	17.3	22.6	22.0	28.4	38.4	10.9	13.3
0.9	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.7	0.9
nd	1.4	3.6	2.1	3.0	2.8	3.8	2.8	3.7	4.6
nd	nd	nd	nd	nd	nd	28.0	nd	nd	nd
2.3	nd	0.2	nd	0.9	0.7	2.6	1.8	nd	5.2
1082	1461	1358	1376	1528	1582	774	887	757	1610
0.14	0.18	0.17	0.17	0.19	0.20	0.10	0.11	0.09	0.20
4.5	2.9	0.5	0.3	0.3	1.1	3.0	2.8	0.3	nd
287	289	265	303	243	242	298	313	320	286
6.1	6.8	7.0	7.1	6.7	6.4	4.5	4.9	5.4	10.0
1.5	2.6	2.8	3.5	2.2	2.3	0.9	1.3	0.7	1.5
1.0	0.8	0.6	nd	0.7	0.7	0.7	0.7	nd	nd
5.2	4.2	3.2	3.7	4.1	3.9	3.3	4.3	1.2	1.1
0.9	1.2	1.4	1.3	2.0	1.7	0.2	0.6	0.5	1.2
24.7	27.0	50.7	34.6	59.7	60.5	5.8	9.2	6.6	38.9
236	284	560	450	670	748	32.3	52.6	67.9	859

15u	15t	16u	16t	17u	17t	18u	18t	19u	19t
3.74	3.16	5.19	4.79	0.61	0.80	2.66	0.98	3.20	3.91
None	Heated	None	Heated	None	Heated	None	Heated	None	Heated
Med.-lt., sl. grayish, green	Lt., very str., bluish green	Med.-lt., very sl. grayish, very sl. bluish green	Lt. green	Very lt. green	Lt., sl. yellowish green	Med.-lt., sl. yellowish green	Lt., sl. yellowish green	Very lt., very sl. bluish green	Lt., very sl. grayish, green
(No change)	(No change)	(Grayish) green	(No change)	(No change)	(No change)	(No change)	(No change)	(No change)	(No change)
36.67	36.71	36.65	36.70	36.71	36.70	36.63	36.70	36.59	36.60
nd	nd	nd	nd	nd	nd	nd	0.02	nd	nd
10.92	10.92	10.92	10.91	10.95	10.94	10.92	10.93	10.91	10.91
41.93	41.95	41.96	41.93	41.95	41.92	41.84	41.72	42.10	42.11
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
1.01	0.69	1.05	1.09	1.28	1.08	1.27	1.34	0.93	0.91
nd	nd	nd	nd	nd	0.01	nd	0.02	nd	nd
0.08	0.10	0.07	0.09	0.03	0.03	0.05	0.06	0.08	0.08
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	0.01	0.01	0.02	nd	nd	nd	0.01	nd	nd
1.79	1.85	1.78	1.76	1.81	1.84	1.79	1.80	1.78	1.77
1.93	2.04	1.93	1.83	2.15	2.18	2.06	2.15	1.91	1.84
0.044	nd	nd	nd	nd	nd	nd	nd	nd	nd
3.30	3.29	3.32	3.29	3.33	3.33	3.34	3.33	3.30	3.31
0.99	1.01	0.94	1.00	0.94	0.95	0.90	0.94	0.98	0.97
98.67	98.57	98.63	98.63	99.16	99.00	98.82	99.02	98.59	98.50
0.42	0.42	0.39	0.42	0.40	0.40	0.38	0.39	0.41	0.41
98.25	98.14	98.24	98.21	98.77	98.60	98.44	98.63	98.17	98.09
5.838	5.842	5.835	5.844	5.824	5.828	5.829	5.834	5.825	5.829
nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
1.706	1.711	1.709	1.715	1.669	1.673	1.677	1.651	1.725	1.735
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
0.136	0.093	0.142	0.147	0.171	0.146	0.172	0.181	0.126	0.123
nd	nd	nd	nd	nd	0.003	nd	0.005	nd	nd
0.010	0.011	0.008	0.011	0.003	0.004	0.006	0.007	0.009	0.010
nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	0.001	0.001	0.002	nd	nd	nd	0.001	nd	nd
1.148	1.182	1.140	1.125	1.155	1.173	1.143	1.153	1.140	1.132
2.999	2.999	3.000	3.000	2.999	3.000	2.998	2.997	3.000	3.000

nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001
0.596	0.628	0.596	0.564	0.661	0.670	0.635	0.662	0.590	0.568
0.009	nd	nd	nd	nd	nd	nd	nd	nd	nd
0.395	0.370	0.403	0.433	0.337	0.327	0.363	0.336	0.410	0.431
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.503	3.491	3.528	3.495	3.525	3.523	3.546	3.528	3.504	3.512
0.497	0.508	0.471	0.505	0.474	0.477	0.453	0.471	0.496	0.487

4.4	15.6	11.4	14.0	4.9	4.0	4.2	3.3	3.9	4.4
0.5	0.3	nd	nd	3.6	2.2	nd	0.7	0.6	nd
120	116	117	110	171	153	176	160	111	119
305	218	255	235	292	296	494	449	177	201
1.5	1.9	1.5	1.5	2.2	2.2	1.8	1.7	1.4	1.4
0.9	3.4	3.2	2.5	3.0	3.3	3.5	3.3	2.7	3.6
563	156	324	105	895	895	1819	2055	113	110
1.3	0.4	1.1	1.4	0.9	0.4	1.0	1.2	1.1	0.4
1185	1603	2038	1865	1480	1436	2431	2365	708	860
0.15	0.20	0.26	0.23	0.19	0.18	0.30	0.30	0.09	0.11
32.7	4.4	8.0	7.5	30.0	27.4	349	496	9.1	9.5
301	320	311	293	380	355	303	295	342	349
4.0	6.6	7.0	7.0	8.1	7.4	5.3	5.4	4.4	4.6
0.2	1.3	2.1	1.7	0.5	nd	0.5	0.5	0.6	0.7
1.7	1.5	1.8	1.9	2.4	2.0	2.1	2.0	1.1	1.5
5.2	5.4	6.0	6.1	6.4	5.6	4.5	4.4	5.3	5.2
nd	0.8	0.7	0.8	nd	nd	nd	nd	nd	nd
5.4	22.3	24.4	27.5	8.8	9.0	5.9	6.0	5.3	5.0
16.8	175	169	185	53.2	46.0	17.3	17.2	18.9	18.1

20u	20t	21u	21t	510-4	510-12	511-7	511-4	510-10
2.95	3.76	3.66	3.20	2.98	5.05	3.49	3.18	4.14
None	Heated	None	Heated	None	None	None	None	None
Med.-lt., sl. grayish, very sl. bluish green	Lt. green	Med.-dark, sl. grayish, green	Med., very sl. grayish, green	Str., pinkish purple	Str., pinkish purple	Str., pinkish purple	Med., pinkish purple	Lt., sl. grayish, violet
(No change)	(No change)	(No change)	(No change)	Purplish pink to red	Purplish pink	Purplish pink	Purplish pink	Sl. greenish gray
36.40	36.63	36.69	36.70	36.67	36.72	36.59	36.65	36.61
nd	nd	nd	nd	nd	nd	nd	nd	nd
10.92	10.93	10.96	10.96	11.00	10.96	10.97	10.98	10.98
42.32	42.21	42.09	42.10	42.38	42.44	42.27	42.36	42.45
nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	0.01	nd	nd	nd
0.95	0.92	1.23	1.25	0.04	0.04	0.26	0.53	0.14
nd	nd	nd	nd	nd	nd	nd	nd	0.01
0.09	0.10	0.06	0.06	nd[c]	0.01	0.11	0.02	0.02
nd	nd	nd	nd	0.05	0.11	0.10	0.22	0.09
nd	nd	nd	nd	nd	nd	nd	nd	nd
0.01	0.01	nd	nd	nd	nd	nd	nd	nd
1.76	1.76	1.79	1.79	2.06	1.94	1.98	1.92	1.98
1.95	1.83	2.10	2.10	2.32	2.02	2.39	2.08	2.36
nd	nd	nd	nd	0.040	0.041	nd	0.021	0.020
3.29	3.30	3.31	3.29	3.24	3.29	3.23	3.28	3.28
1.00	0.99	1.00	1.03	1.17	1.04	1.18	1.07	1.06
98.71	98.67	99.24	99.30	98.99	98.63	99.08	99.13	99.01
0.42	0.42	0.42	0.43	0.49	0.44	0.49	0.45	0.45
98.29	98.26	98.82	98.87	98.50	98.19	98.58	98.68	98.56
5.793	5.825	5.817	5.817	5.793	5.821	5.798	5.801	5.794
nd	nd	nd	nd	nd	nd	nd	nd	nd
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
1.733	1.737	1.683	1.681	1.684	1.752	1.693	1.705	1.714
nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd
0.129	0.124	0.166	0.168	0.005	0.005	0.035	0.071	0.019
nd	nd	nd	nd	nd	nd	nd	nd	0.002
0.011	0.011	0.008	0.007	nd	0.001	0.013	0.002	0.002
nd	nd	nd	nd	nd	nd	nd	nd	nd
0.001	0.001	nd	nd	nd	nd	nd	nd	nd
1.126	1.127	1.144	1.143	1.308	1.239	1.259	1.220	1.262
3.000	3.000	3.000	3.000	2.997	2.997	3.000	2.998	3.000

nd	nd	nd	nd	0.008	0.019	0.016	0.037	0.015
0.602	0.564	0.646	0.646	0.711	0.620	0.736	0.639	0.723
nd	nd	nd	nd	0.008	0.008	nd	0.004	0.004
0.398	0.434	0.354	0.354	0.272	0.352	0.247	0.321	0.258
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.496	3.501	3.499	3.483	3.414	3.477	3.410	3.463	3.467
0.504	0.498	0.501	0.516	0.585	0.522	0.589	0.536	0.532

4.3	3.5	3.3	3.7	7.3	7.7	6.8	6.0	6.9
0.7	nd	8.0	7.1	0.8	0.6	6.6	1.1	nd
106	122	153	180	172	150	175	173	129
217	212	408	444	50.9	36.0	122	46.6	11.0
1.3	1.4	1.2	1.2	0.6	0.5	0.3	0.7	0.6
1.9	3.1	nd	2.9	4.2	5.2	8.8	6.3	3.9
221	238	2618	3047	nd	nd	nd	nd	nd
nd	0.4	2.1	3.1	nd	0.6	0.6	0.6	nd
1070	1029	1822	1973	429	420	520	1861	1420
0.13	0.13	0.23	0.25	0.05	0.05	0.07	0.23	0.18
15.1	14.6	145	193	nd	0.6	1.4	2.5	0.8
334	317	234	263	646	605	617	469	490
4.1	4.2	4.6	6.0	4.8	5.2	4.6	6.0	6.2
0.5	0.5	nd	0.5	1.4	1.2	1.4	1.3	1.3
1.4	1.1	2.0	2.1	nd	nd	nd	0.4	0.1
4.7	4.5	7.5	5.8	10.4	8.1	12.1	4.9	2.5
nd	nd	nd	nd	0.6	0.2	nd	0.6	0.7
4.6	4.8	5.3	5.7	9.6	8.8	10.0	9.0	9.8
15.4	18.7	15.6	16.5	55.3	53.8	38.4	45.9	86.8

511-8	511-1	511-3	510-2	510-8	510-6	510-3	510-11	511-2
3.38	2.35	2.33	4.38	2.77	2.65	4.15	4.79	1.26
None	None	None	None	None	None	None	None	None
Lt., very sl. grayish, bluish violet	Lt., very sl. grayish, greenish blue with pink "mercedes"	Very lt., green-blue with violet-purple areas	Med.-lt., sl. grayish, violetish blue	Lt., str., very sl. grayish blue	Lt. greenish blue	Lt., str., green-blue	Str., sl. yellowish green	Very lt., blue-green
Lt. greenish gray	Lt. grayish green with pink core	(No change)	Med.-lt. bluish grayish green	Grayish green	(No change)	(No change)	(No change)	(No obvious change to bluish green)
36.69	36.58	36.58	36.65	36.59	36.68	36.62	36.66	36.63
nd	nd	nd	nd	nd	nd	nd	nd	nd
11.02	10.95	10.97	11.00	10.99	10.97	10.97	10.98	10.99
42.38	41.45	42.39	41.95	42.40	42.20	42.19	42.00	42.42
nd	nd	nd	0.01	0.01	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	0.18	0.10
0.05	1.97	0.04	1.50	0.22	0.41	0.01	1.00	0.03
nd	nd	0.02	0.01	nd	0.01	0.02	0.04	nd
0.13	0.08	0.13	0.25	0.13	0.12	0.12	0.02	nd[d]
0.45	0.29	0.15	0.64	0.48	0.16	0.92	0.22	0.23
nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd
2.07	1.84	1.99	1.83	2.00	1.94	2.04	1.87	2.02
2.32	2.31	2.33	1.78	2.08	2.21	1.63	2.20	2.36
0.028	0.032	0.031	0.026	0.032	0.036	nd	nd	nd
3.33	3.32	3.28	3.34	3.32	3.24	3.28	3.35	3.35
1.00	0.96	1.06	0.95	1.00	1.16	1.05	0.92	0.94
99.46	99.79	98.98	99.93	99.25	99.13	98.86	99.44	99.08
0.42	0.40	0.45	0.40	0.42	0.49	0.44	0.39	0.39
99.04	99.38	98.54	99.53	98.83	98.64	98.42	99.05	98.69
5.786	5.803	5.793	5.792	5.784	5.810	5.802	5.803	5.791
nd	nd	nd	nd	nd	nd	nd	nd	nd
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000
6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
1.664	1.554	1.706	1.605	1.683	1.691	1.681	1.639	1.695
nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	0.024	0.013
0.007	0.265	0.005	0.201	0.029	0.055	0.001	0.134	0.004
nd	nd	0.004	0.004	nd	0.003	0.004	0.008	nd
0.015	0.010	0.015	0.030	0.016	0.014	0.015	0.003	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd
nd	nd	nd	nd	nd	nd	nd	nd	nd
1.315	1.171	1.270	1.161	1.270	1.237	1.299	1.191	1.286
3.000	3.000	3.000	3.001	2.999	3.000	3.000	2.999	2.998

0.077	0.050	0.025	0.108	0.081	0.026	0.157	0.037	0.039
0.708	0.709	0.717	0.545	0.637	0.678	0.501	0.674	0.723
0.006	0.006	0.006	0.005	0.006	0.007	nd	nd	nd
0.210	0.234	0.252	0.342	0.276	0.289	0.340	0.287	0.236
1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
3.502	3.518	3.468	3.524	3.501	3.419	3.471	3.541	3.530
0.498	0.481	0.532	0.476	0.499	0.580	0.528	0.459	0.469

54.1	13.8	25.1	37.9	43.5	6.6	96.2	9.3	82.0
nd	1.1	1.1	0.8	1.8	1.4	nd	91.6	0.2
148	166	127	154	162	191	76.3	227	77.6
15.6	48.8	14.1	54.0	40.3	38.9	15.0	289	17.8
0.7	0.9	0.8	0.7	0.7	0.7	0.7	12.6	0.7
9.4	1.0	7.0	nd	4.4	4.8	4.2	5.5	3.2
nd	62.8	nd	nd	nd	nd	nd	4047	nd
0.6	0.9	0.4	0.6	0.3	0.3	nd	0.3	0.6
2311	2720	2799	4557	4342	2102	3802	2143	2745
0.29	0.34	0.35	0.57	0.54	0.26	0.48	0.27	0.34
0.7	12.5	1.4	1.5	2.5	1.4	0.6	94.7	0.4
368	508	390	412	379	517	624	372	539
11.2	9.9	14.3	10.2	8.4	5.9	6.8	8.6	7.5
1.8	2.7	2.0	3.1	4.4	1.4	nd	1.2	nd
nd	0.8	nd	0.5	0.8	0.7	nd	0.7	nd
1.8	5.8	1.9	7.2	6.1	4.0	0.3	1.1	0.2
1.9	1.3	1.5	3.6	3.3	0.7	0.6	0.8	0.6
73.6	41.8	49.0	140	115	10.4	292	72.7	266
2055	435	1234	1364	1144	61.3	3445	87.7	3335

511-5	510-9	511-6
2.84	4.55	2.14
None	None	None
Med, str., green	Med.-lt., str., yellow-green	Med.-lt., sl. yellowish green
(No change)	(No change)	(No change)
36.63	36.69	36.66
nd	nd	nd
10.96	11.01	11.00
41.97	42.17	42.46
nd	nd	nd
nd	nd	0.01
0.92	0.52	0.34
nd	0.03	nd
0.06	0.15	0.02
0.12	0.54	0.37
nd	nd	nd
nd	nd	nd
1.90	1.99	1.97
2.30	2.14	2.08
nd	nd	0.035
3.23	3.34	3.35
1.16	0.97	0.94
99.29	99.56	99.23
0.49	0.41	0.39
98.80	99.15	98.84
5.808	5.792	5.791
nd	nd	nd
6.000	6.000	6.000
3.000	3.000	3.000
6.000	6.000	6.000
1.654	1.639	1.696
nd	nd	nd
nd	nd	0.001
0.124	0.070	0.045
nd	0.007	nd
0.008	0.018	0.002
nd	nd	nd
nd	nd	nd
1.212	1.266	1.254
2.997	2.999	2.999

0.021	0.091	0.062
0.708	0.654	0.637
nd	nd	0.007
0.269	0.255	0.294
1.000	1.000	1.000
3.415	3.518	3.531
0.584	0.482	0.468

79.5	166	119
10.7	91.7	97.4
209	151	140
356	262	333
1.3	1.7	1.8
8.2	3.9	8.1
5775	3263	5123
0.3	0.2	nd
3863	1420	1062
0.48	0.18	0.13
188	28.1	42.8
247	292	291
20.8	23.6	21.2
nd	0.9	1.0
1.0	nd	nd
3.3	10.0	11.7
nd	nd	nd
128	78.9	80.3
3163	8455	6429