

Appendix 1

Representative EMPA data for two generation of sphalerite: sphalerite I [1–13], sphalerite II [14–33]

Analyzes	wt.%					Total	apfu Σ1 Cation				
	Fe	Zn	Cu	Cd	S		Fe	Zn	Cu	Cd	S
1	3.53	57.95	3.45	1.18	32.56	99.41	0.06	0.87	0.05	0.01	0.99
2	4.71	55.65	4.71	1.10	32.81	99.66	0.08	0.83	0.07	0.01	1.00
3	3.80	58.39	3.60	1.11	32.80	100.49	0.07	0.87	0.06	0.01	1.00
4	3.99	57.97	3.67	1.04	32.27	99.36	0.07	0.87	0.06	0.01	0.99
5	3.59	59.23	3.09	1.08	32.30	99.81	0.06	0.89	0.05	0.01	0.99
6	4.76	55.05	5.01	0.98	32.60	98.87	0.08	0.83	0.08	0.01	1.00
7	3.74	58.66	3.47	0.98	32.34	99.83	0.07	0.88	0.05	0.01	0.99
8	3.38	59.86	1.77	0.67	33.29	99.13	0.06	0.90	0.03	0.01	1.02
9	4.04	59.28	2.61	0.66	33.48	100.29	0.07	0.89	0.04	0.01	1.02
10	1.27	64.14	1.94	0.33	32.82	100.50	0.02	0.96	0.03	<0.01	1.00
11	3.44	58.07	4.18	0.25	33.56	99.56	0.06	0.87	0.06	0.01	1.03
12	3.13	58.58	4.53	0.36	32.20	98.82	0.05	0.88	0.07	0.01	0.98
13	0.42	63.96	2.90	0.47	33.51	101.27	0.01	0.96	0.04	0.00	1.02
14	0.07	65.85	0.21	0.59	32.95	99.69	0.00	0.99	0.00	0.01	1.01
15	0.12	65.83	0.41	0.42	32.69	99.60	0.00	0.99	0.01	0.00	1.00
16	0.08	65.72	0.27	1.09	32.71	99.95	0.00	0.98	0.00	0.01	1.00
17	0.10	65.82	0.52	0.65	32.64	99.80	0.00	0.99	0.01	0.01	1.00
18	0.12	65.60	0.22	1.19	32.79	100.00	0.00	0.98	0.00	0.01	1.00
19	0.55	65.26	0.59	1.16	32.76	100.39	0.01	0.98	0.01	0.01	1.00
20	0.20	66.17	0.24	0.99	32.76	100.48	0.00	0.99	0.00	0.01	1.00
21	0.23	65.93	0.30	1.16	32.75	100.45	0.00	0.99	0.00	0.01	1.00
22	1.15	64.92	0.82	0.56	32.80	100.36	0.02	0.97	0.01	0.00	1.00
23	0.22	65.44	0.50	1.10	32.68	100.06	0.00	0.98	0.01	0.01	1.00
24	0.91	63.24	1.56	0.48	32.79	99.11	0.02	0.95	0.02	0.00	1.00
25	0.76	64.53	0.72	0.62	32.83	99.58	0.01	0.97	0.01	0.01	1.00
26	0.49	64.57	0.29	0.83	32.88	99.17	0.01	0.97	0.00	0.01	1.00
27	0.11	65.78	0.41	0.79	32.76	99.97	0.00	0.99	0.01	0.01	1.00
28	0.07	65.72	0.40	0.76	32.84	99.87	0.00	0.98	0.01	0.01	1.00
29	0.24	65.46	0.94	0.32	32.85	99.86	0.00	0.98	0.01	0.00	1.00
30	0.71	64.70	1.28	0.83	33.00	100.57	0.01	0.97	0.02	0.01	1.01
31	0.14	63.08	0.65	2.45	32.65	99.04	0.00	0.94	0.01	0.02	1.00
32	0.17	62.50	0.64	3.40	32.42	99.23	0.00	0.94	0.01	0.03	0.99
33	0.60	65.01	0.83	0.63	32.42	99.54	0.01	0.97	0.01	0.01	0.99

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, Co were omitted from table.

Representative EMPA data arsenopyrite [1–10] and pyrite [11–12]

Analyzes	wt.%					Total	apfu Σ1 Cation				
	Fe	Zn	Co	S	As		Fe	Zn	Co	S	As
1	34.62	0.00	0.02	20.02	45.59	100.56	1.00	–	0.00	1.00	0.98
2	34.54	0.01	0.03	20.04	45.89	100.75	1.00	0.00	0.00	1.01	0.99
3	34.59	0.01	0.01	19.69	46.3	100.91	1.00	0.00	0.00	0.99	0.99
4	34.51	0.00	0.03	19.89	45.97	100.65	1.00	–	0.00	1.00	0.99
5	34.38	0.05	0.03	19.82	45.96	100.46	1.00	0.00	0.00	1.00	0.99
6	34.78	0.01	0.01	19.98	45.66	100.90	1.00	0.00	0.00	1.00	0.97
7	34.70	0.02	0.05	20.00	46.09	101.20	0.99	0.00	0.00	1.00	0.98
8	34.31	0.09	0.01	20.18	45.81	101.05	0.99	0.00	0.00	1.01	0.98
9	34.75	0.02	0.00	20.07	45.36	100.38	1.00	0.00	–	1.00	0.97
10	34.64	0.02	0.00	20.12	45.40	100.30	1.00	0.00	–	1.01	0.97
11	46.80	0.04	0.00	53.71	0.01	100.56	1.00	0.00	–	1.99	0.00
12	46.43	0.03	0.00	53.16	0.01	99.73	1.00	0.00	–	1.99	0.00

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, Sb, In, Te, Cu, Ni, Bi, Au were omitted from table.

Representative EMPA data for chalcopyrite I [1–6] and II [7–23]

Analyzes	wt.%					Total	apfu Σ1 Cation				
	Cu	Zn	Fe	Co	S		Cu	Zn	Fe	Co	S
1	34.42	0.00	29.72	0.26	34.15	98.63	1.00	–	0.99	0.01	1.97
2	34.60	0.00	29.57	0.09	34.33	98.68	1.01	–	0.98	0.00	1.99
3	34.54	0.00	29.23	0.06	34.28	98.16	1.02	–	0.98	0.00	2.00
4	34.54	0.00	29.46	0.15	34.11	98.32	1.01	–	0.98	0.00	1.98
5	34.56	0.06	29.69	0.04	34.37	98.88	1.01	0.00	0.99	0.00	1.99
6	34.44	0.00	30.12	0.00	33.88	98.4	1.00	–	1.00	–	1.95
7	34.62	0.00	29.61	0.00	34.36	98.67	1.01	–	0.99	–	2.02
8	34.5	0.00	29.82	0.00	34.86	99.23	1.01	–	0.99	–	2.03
9	34.51	0.00	29.62	0.00	34.97	99.16	1.01	–	0.98	–	2.02
10	34.74	0.00	29.64	0.00	34.94	99.46	1.01	–	0.99	–	2.02
11	34.52	0.00	29.86	0.00	34.88	99.4	1.01	–	0.99	–	2.02
12	34.46	0.00	29.6	0.00	34.65	98.77	1.01	–	0.99	–	2.02
13	34.48	0.00	29.86	0.00	34.85	99.32	1.01	–	0.99	–	2.01
14	34.63	0.00	29.86	0.00	34.83	99.43	1.01	–	0.99	–	2.04
15	34.39	0.00	29.74	0.00	35.19	99.38	1.01	–	0.99	–	2.03
16	34.28	0.00	29.64	0.00	34.88	98.88	1.01	–	0.99	–	2.00
17	34.77	0.00	29.69	0.00	34.58	99.08	1.01	–	0.99	–	2.01
18	34.73	0.00	29.71	0.00	34.73	99.26	1.01	–	0.99	–	2.00
19	34.65	0.00	29.63	0.00	34.52	98.86	1.01	–	0.99	–	1.98
20	34.66	0.00	29.8	0.00	34.27	98.81	1.02	–	0.98	–	2.02
21	34.82	0.00	29.24	0.00	34.68	98.81	1.02	–	0.98	–	2.05
22	34.5	0.00	29.05	0.00	35.01	98.66	1.00	–	1.00	–	2.00
23	34.3	0.00	30.00	0.00	34.58	99.03	0.99	–	1.01	–	2.01

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, Sb, In, Te, Cu, Ni, Bi, Au were omitted from table.

Representative EMPA data for tetrahedrite group minerals: tennantite-(Zn) [1–14], tetrahedrite-(Fe) [15–21], tetrahedrite-(Zn) [21–32], tetrahedrite-(Fe) [33]

Anal-yses	wt.%							Total	apfu Σ16 Cations						
	Sb	Cu	Fe	Zn	S	Bi	As		Sb	Cu	Fe	Zn	S	Bi	As
1	0.02	42.39	3.18	5.91	27.85	0.08	20.65	100.34	0.00	9.77	0.83	1.32	12.73	0.01	4.04
2	1.39	43.55	3.34	4.32	28.39	0.00	19.39	100.44	0.17	10.14	0.88	0.98	13.10	–	3.83
3	3.69	42.81	2.71	5.71	28.02	0.00	17.27	100.33	0.45	10.06	0.72	1.30	13.06	–	3.44
4	2.17	43.39	3.40	4.38	28.00	0.00	18.90	100.37	0.26	10.10	0.90	0.99	12.92	–	3.73
5	3.81	41.64	1.66	6.66	27.81	0.00	17.61	99.47	0.47	9.94	0.45	1.55	13.16	–	3.57
6	2.64	43.25	3.05	4.82	28.10	0.00	18.52	100.49	0.32	10.10	0.81	1.09	13.00	–	3.67
7	0.08	43.95	2.50	5.33	28.40	0.00	20.53	100.93	0.01	10.12	0.65	1.19	12.96	–	4.01
8	0.04	43.66	2.47	5.36	28.79	0.00	20.19	100.58	0.00	10.14	0.65	1.21	13.26	–	3.98
9	0.11	44.21	2.94	4.80	28.45	0.00	20.36	100.97	0.01	10.16	0.77	1.07	12.96	–	3.97
10	0.04	44.02	2.86	5.09	28.31	0.00	20.59	101.06	0.00	10.09	0.75	1.13	12.87	–	4.00
11	0.01	44.24	3.24	4.43	28.52	0.00	20.50	101.13	0.00	10.15	0.85	0.99	12.97	–	3.99
12	0.01	44.23	3.25	4.52	28.43	0.00	20.45	101.06	0.00	10.15	0.85	1.01	12.93	–	3.98
13	0.03	44.18	3.11	4.76	28.35	0.00	20.41	100.95	0.00	10.14	0.81	1.06	12.90	–	3.97
14	0.06	44.14	3.19	4.55	28.56	0.00	20.39	100.93	0.01	10.16	0.84	1.02	13.02	–	3.98
15	1.78	43.84	4.55	2.89	28.42	0.00	19.31	100.84	0.21	10.14	1.20	0.65	13.03	–	3.79
16	2.52	43.61	4.33	3.20	28.19	0.02	18.88	100.86	0.30	10.11	1.14	0.72	12.95	0.00	3.71
17	2.71	43.37	4.29	3.31	28.37	0.03	18.64	100.91	0.33	10.09	1.14	0.75	13.08	0.00	3.68
18	2.88	43.59	4.07	3.52	27.87	0.00	18.50	100.59	0.35	10.12	1.08	0.79	12.83	–	3.64
19	3.18	43.30	3.70	4.04	27.98	0.00	18.26	100.64	0.39	10.09	0.98	0.91	12.92	–	3.61
20	2.84	42.97	3.74	3.78	28.12	0.00	18.43	100.05	0.35	10.10	1.00	0.86	13.10	–	3.67
21	0.82	42.96	3.85	3.93	28.49	0.00	19.70	99.89	0.10	10.06	1.03	0.89	13.22	–	3.91
22	25.19	39.98	0.52	7.34	25.28	–	2.37	100.84	3.34	10.16	0.15	1.81	12.74	–	0.51
23	24.41	39.67	0.63	7.15	25.60	–	2.84	100.34	3.26	10.16	0.18	1.78	12.99	–	0.62
24	27.52	39.05	0.66	7.16	24.43	–	1.06	100.07	3.70	10.06	0.19	1.79	12.48	–	0.23
25	27.20	39.22	0.64	7.19	24.68	–	1.33	100.38	3.65	10.07	0.19	1.79	12.56	–	0.29
26	26.64	39.11	0.64	7.35	24.79	–	1.43	100.02	3.58	10.07	0.19	1.84	12.65	–	0.31
27	27.92	39.22	0.53	7.45	24.62	–	0.94	100.74	3.73	10.05	0.15	1.86	12.50	–	0.20

Anal-yses	wt.%							Total	apfu Σ16 Cations						
	Sb	Cu	Fe	Zn	S	Bi	As		Sb	Cu	Fe	Zn	S	Bi	As
28	26.21	39.26	0.57	7.42	24.59	–	1.83	100.06	3.51	10.06	0.17	1.85	12.49	–	0.40
29	23.70	39.68	0.78	7.02	24.69	–	3.81	99.69	3.14	10.08	0.22	1.73	12.43	–	0.82
30	27.13	39.16	0.66	7.23	24.51	–	1.53	100.27	3.63	10.04	0.19	1.80	12.45	–	0.33
31	17.13	38.64	1.41	7.15	24.13	5.26	4.79	98.72	2.31	9.99	0.42	1.79	12.36	0.41	1.05
32	20.32	38.83	1.62	7.29	24.23	2.40	4.64	99.57	2.69	9.84	0.47	1.80	12.17	0.18	1.00
33	16.57	38.61	4.31	4.03	25.27	–	12.37	101.16	2.15	9.91	1.19	0.88	13.94	–	1.85

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, In, Te, Hg, Au were omitted from table.

Representative EMPA data for Bi-rich tetrahedrite group minerals [1–11]

Anal-yses	wt.%							Total	apfu Σ16 Cations						
	Sb	Cu	Fe	Zn	S	Bi	As		Sb	Cu	Fe	Zn	S	Bi	As
1	–	39.69	2.35	5.11	25.17	16.73	11.20	100.43	–	10.24	0.69	1.28	12.87	1.31	2.45
2	0.07	37.16	1.43	5.87	23.39	23.88	7.94	100.16	0.01	10.12	0.44	1.55	12.62	1.98	1.83
3	0.07	37.22	1.43	5.92	23.19	23.05	8.23	99.51	0.01	10.12	0.44	1.56	12.49	1.91	1.90
4	0.09	37.11	1.26	5.88	22.89	25.31	7.12	100.16	0.01	10.18	0.39	1.57	12.45	2.11	1.66
5	0.03	37.28	1.45	5.97	23.36	22.55	8.18	99.19	0.00	10.15	0.45	1.58	12.61	1.87	1.89
6	0.08	36.56	1.28	6.17	22.86	26.44	7.01	100.93	0.01	10.02	0.40	1.64	12.42	2.20	1.63
7	0.13	39.59	2.10	5.91	24.69	15.78	12.01	100.42	0.02	10.07	0.61	1.46	12.45	1.22	2.59
8	0.11	39.36	2.11	5.56	24.70	16.17	11.38	99.65	0.01	10.17	0.62	1.40	12.65	1.27	2.49
9	0.05	38.98	2.14	6.12	24.83	15.64	11.78	99.72	0.01	10.02	0.62	1.53	12.65	1.22	2.57
10	0.18	39.72	2.64	5.41	25.07	13.14	12.65	98.95	0.02	10.11	0.76	1.34	12.65	1.02	2.73
11	0.24	38.56	1.84	6.77	24.81	14.34	12.11	98.86	0.03	9.94	0.54	1.70	12.67	1.12	2.65

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, In, Te, Hg, Au were omitted from table.

Representative EMPA data for chalcocite [1–23]

Analyzes	wt.%					Total	apfu Σ1 Cation				
	S	Ag	Pb	Cu	Fe		S	Ag	Pb	Cu	Fe
1	22.96	–	0.01	75.78	2.08	100.94	1.16	–	0.00	1.94	0.06
2	22.67	0.07	0.02	77.23	0.80	100.83	1.15	0.00	0.00	1.98	0.02
3	22.94	0.04	0.04	75.85	1.35	100.34	1.17	0.00	0.00	1.96	0.04
4	21.55	0.09	0.05	77.51	0.93	100.31	1.09	0.00	0.00	1.97	0.03
5	22.36	0.05	0.12	75.77	2.80	101.15	1.12	0.00	0.00	1.92	0.08
6	22.02	0.05	0.05	77.39	0.84	100.38	1.11	0.00	0.00	1.97	0.02
7	22.22	0.05	0.02	75.53	0.76	98.66	1.15	0.00	0.00	1.98	0.02
8	22.67	0.18	0.01	75.80	1.24	99.93	1.16	0.00	0.00	1.96	0.04
9	22.34	0.04	0.04	76.30	1.66	100.45	1.13	0.00	0.00	1.95	0.05
10	21.91	0.06	0.01	77.01	1.50	100.53	1.10	0.00	0.00	1.96	0.04
11	21.03	–	0.05	77.79	1.69	100.59	1.05	–	0.00	1.95	0.05
12	21.26	0.04	0.05	79.09	1.47	101.97	1.04	0.00	0.00	1.96	0.04
13	21.49	0.04	0.07	78.99	1.45	102.22	1.06	0.00	0.00	1.96	0.04
14	21.37	0.22	–	80.74	0.06	102.39	1.05	0.00	–	2.00	0.00
15	22.85	0.67	–	77.60	0.04	101.16	1.16	0.01	–	1.99	0.00
16	21.12	0.39	–	80.37	0.01	101.89	1.04	0.01	–	1.99	0.00
17	19.98	0.32	0.02	79.91	0.02	100.24	0.99	0.00	0.00	1.99	0.00
18	19.29	0.17	–	80.35	0.00	99.81	0.95	0.00	–	2.00	0.00
19	19.38	0.23	0.01	80.37	0.01	99.99	0.95	0.00	0.00	2.00	0.00
20	19.48	0.18	–	80.62	0.01	100.29	0.96	0.00	–	2.00	0.00
21	20.18	0.18	0.09	80.28	0.01	100.73	0.99	0.00	0.00	2.00	0.00
22	22.20	0.02	0.07	78.09	0.07	100.45	1.13	0.00	0.00	2.00	0.00
23	22.02	0.03	0.06	78.42	0.06	100.60	1.11	0.00	0.00	2.00	0.00

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Se, Te, As, Au were omitted from table.

Representative EMPA data for wittichenite [1–4]

Ana-lyzes	wt. %							Total	apfu Σ6 Cations						
	Ag	Fe	Se	Cu	Bi	S	Pb		Ag	Fe	Se	Cu	Bi	S	Pb
1	0.36	0.01	0.07	40.27	41.86	19.34	1.23	103.18	0.02	0.00	0.00	3.00	0.95	2.86	0.03
2	0.28	0.01	0.08	39.81	42.05	19.65	1.28	103.21	0.01	0.00	0.00	2.99	0.96	2.93	0.03
3	0.34	–	0.07	39.93	41.62	19.57	0.19	101.78	0.01	–	0.00	3.02	0.96	2.93	0.00
4	0.45	0.02	0.67	41.19	41.44	19.68	–	103.52	0.02	0.00	0.04	3.04	0.93	2.88	–

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Se, Te, As, Au were omitted from table.

Representative EMPA data for betekhtinite [1–9]

Anal-yses	wt.%							Total	apfu Σ11 Cations						
	Sb	Ag	Fe	Cu	Bi	S	Pb		Sb	Ag	Fe	Cu	Bi	S	Pb
1	0.03	0.28	2.47	61.72	0.15	20.35	15.13	100.11	0.00	0.03	0.44	9.69	0.01	6.34	0.73
2	0.05	0.38	2.41	61.67	0.14	20.37	15.85	100.87	0.00	0.04	0.43	9.66	0.01	6.33	0.76
3	0.06	0.35	2.32	61.37	0.19	20.30	16.25	100.91	0.01	0.03	0.42	9.65	0.01	6.32	0.78
4	0.04	0.32	2.38	61.59	0.10	20.42	15.84	100.71	0.00	0.03	0.43	9.67	0.00	6.36	0.76
5	0.08	0.32	2.33	62.28	0.20	20.59	13.98	99.80	0.01	0.03	0.42	9.76	0.01	6.40	0.67
6	0.10	0.25	2.33	61.77	0.24	20.16	15.18	100.13	0.01	0.02	0.42	9.70	0.01	6.27	0.73
7	0.04	0.25	2.36	61.46	0.11	20.55	17.27	102.05	0.00	0.02	0.42	9.62	0.01	6.38	0.83
8	0.01	0.27	2.39	61.73	0.10	20.04	16.60	101.29	0.00	0.02	0.42	9.63	0.00	6.20	0.79
9	0.04	0.24	2.37	62.14	0.20	20.49	16.36	102.01	0.00	0.02	0.42	9.65	0.01	6.31	0.78

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Se, As were omitted from table.

Representative EMPA data for galena I [1–9] and II [10–19]

Ana-lyzes	wt. %							Total	apfu Σ1 Cations						
	S	Bi	Ag	Pb	Cu	Fe	Se		S	Bi	Ag	Pb	Cu	Fe	Se
1	13.54	0.18	0.17	86.06	0.19	0.03	0.00	100.21	1.00	0.00	0.00	0.99	0.01	0.00	–
2	13.53	0.26	0.12	86.16	0.06	0.03	0.00	100.21	1.00	0.00	0.00	0.99	0.00	0.00	–
3	13.52	0.21	0.13	86.21	0.15	0.05	0.17	100.49	0.99	0.00	0.00	0.98	0.01	0.00	0.01
4	13.71	0.24	0.02	85.93	0.20	0.04	0.19	100.4	1.01	0.00	0.00	0.98	0.01	0.00	0.01
5	13.32	3.37	1.79	79.98	0.07	0.02	0.20	98.82	0.98	0.04	0.04	0.91	0.00	0.00	0.01
6	13.36	0.12	0.05	84.73	0.01	0.40	0.00	98.75	1.00	0.00	0.00	0.98	0.00	0.02	–
7	13.36	4.61	1.51	78.57	0.00	0.02	0.30	98.62	0.98	0.05	0.03	0.90	–	0.00	0.01
8	13.5	3.26	1.30	80.50	0.03	0.06	0.49	99.49	0.98	0.04	0.03	0.91	0.00	0.00	0.01
9	13.24	3.13	1.44	79.54	0.07	0.08	0.50	98.14	0.98	0.04	0.03	0.91	0.00	0.00	0.01
10	13.28	1.05	–	86.33	0.02	0.03	–	100.71	0.98	0.01	–	0.99	0.00	0.00	–
11	13.14	1.12	–	85.92	0.02	0.01	–	100.21	0.97	0.01	–	0.99	0.00	0.00	–
12	13.05	1.09	–	86.13	–	0.02	–	100.28	0.97	0.01	–	0.99	–	0.00	–
13	13.07	1.09	–	86.32	–	0.03	0.05	100.55	0.96	0.01	–	0.99	–	0.00	0.00
14	13.31	1.13	–	85.86	–	0.03	0.01	100.34	0.99	0.01	–	0.99	–	0.00	0.00
15	12.88	0.41	–	85.75	0.82	0.03	0.44	100.32	0.92	0.00	–	0.95	0.03	0.00	0.01
16	13.43	0.56	0.03	85.85	0.71	0.04	0.13	100.75	0.97	0.01	0.00	0.96	0.03	0.00	0.00
17	13.01	1.09	–	86.45	0.01	0.02	–	100.59	0.96	0.01	–	0.99	0.00	0.00	–
18	12.88	0.37	–	86.79	0.02	0.01	0.00	100.07	0.95	0.00	–	0.99	0.00	0.00	0.00
19	12.89	1.01	–	86.66	0.22	0.04	–	100.82	0.94	0.01	–	0.98	0.01	0.00	–

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, As were omitted from table.

Representative EMPA data for bornite I [1–5] and II [6–25]

Ana-lyzes	wt. %							Total	apfu Σ6 Cations						
	S	Bi	Ag	Pb	Cu	Zn	Fe		S	Bi	Ag	Pb	Cu	Zn	Fe
1	27.37	–	0.09	–	58.12	0.08	12.73	98.39	4.48	–	0.00	–	4.80	0.01	1.20
2	26.63	–	0.07	–	59.95	0.18	12.43	99.26	4.27	–	0.00	–	4.85	0.01	1.14

Ana-lyzes	wt. %							Total	apfu Σ6 Cations						
	S	Bi	Ag	Pb	Cu	Zn	Fe		S	Bi	Ag	Pb	Cu	Zn	Fe
3	26.37	–	0.05	–	60.02	0.26	12.24	98.93	4.24	–	0.00	–	4.87	0.02	1.13
4	26.45	–	0.05	–	61.04	–	12.40	99.94	4.18	–	0.00	–	4.87	–	1.13
5	26.39	–	0.09	–	61.64	–	12.25	100.37	4.15	–	0.00	–	4.89	–	1.11
6	25.77	–	0.05	0.05	62.89	0.21	10.64	99.74	4.07	–	0.00	0.00	5.01	0.02	0.97
7	26.06	–	0.06	0.05	62.01	–	11.76	100.00	4.11	–	0.00	0.00	4.93	–	1.06
8	25.45	–	0.02	0.03	63.38	–	10.94	99.88	3.99	–	0.00	0.00	5.01	–	0.98
9	25.66	–	0.03	0.08	63.15	–	10.85	99.80	4.04	–	0.00	0.00	5.02	–	0.98
10	25.80	–	0.01	–	63.25	–	10.91	100.01	4.05	–	0.00	–	5.02	–	0.98
11	25.54	–	–	0.03	63.37	–	10.90	99.87	4.01	–	–	0.00	5.02	–	0.98
12	25.62	–	–	0.03	62.57	–	11.61	99.88	4.02	–	–	0.00	4.95	–	1.05
13	25.59	–	–	0.08	62.51	–	11.45	99.76	4.03	–	–	0.00	4.96	–	1.03
14	25.89	–	–	0.06	62.89	–	10.93	99.90	4.09	–	–	0.00	5.01	–	0.99
15	25.64	–	0.03	0.03	63.37	–	10.89	100.07	4.02	–	0.00	0.00	5.02	–	0.98
16	25.58	–	–	0.07	63.34	–	10.85	99.96	4.02	–	–	0.00	5.02	–	0.98
17	25.64	–	0.01	0.06	63.27	–	10.73	99.77	4.04	–	0.00	0.00	5.03	–	0.97
18	27.15	–	0.02	0.06	61.14	–	11.45	99.89	4.35	–	0.00	0.00	4.94	–	1.05
19	27.20	–	0.03	0.05	60.95	–	11.58	99.87	4.36	–	0.00	0.00	4.93	–	1.07
20	26.81	–	0.03	–	61.33	–	11.38	99.66	4.29	–	0.00	–	4.95	–	1.05
21	26.89	–	0.01	0.03	61.42	–	11.33	99.75	4.30	–	0.00	0.00	4.96	–	1.04
22	25.62	–	0.02	0.04	63.05	–	10.79	99.58	4.04	–	0.00	0.00	5.02	–	0.98
23	25.66	–	0.07	0.07	62.98	–	10.75	99.60	4.05	–	0.00	0.00	5.02	–	0.98
24	25.68	–	–	0.05	63.06	–	10.93	99.75	4.04	–	–	0.00	5.01	–	0.99
25	25.70	–	–	0.04	63.03	–	10.92	99.70	4.05	–	–	0.00	5.01	–	0.99

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Au, Se, Te, Sb, As were omitted from table.

Representative EMPA data for stannoidite I [1–5] and II [6–15]

Analyzes	wt.%						Total	apfu Σ13 Cations					
	Fe	Sn	Ag	Zn	Cu	S		Fe	Sn	Ag	Zn	Cu	S
1	11.75	17.69	0.02	3.36	38.29	29.16	100.27	2.70	1.91	0.00	0.66	7.73	11.67
2	10.57	18.04	0.05	4.00	38.38	29.45	100.49	2.44	1.96	0.01	0.79	7.80	11.86
3	10.17	18.43	0.06	3.74	38.81	29.35	100.56	2.35	2.01	0.01	0.74	7.89	11.83
4	10.43	18.77	0.05	3.32	38.26	29.60	100.43	2.43	2.06	0.01	0.66	7.84	12.02
5	10.39	18.90	0.05	3.13	38.88	29.67	101.02	2.41	2.06	0.01	0.62	7.91	11.97
6	9.59	17.88	–	3.63	40.29	28.66	100.05	2.21	1.94	–	0.71	8.15	11.49
7	9.32	17.95	–	3.75	39.52	28.49	99.03	2.17	1.97	–	0.75	8.11	11.59
8	9.47	17.83	–	3.64	39.37	28.17	98.47	2.21	1.96	–	0.73	8.10	11.48
9	9.00	18.01	–	3.93	39.44	27.85	98.22	2.11	1.98	–	0.79	8.12	11.37
10	9.58	17.23	–	3.39	40.32	27.86	98.36	2.22	1.88	–	0.67	8.22	11.26
11	9.29	17.88	0.01	3.76	39.25	27.99	98.18	2.18	1.97	0.00	0.75	8.09	11.44
12	9.50	18.09	–	3.56	39.34	28.19	98.69	2.22	1.99	–	0.71	8.08	11.47
13	9.52	18.00	–	3.73	39.43	28.29	98.97	2.22	1.97	–	0.74	8.07	11.48
14	9.32	17.94	–	3.86	39.39	28.49	99.00	2.18	1.97	–	0.77	8.08	11.59
15	9.31	17.98	–	3.80	39.78	28.49	99.35	2.16	1.96	–	0.75	8.12	11.52

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Mn, Sb, As, Ga, Bi, Cd were omitted from table.

Representative EMPA data for mawsonite I [1–22] and II [23–47]

Analyzes	wt.%						Total	apfu Σ9 Cations					
	Fe	Sn	Ag	Zn	Cu	S		Fe	Sn	Ag	Zn	Cu	S
1	12.71	13.37	0.10	–	43.91	28.37	98.46	1.98	0.98	0.00	–	6.03	7.72
2	13.14	13.58	0.01	–	44.28	28.72	99.74	2.02	0.98	0.00	–	5.99	7.70
3	12.52	12.99	–	–	44.51	27.60	97.63	1.95	0.95	–	–	6.10	7.49
4	13.24	13.53	–	–	43.92	28.76	99.50	2.05	0.98	–	–	5.97	7.75
5	12.89	13.41	–	–	44.31	28.32	98.95	1.99	0.98	–	–	6.03	7.64
6	12.92	13.59	–	–	44.12	28.10	98.74	2.00	0.99	–	–	6.01	7.58

Analyzes	wt. %						Total	apfu Σ9 Cations					
	Fe	Sn	Ag	Zn	Cu	S		Fe	Sn	Ag	Zn	Cu	S
7	12.88	13.48	–	–	44.24	27.68	98.31	2.00	0.98	–	–	6.02	7.47
8	12.87	13.41	–	–	44.25	28.27	98.81	1.99	0.98	–	–	6.03	7.64
9	12.61	13.31	–	–	44.51	28.45	98.88	1.96	0.97	–	–	6.07	7.69
10	12.62	13.38	0.00	–	44.67	28.26	98.95	1.95	0.97	0.00	–	6.07	7.62
11	12.53	13.49	–	–	44.54	28.57	99.14	1.94	0.98	–	–	6.07	7.72
12	12.72	13.52	–	–	44.66	28.60	99.52	1.96	0.98	–	–	6.06	7.69
13	12.33	13.46	–	–	44.17	28.25	98.20	1.93	0.99	–	–	6.08	7.70
14	12.48	13.36	–	–	44.49	28.38	98.76	1.94	0.98	–	–	6.08	7.69
15	12.59	13.41	–	–	43.87	28.22	98.11	1.97	0.99	–	–	6.04	7.70
16	12.69	13.53	–	–	44.16	28.46	98.86	1.97	0.99	–	–	6.04	7.71
17	12.67	13.50	0.01	–	44.36	28.17	98.72	1.97	0.99	0.00	–	6.05	7.61
18	12.63	13.48	0.03	–	44.17	28.53	98.90	1.97	0.99	0.00	–	6.04	7.74
19	12.92	13.52	–	–	44.09	28.11	98.70	2.00	0.99	–	–	6.01	7.59
20	12.83	13.51	–	–	43.79	28.24	98.40	2.00	0.99	–	–	6.01	7.68
21	13.07	13.52	–	–	44.06	28.02	98.69	2.02	0.98	–	–	5.99	7.56
22	12.85	13.42	0.02	–	44.25	28.20	98.78	1.99	0.98	0.00	–	6.03	7.61
23	13.04	13.64	0.32	0.09	40.55	28.66	96.35	2.12	1.04	0.03	0.01	5.80	8.12
24	13.42	13.58	0.33	0.13	40.88	28.65	97.03	2.16	1.03	0.03	0.02	5.77	8.02
25	12.73	13.41	–	–	44.84	29.08	100.07	1.96	0.97	–	–	6.07	7.80
26	12.51	13.42	0.01	0.05	44.41	28.88	99.29	1.94	0.98	0.00	0.01	6.07	7.82
27	12.58	13.41	–	–	44.41	29.20	99.65	1.95	0.98	–	–	6.06	7.90
28	13.22	13.15	–	–	44.70	29.49	100.57	2.03	0.95	–	–	6.02	7.88
29	13.24	13.15	0.00	0.01	44.44	29.54	100.39	2.04	0.95	0.00	0.00	6.01	7.92
30	13.49	13.21	–	0.01	44.40	29.22	100.35	2.07	0.95	–	0.00	5.98	7.80
31	13.36	13.27	–	–	44.47	29.93	101.04	2.05	0.96	–	–	5.99	8.00
32	13.32	13.42	0.02	–	44.09	29.68	100.53	2.05	0.97	0.00	–	5.97	7.97
33	13.25	13.31	0.02	–	44.11	29.52	100.23	2.05	0.97	0.00	–	5.98	7.94
34	13.25	13.23	0.02	0.05	44.21	29.43	100.20	2.04	0.96	0.00	0.01	5.99	7.90
35	13.26	13.35	–	–	44.40	29.72	100.75	2.04	0.97	–	–	6.00	7.96
36	13.30	13.42	0.00	0.05	44.43	29.67	100.90	2.04	0.97	0.00	0.01	5.99	7.92
37	13.18	13.42	0.02	0.05	44.04	29.04	99.76	2.04	0.98	0.00	0.01	5.98	7.82
38	13.47	13.26	–	0.01	43.78	28.85	99.39	2.08	0.97	–	0.00	5.95	7.77
39	13.22	13.25	0.01	–	44.01	28.90	99.41	2.05	0.96	0.00	–	5.99	7.79
40	12.81	13.16	–	–	43.28	28.60	97.87	2.02	0.98	–	–	6.00	7.86
41	13.07	13.34	–	0.02	44.38	28.73	99.56	2.02	0.97	–	0.00	6.01	7.72
42	12.79	13.23	–	0.07	44.14	28.74	98.99	1.99	0.97	–	0.01	6.03	7.79
43	12.93	13.20	–	–	44.39	28.33	98.87	2.00	0.96	–	–	6.04	7.64
44	12.81	13.36	–	0.03	43.51	28.53	98.24	2.01	0.99	–	0.00	6.00	7.80
45	12.99	13.31	–	–	44.71	28.51	99.53	2.00	0.96	–	–	6.04	7.63
46	13.02	13.40	0.01	–	44.40	28.80	99.66	2.01	0.97	0.00	–	6.02	7.74
47	13.15	13.34	0.01	–	44.42	28.50	99.42	2.02	0.97	0.00	–	6.01	7.64

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Mn, Sb, As, Ga, Bi, Cd were omitted from table.

Representative EMPA data for native silver [1–4]

Ana-lyzes	wt. %							Total	apfu Σ1 Cations						
	Ag	Te	Hg	As	Cu	S	Au		Ag	Te	Hg	As	Cu	S	Au
1	99.18	0.09	0.07	–	0.48	0.31	0.12	100.39	0.99	0.00	0.00	–	0.01	0.01	0.00
2	98.19	0.13	0.23	0.20	0.10	0.66	–	99.50	0.99	0.00	0.00	0.00	0.00	0.02	–
3	99.91	0.06	0.43	0.23	0.01	0.15	0.16	100.95	0.99	0.00	0.00	0.00	0.00	0.01	0.00
4	100.05	0.10	0.44	0.14	0.10	0.13	–	100.95	0.99	0.00	0.00	0.00	0.00	0.00	–

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Se were omitted from table.

Representative EMPA data for proustit [1–6]

Ana-lyzes	wt. %							Total	apfu Σ6 Cations						
	S	Cd	Ag	Cu	Zn	Fe	As		S	Cd	Ag	Cu	Zn	Fe	As
1	17.88	0.12	66.89	0.41	0.28	0.11	13.79	99.48	2.73	0.01	3.04	0.03	0.02	0.01	0.90
2	19.17	0.12	65.91	0.36	0.19	0.04	14.46	100.26	2.94	0.01	3.00	0.03	0.01	0.00	0.95
3	18.46	0.15	66.5	0.47	0.63	0.11	13.85	100.32	2.81	0.01	3.00	0.04	0.05	0.01	0.90
4	18.91	0.16	65.27	1.16	0.06	0.16	14.32	100.11	2.88	0.01	2.96	0.09	0.00	0.01	0.93
5	19.09	0.14	65.35	1.24	0.07	0.25	14.37	100.53	2.89	0.01	2.95	0.09	0.01	0.02	0.93
6	19.05	0.11	65.48	1.26	0.09	0.26	14.59	100.89	2.87	0.00	2.93	0.10	0.01	0.02	0.94

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb,. Se, Te, Au were omitted from table.

Representative EMPA data for acanthite [1–4]

Analyzes	wt.%					Total	apfu Σ2 Cation				
	Ag	Te	Cu	Fe	S		Ag	Te	Cu	Fe	S
1	82.05	0.13	0.35	0.28	16.36	99.22	1.97	0.00	0.01	0.01	1.32
2	86.55	0.08	0.40	0.10	13.58	100.98	1.97	0.00	0.02	0.00	1.04
3	84.54	0.09	0.66	0.06	14.23	99.58	1.97	0.00	0.03	0.00	1.12
4	81.90	-	1.42	0.9	14.05	98.27	1.90	–	0.06	0.04	1.10

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Te, Se, Au were omitted from table.

Representative EMPA data for mckinstryite [1]

Analyzes	wt.%					Total	apfu Σ2 Cation				
	Ag	Te	Cu	Fe	S		Ag	Te	Cu	Fe	S
1	61.14	0.10	23.87	0.71	15.30	101.52	1.18	0.00	0.78	0.03	1.00

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Se, Au were omitted from table.

Representative EMPA data for hessite [1–2]

Analyzes	wt.%					Total	apfu Σ2 Cation				
	Ag	Te	Se	Sb	S		Ag	Te	Se	Sb	S
1	59.26	37.01	0.30	0.19	1.17	97.93	1.99	1.00	0.01	0.01	0.13
2	61.13	36.09	0.10	0.09	0.93	98.34	2.00	0.99	0.00	0.00	0.1

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Fe, Te, Au were omitted from table.

Representative EMPA data for naumannite [1–2]

Analyzes	wt.%					Total	apfu Σ2 Cation				
	Ag	Se	Cu	Sb	S		Ag	Se	Cu	Sb	S
1	73.02	25.98	0.01	0.09	0.16	99.26	2.00	0.99	0.00	0.00	0.00
2	72.13	26.57	0.17	–	0.03	98.90	1.99	1.01	0.01	0.00	0.00

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Fe, Au were omitted from table.

Representative EMPA data for cervellite [1]

Analyzes	wt.%					Total	apfu Σ4 Cation				
	Ag	Te	Fe	Se	S		Ag	Te	Fe	Se	S
1	73.51	23.48	0.01	0.03	4.76	101.75	4.00	1.02	0.00	0.00	0.95

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Au were omitted from table.

Representative EMPA data for selenojalpaite [1–2]

Ana-lyzes	wt.%							Total	apfu Σ6 Cations						
	Ag	Fe	Se	Cu	Bi	S	Pb		Ag	Fe	Se	Cu	Bi	S	Pb
1	59.88	0.74	26.15	10.20	0.80	2.21	0.66	100.66	3.02	0.07	1.80	0.87	0.02	0.37	0.02
2	54.51	1.65	27.73	13.35	0.84	2.70	0.05	100.85	2.70	0.16	1.87	1.12	0.02	0.45	0.00

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Au were omitted from table.

Representative EMPA data for stromeyerite [1–5]

Analyzes	wt.%					Total	apfu Σ2 Cation				
	Ag	Te	Cu	Fe	S		Ag	Te	Cu	Fe	S
1	51.39	0.07	32.76	0.04	16.14	100.41	0.96	0.00	1.04	0.00	1.01
2	51.85	0.06	33.00	0.07	16.34	101.33	0.96	0.00	1.04	0.00	1.02
3	51.70	0.02	33.19	0.01	16.55	101.63	0.96	0.00	1.04	0.00	1.03
4	51.79	0.07	33.22	0.11	15.84	101.29	0.95	0.00	1.04	0.00	0.98
5	52.24	0.07	32.54	0.23	15.66	101.00	0.97	0.00	1.02	0.01	0.97

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, Se, Au were omitted from table.

Representative EMPA data for löllingite [1–20]

Ana-lyzes	wt.%							Total	apfu Σ2 Cations						
	Fe	As	Ni	Co	Bi	S	Cu		Fe	As	Ni	Co	Bi	S	Cu
1	28.11	72.01	0.05	0.12	–	1.34	0.38	102.01	0.98	1.88	0.00	0.00	–	0.08	0.01
2	28.59	70.56	0.00	0.07	–	1.90	0.04	101.16	1.00	1.83	0.00	0.00	–	0.12	0.00
3	26.56	71.55	0.07	0.37	0.07	0.55	0.95	100.11	0.95	1.92	0.00	0.01	0.00	0.03	0.03
4	26.85	72.10	0.02	0.24	–	0.99	1.82	102.02	0.94	1.87	0.00	0.01	–	0.06	0.06
5	27.74	69.81	0.00	0.35	1.54	1.89	0.51	101.84	0.96	1.80	0.00	0.01	0.01	0.11	0.02
6	28.52	64.43	0.02	0.34	–	5.00	0.50	98.80	0.97	1.64	0.00	0.01	–	0.30	0.01
7	28.22	67.73	0.01	0.18	–	3.27	1.06	100.46	0.96	1.72	0.00	0.01	–	0.19	0.03
8	27.77	71.24	0.01	0.06	–	0.84	0.71	100.63	0.98	1.87	0.00	0.00	–	0.05	0.02
9	28.40	68.94	0.01	0.09	0.73	2.63	0.35	101.14	0.98	1.77	0.00	0.00	0.01	0.16	0.01
10	27.56	71.63	–	0.02	–	0.78	1.15	101.14	0.96	1.87	–	0.00	–	0.05	0.04
11	27.96	71.85	–	0.06	–	1.22	1.51	102.60	0.95	1.83	–	0.00	–	0.07	0.05
12	28.22	70.24	0.01	0.07	0.26	1.95	1.27	102.02	0.96	1.78	0.00	0.00	0.00	0.12	0.04
13	28.81	68.05	0.01	0.06	–	3.23	0.05	100.20	1.00	1.75	0.00	0.00	–	0.19	0.00
14	28.01	71.24	–	0.06	–	0.97	0.09	100.36	1.00	1.89	–	0.00	–	0.06	0.00
15	27.25	72.35	0.00	0.06	–	0.36	0.51	100.53	0.98	1.94	0.00	0.00	–	0.02	0.02
16	28.09	68.59	0.08	0.15	–	2.59	0.10	99.59	0.99	1.80	0.00	0.00	–	0.16	0.00
17	28.37	64.81	0.13	0.50	–	4.73	0.10	98.64	0.98	1.66	0.00	0.02	–	0.28	0.00
18	27.10	72.80	–	0.04	0.02	0.33	1.78	102.07	0.94	1.89	–	0.00	0.00	0.02	0.05
19	27.35	71.65	–	0.05	–	0.52	0.47	100.03	0.98	1.92	–	0.00	–	0.03	0.01
20	26.97	71.59	–	–	–	1.21	2.01	101.78	0.94	1.86	–	–	–	0.07	0.06

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Pb, Ag, Sb, In, Te, Cu, Au were omitted from table.

Representative EMPA data for clausthalite [1–6]

Ana-lyzes	wt. %							Total	apfu Σ1 Cations						
	S	Bi	Ag	Pb	Cu	Fe	Se		S	Bi	Ag	Pb	Cu	Fe	Se
1	7.76	4.68	1.39	65.27	3.79	3.71	14.59	101.19	0.51	0.05	0.03	0.66	0.13	0.14	0.39
2	9.72	5.02	1.10	60.78	6.04	5.52	13.09	101.27	0.58	0.05	0.02	0.56	0.18	0.19	0.32
3	4.29	0.97	0.15	71.48	2.27	0.30	18.39	97.84	0.34	0.01	0.00	0.88	0.09	0.01	0.59
4	4.86	0.70	0.31	72.59	1.15	0.12	17.34	97.06	0.40	0.01	0.01	0.93	0.05	0.01	0.58
5	4.78	0.80	0.35	72.50	0.86	0.09	17.64	97.03	0.40	0.01	0.01	0.94	0.04	0.00	0.60
6	3.37	0.95	0.71	72.98	2.33	0.04	20.22	100.60	0.26	0.01	0.02	0.88	0.09	0.00	0.64

Measured elements with values below detection limit or not included in mineral formula (<0.01 apfu): Sb, As were omitted from table.