

Table S1

Summary of minerals and their formulas cited in the text.

Mineral	Discredited name	Formula
alunogen		$\text{Al}_2(\text{SO}_4)_3(\text{H}_2\text{O})_{12} \cdot 5\text{H}_2\text{O}$
anglesite		$\text{Pb}(\text{SO}_4)$
anhydrite		$\text{Ca}(\text{SO}_4)$
antlerite		$\text{Cu}^{2+}_3(\text{SO}_4)(\text{OH})_4$
apthitalite		$\text{K}_3\text{Na}(\text{SO}_4)_2$
atacamite		$\text{Cu}_2\text{Cl}(\text{OH})_3$
azurite		$\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$
bannermanite		$(\text{Na},\text{K})_x\text{V}_{4+x}\text{V}^{5+}_{6-x}\text{O}_{15} \quad (0.5 < x < 0.9)$
blossite		$\text{Cu}_2\text{V}^{5+}_2\text{O}_7$
botallackite		$\text{Cu}_2\text{Cl}(\text{OH})_3$
cerussite		$\text{Pb}(\text{CO}_3)$
chrysocolla		$(\text{Cu}_{2-x}\text{Al}_x)\text{H}_{2-x}\text{Si}_2\text{O}_5(\text{OH})_4 \cdot n\text{H}_2\text{O}$
clinoatacamite		$\text{Cu}_2\text{Cl}(\text{OH})_3$
colimaite		K_3VS_4
cuprite		Cu_2O
descloizite		$\text{PbZn}(\text{VO}_4)(\text{OH})$
diopside		$\text{CuSiO}_3 \cdot \text{H}_2\text{O}$
euchlorine		$\text{KNaCu}_3\text{O}(\text{SO}_4)_3$
fingerite		$\text{Cu}_{11}\text{O}_2(\text{VO}_4)_6$
gypsum		$\text{Ca}(\text{SO}_4) \cdot 2\text{H}_2\text{O}$
halite		NaCl
hausmannite		$\text{Mn}^{2+}\text{Mn}^{3+}_2\text{O}_4$
hollandite		$\text{Ba}(\text{Mn}^{4+}_6\text{Mn}^{3+}_2)\text{O}_{16}$
hydrokenoralstonite	ralstonite	$\square_2\text{Al}_2\text{F}_6(\text{H}_2\text{O})$
leningradite		$\text{PbCu}_3(\text{VO}_4)_2\text{Cl}_2$
malachite		$\text{Cu}_2(\text{CO}_3)(\text{OH})_2$
mcbirneyite		$\text{Cu}_3(\text{VO}_4)_2$
mottramite		$\text{PbCu}(\text{VO}_4)(\text{OH})$
opal		$\text{SiO}_2 \cdot n\text{H}_2\text{O}$
paratacamite	atelina	$\text{Cu}_3(\text{Cu},\text{Zn})\text{Cl}_2(\text{OH})_6$
pyromorphite		$\text{Pb}_5(\text{PO}_4)_3\text{Cl}$
realgar		AsS
romanèchite		$(\text{Ba},\text{H}_2\text{O})_2(\text{Mn}^{4+},\text{Mn}^{3+})_5\text{O}_{10}$
salammoniac		$(\text{NH}_4)\text{Cl}$
sassolite		$\text{B}(\text{OH})_3$
shcherbinaite		V_2O_5
starovaite		$\text{KCu}_5\text{O}(\text{VO}_4)_3$
stoiberite		$\text{Cu}_5\text{O}_2(\text{VO}_4)_2$
stolzite		$\text{Pb}(\text{WO}_4)$
sylvite		KCl
tenorite		CuO
thenardite		$\text{Na}_2(\text{SO}_4)$
vanadinite		$\text{Pb}_5(\text{VO}_4)_3\text{Cl}$
vesignieite		$\text{Cu}_3\text{Ba}(\text{VO}_4)_2(\text{OH})_2$
volborthite		$\text{Cu}_3\text{V}_2\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$
wulfenite		PbMoO_4

Table S2

Selected compositions of volborthite from the studied samples (EDS). Sample in bold *Italics* were analyzed by WDS.

	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II
	P2 [§]	P2 [§]	902R	902R	902R	902R ⁺	902R ⁺	911R-b	911R-b	911R-b	911R-b	911R-b	P9	P9 [†]	P9 [†]	1000R-1	1002R	1002R	1002R	1002R	1002R	1002R	1002R	1002R
SiO ₂	0.26	0.17	1.45	1.74	1.49	1.92	1.45	0.00	0.00	0.00	0.00	0.54	0.47	0.32	0.55	0.87	0.99	1.40	0.99	1.44	1.68	1.80	1.50	1.03
Al ₂ O ₃	0.12	0.14	1.00	1.52	1.00	1.35	1.00	1.09	0.54	1.10	0.94	0.79	0.34	0.79	0.10	0.66	0.59	0.63	0.00	0.66	0.90	0.84	0.69	0.38
FeO	0.00	0.50	0.17	0.08	0.07	0.09	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.00	0.00	0.91	5.29	0.67	0.90	0.91	0.98	2.37	2.88	2.73	1.60	0.38	1.25	3.72	1.54	4.20	4.61	5.26	4.31	5.06	4.84	2.64	5.22
MgO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.03	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.34	0.15	0.47	0.73	0.53	0.68	0.47	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34
K ₂ O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.09	1.00	1.10	1.19	1.04	0.60	0.23	0.44	0.52	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BaO	0.00	0.00	0.00	0.00	0.00	3.23	3.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CuO	49.83	48.75	43.13	41.91	40.71	42.85	43.13	47.32	45.07	43.27	43.57	47.49	48.2	50.25	49.00	41.19	42.66	39.8	40.25	42.56	41.01	39.27	42.85	37.94
ZnO	0.00	0.00	1.19	1.13	1.10	1.30	1.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.87
PbO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.47	0.24	5.90	0.00	2.77	5.82	3.26	2.86	2.53	2.60	7.44
As ₂ O ₅	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.19	0.18	0.00	0.00	2.50	0.00	0.00	2.84	2.51	0.00	0.00
V ₂ O ₅	37.18	39.48	37.99	32.85	36.52	31.74	37.99	35.95	36.97	35.82	37.02	37.17	37.7	31.05	29.64	34.42	35.79	34.38	35.42	34.95	34.72	35.05	33.48	33.26
P ₂ O ₅	0.58	0.51	0.10	0.10	0.14	0.12	0.10	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₃	0.00	0.00	0.21	0.74	0.31	0.52	0.21	0.00	0.00	0.00	0.00	0.00	0.16	0.58	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OH*	3.54	3.65	3.63	3.53	3.49	3.21	3.47	3.48	3.48	3.42	3.48	3.59	3.62	3.81	3.75	3.32	3.48	3.48	3.42	3.47	3.60	3.55	3.34	3.33
H ₂ O**	8.15	6.66	9.75	10.38	13.97	12.09	6.90	10.09	10.57	12.41	11.07	7.78	7.15	10.8	11.28	11.58	11.33	10.43	8.84	9.35	7.33	9.61	12.9	9.19
sum	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

5 cations (Cu + V) pfu																										
Si	0.02	0.01	0.13	0.16	0.14	0.18	0.13	0.00	0.00	0.00	0.00	0.04	0.04	0.03	0.05	0.08	0.09	0.13	0.09	0.13	0.16	0.17	0.14	0.10		
Al	0.01	0.01	0.10	0.17	0.11	0.15	0.10	0.11	0.05	0.12	0.10	0.08	0.03	0.08	0.01	0.07	0.06	0.07	0.00	0.07	0.10	0.09	0.07	0.04		
Fe	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mn	0.00	0.00	0.07	0.42	0.05	0.07	0.07	0.07	0.17	0.22	0.20	0.11	0.03	0.09	0.28	0.12	0.32	0.37	0.41	0.33	0.40	0.39	0.21	0.44		
Mg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Ca	0.03	0.01	0.04	0.07	0.05	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04		
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.11	0.12	0.13	0.11	0.06	0.03	0.05	0.06	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Ba	0.00	0.00	0.00	0.00	0.00	0.12	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Cu	3.03	2.93	2.82	2.97	2.80	3.03	2.82	3.00	2.91	2.90	2.87	2.97	2.97	3.25	3.27	2.89	2.88	2.85	2.83	2.91	2.87	2.81	2.97	2.83		
Zn	0.00	0.00	0.08	0.08	0.07	0.09	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14		
Pb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.15	0.00	0.07	0.15	0.08	0.07	0.06	0.06	0.20		
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.08	0.00	0.00	0.12	0.00	0.00	0.14	0.12	0.00	0.00		
V	1.97	2.07	2.18	2.03	2.20	1.97	2.18	2.00	2.09	2.10	2.13	2.03	2.03	1.75	1.73	2.11	2.12	2.15	2.17	2.09	2.13	2.19	2.03	2.17		
P	0.04	0.03	0.01	0.01	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
SO ₂	0.00	0.00	0.01	0.05	0.02	0.04	0.12	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
OH	1.90	1.93	2.10	2.21	2.12	2.00	2.01	1.95	1.99	2.02	2.03	1.98	1.97	2.17	2.21	2.06	2.07	2.20	2.12	2.10	2.23	2.24	2.05	2.20		
H ₂ O	2.00	1.96	2.01	2.12	2.23	2.11	1.95	2.05	2.09	2.10	2.09	2.09	2.00	2.18	2.19	2.06	2.10	2.10	2.10	2.09	1.98	2.10	2.08	2.00		

[§] First analysis is Vbo-1 and second analysis is Vbo-2 in Fig.3a.

[†] First analysis is Vbo-1 in Fig. 4c and second analysis is Vbo-2 in Fig.4d.

* Calculated from stoichiometry. ** Calculated by difference. pfu. per formula unit. + Cl amounts of 0.51 and 0.36 wt.%, respectively.

Table S3

Selected compositions of mottramite from the studied samples (EDS). Sample in bold Italics were analyzed by WDS.

	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II
	911R-g	<i>911R-g</i>	<i>911R-g</i>	<i>911R-g</i>	911R-g	911R-g	911R-g	911R-g	911R-g	911R-b	911R-b	911R-b	P18	P18	P18	P18	P18	911R-T	998R	1002R	1002R	1002R
SiO ₂	0.54	2.22	4.83	5.42	5.58	5.66	2.22	2.22	1.70	0.00	0.00	0.00	0.00	0.87	0.00	1.12	0.00	4.30	4.08	0.00	1.66	1.65
Al ₂ O ₃	0.00	1.10	3.71	4.19	3.89	4.42	1.10	1.10	0.76	0.65	0.00	0.88	0.00	0.00	0.00	0.00	0.00	3.83	0.70	0.00	0.68	0.77
FeO	0.78	0.05	0.07	0.08	0.12	0.11	0.05	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.00	0.23	0.00	0.00	0.00	0.00	0.23	0.23	0.20	0.00	0.00	0.00	0.97	1.54	1.64	0.90	0.83	0.00	0.00	1.03	0.00	0.00
MgO	0.22	0.00	0.27	0.26	0.28	0.27	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.00	0.05	1.96	2.01	2.12	1.98	0.33	0.33	0.18	0.00	0.00	0.00	0.00	1.56	1.50	0.00	0.00	0.00	0.50	0.76	0.58	0.56
K ₂ O	0.00	0.24	0.00	0.00	0.00	0.00	0.24	0.24	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.73	0.00	0.00
CuO	15.66	18.72	16.73	16.60	16.20	15.98	18.72	18.72	16.80	21.03	21.20	17.91	18.00	22.26	21.32	18.22	16.09	17.19	20.64	20.06	22.04	22.28
ZnO	0.00	0.00	0.70	0.74	0.70	0.72	0.00	0.00	0.00	0.00	0.00	0.00	1.62	0.00	0.00	0.00	1.62	0.00	0.00	0.00	0.00	0.00
PbO	60.13	54.70	45.96	43.88	45.94	47.88	54.70	54.70	54.56	50.23	51.46	53.15	54.37	44.25	48.76	49.84	55.01	47.92	50.09	48.54	51.05	49.52
As ₂ O ₅	0.84	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	1.49	1.47	0.00	0.00	0.97	0.00	0.59	0.07	0.00
V ₂ O ₅	15.30	16.34	20.19	19.63	20.74	20.00	18.09	18.56	17.75	21.08	21.72	18.17	20.76	19.71	21.18	22.12	20.42	16.56	19.55	23.07	19.08	18.87
P ₂ O ₅	0.00	0.60	0.13	0.12	0.16	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00
SO ₃	0.00	0.00	0.13	0.13	0.15	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.73	0.00	0.00
OH*	1.88	2.16	2.61	2.62	2.69	2.69	2.20	2.22	2.06	2.18	2.19	1.98	2.20	2.26	2.25	2.30	2.09	2.40	2.42	2.36	2.24	2.22
sum	95.35	97.07	97.29	95.69	98.57	99.97	97.95	98.44	94.05	95.17	96.57	92.02	98.99	93.94	98.12	94.90	96.06	94.42	98.68	97.87	97.40	95.87
5 anions pfu. O4(OH)																						
Si	0.04	0.15	0.28	0.31	0.31	0.32	0.15	0.15	0.12	0.00	0.00	0.00	0.00	0.06	0.00	0.07	0.00	0.27	0.25	0.00	0.10	0.10
Al	0.00	0.09	0.25	0.28	0.26	0.29	0.09	0.09	0.07	0.05	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.28	0.05	0.00	0.05	0.06
Fe	0.05	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.06	0.09	0.09	0.05	0.05	0.00	0.00	0.05	0.00	0.00
Mg	0.03	0.00	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.12	0.12	0.13	0.12	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.11	0.10	0.00	0.00	0.00	0.03	0.05	0.04	0.04
K	0.00	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.05	0.00	0.00
Cu	0.94	0.98	0.73	0.72	0.68	0.67	0.96	0.95	0.92	1.09	1.10	1.02	0.93	1.11	1.05	0.92	0.87	0.81	0.96	0.87	1.00	1.02
Zn	0.00	0.00	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
Pb	1.29	1.02	0.71	0.68	0.69	0.72	1.00	0.99	1.07	0.93	0.95	1.08	1.00	0.79	0.86	0.90	1.06	0.81	0.83	0.75	0.83	0.81
As	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.05	0.00	0.00	0.03	0.00	0.02	0.00	0.00
V	0.81	0.75	0.77	0.74	0.76	0.74	0.82	0.83	0.85	0.96	0.98	0.91	0.94	0.86	0.91	0.98	0.97	0.68	0.80	0.87	0.76	0.76
P	0.00	0.04	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00
SO ₂	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
OH	0.97	1.00	1.02	1.02	1.02	1.02	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	0.98	1.03	1.00	1.00	1.00	0.90	0.90	1.00

* Calculated from stoichiometry. pfu. per formula unit.

Table S4

Selected compositions of vanadinite (EDS).

	Group I	Group I	Group I	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II
	P2	911R-g	911R-g	P18	P18	P18	P18	P18	911R-T	911R-T	912R	990R	990R	998R	998R	998R*
SiO ₂	0.64	3.12	0.74	0.00	0.00	0.00	0.00	1.24	0.00	0.00	0.19	1.22	0.94	0.66	1.54	0.00
Al ₂ O ₃	0.00	1.86	0.79	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.47	0.89	0.15	0.00	0.00	0.00
FeO	0.46	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.76	0.21	0.00	0.00	0.00
MnO	0.00	0.00	0.6	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.22	0.34	0.18	0.00	0.00	0.00
MgO	0.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.37	0.05	0.00	0.00	0.00
CaO	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	2.75	2.37	0.00	0.00	0.57
K ₂ O	1.16	0.35	0.34	2.00	1.39	1.29	2.09	0.00	0.00	0.00	1.01	0.57	0.44	0.00	0.48	0.00
CuO	1.22	1.13	1.31	1.69	1.60	1.79	2.14	3.85	2.50	2.90	3.73	3.36	3.70	5.74	5.70	5.41
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PbO	77.95	73.42	76.33	76.37	76.44	76.25	77.13	74.60	76.91	75.99	76.15	71.05	73.12	73.99	72.43	75.18
As ₂ O ₅	0.00	1.19	1.14	0.00	1.39	1.18	0.00	0.91	0.00	0.00	0.00	0.09	0.44	0.00	0.00	0.00
V ₂ O ₅	15.74	14.68	15.99	17.85	17.72	17.73	16.70	15.84	17.76	16.53	15.13	16.72	16.16	15.62	16.54	9.80
MoO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P ₂ O ₅	0.00	0.67	0.02	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.25	0.00	1.53	0.90	6.48
SO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	3.30	2.22	2.00	2.75	2.32	2.19	2.76	3.11	3.06	3.13	3.33	2.69	3.00	3.06	2.88	3.14
O=Cl	0.75	0.50	0.45	0.62	0.52	0.49	0.62	0.70	0.69	0.71	0.75	0.61	0.68	0.69	0.65	0.71
sum	99.93	98.53	99.57	100.04	100.34	99.93	100.19	100.89	99.54	97.84	99.81	100.45	100.07	99.91	99.83	99.87
16 cations (M+B)																
Si	0.29	1.34	0.32	0.00	0.00	0.00	0.00	0.54	0.00	0.00	0.08	0.48	0.39	0.29	0.65	0.00
Al	0.00	0.94	0.40	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.24	0.42	0.07	0.00	0.00	0.00
Fe	0.18	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.25	0.07	0.00	0.00	0.00
Mn	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.12	0.06	0.00	0.00	0.00
Mg	0.13	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.22	0.03	0.00	0.00	0.00
Ca	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1.16	1.06	0.00	0.00	0.26
K	0.67	0.19	0.19	1.13	0.79	0.74	1.18	0.00	0.00	0.00	0.55	0.29	0.24	0.00	0.26	0.00
Cu	0.42	0.37	0.43	0.56	0.54	0.60	0.72	1.27	0.88	1.04	1.21	1.00	1.17	1.90	1.83	1.77
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	9.57	8.47	8.98	9.09	9.15	9.16	9.21	8.77	9.65	9.75	8.82	7.54	8.22	8.72	8.29	8.87
As	0.00	0.27	0.26	0.00	0.32	0.27	0.00	0.21	0.00	0.00	0.00	0.02	0.10	0.00	0.00	0.00
V	4.74	4.16	4.62	5.22	5.2	5.23	4.89	4.57	5.47	5.21	4.30	4.35	4.46	4.52	4.64	2.81
Mo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P	0.00	0.24	0.01	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.08	0.00	0.57	0.33	2.31
SO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	2.55	1.61	1.48	2.06	1.75	1.66	2.07	2.30	2.42	2.53	2.43	1.80	2.13	2.27	2.07	2.31

* Solid solution with pyromorphite.

Table S5

Selected compositions of atacamite from the studied samples (EDS). Sample in bold Italics were analyzed by WDS.

	Group I	Group I	Group I	Group I	Group I	Group I	Group I	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II
	911R-g	911R-g	911R-g	911R-g	911R-a	911R-a	911R-a	C26	C26	C26	P9	P9	<i>P9</i>	<i>P9</i>	<i>P9</i>	P18	P18	P18 [†]	P18 ^{††}	911R-t	912R	912R	912R	912R	1002R	1002R	1002R	1002R
SiO ₂	0.85	0.00	0.65	0.80	0.49	0.49	0.46	0.06	0.00	0.00	0.26	0.00	0.13	1.84	0.18	0.00	0.00	0.00	4.62	0.00	0.59	0.69	0.00	0.38	0.00	0.60	0.00	0.00
Al ₂ O ₃	0.00	0.00	0.00	0.00	0.18	0.07	0.57	0.16	0.67	0.62	0.29	0.00	0.00	0.26	0.00	0.00	0.00	0.00	2.90	0.00	0.00	0.00	0.58	0.28	0.75	0.65	0.59	0.73
FeO	0.60	0.26	1.10	0.37	0.00	0.37	0.29	0.53	0.33	0.27	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MnO	3.32	4.67	5.06	5.17	1.50	1.46	1.69	0.53	0.00	0.00	0.24	1.23	0.51	0.00	0.50	0.00	2.56	4.42	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
MgO	1.12	0.00	1.09	1.00	0.00	0.15	1.69	0.22	0.02	0.02	0.43	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.00	0.21	0.00	0.00	0.00	0.00	0.00
CaO	0.00	0.00	0.97	0.80	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.09	0.15	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.34	0.00	0.00	0.00	0.00
K ₂ O	0.00	0.00	0.89	0.16	0.00	0.00	0.00	0.00	0.10	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00
CuO	65.46	64.92	60.04	60.12	70.28	68.94	67.93	71.64	69.84	69.92	68.55	68.55	67.95	69.67	66.97	69.08	67.15	66.15	66.97	74.52	69.25	65.67	70.68	67.68	68.59	69.74	68.70	69.39
ZnO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PbO	1.75	1.63	1.02	2.18	1.32	0.82	1.28	0.00	0.00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.96	3.26	1.41	3.17	1.41	0.00	0.00	0.00	0.00
As ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
V ₂ O ₅	0.00	0.00	0.06	0.36	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.79	1.04	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.71	0.49
MoO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P ₂ O ₅	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.10	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₃	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	15.86	15.37	16.68	17.67	17.69	17.15	17.06	17.49	17.32	17.40	18.04	17.75	16.14	15.77	18.18	15.86	15.94	15.61	12.66	16.06	16.41	16.29	17.36	15.33	16.16	16.56	16.92	17.72
H ₂ O*	12.25	12.35	11.46	11.03	12.03	11.98	11.86	12.24	11.61	11.58	11.08	11.44	11.38	11.73	10.70	11.57	11.77	12.09	11.82	12.76	11.81	11.27	11.83	11.89	11.62	11.56	11.25	11.22
	101.21	99.21	99.14	100.05	103.84	101.48	102.84	102.86	101.53	100.23	98.99	100.44	98.16	100.36	97.74	96.51	97.42	98.27	99.26	103.34	100.50	97.57	102.26	99.14	98.87	99.11	98.17	99.55
O = Cl	-3.58	-3.47	-3.76	-3.99	-3.99	-3.87	-3.85	-3.95	-3.91	-3.93	-4.07	-4.00	-3.64	-3.56	-4.10	-3.58	-3.60	-3.52	-2.86	-3.62	-3.70	-3.68	-3.92	-3.46	-3.65	-3.74	-3.82	-4.00
sum	97.63	95.74	95.38	96.07	99.85	97.61	98.99	98.91	97.63	96.31	94.92	96.44	94.52	96.80	93.63	92.93	93.82	94.74	96.40	99.71	96.80	93.90	98.34	95.68	95.23	95.38	94.35	95.55
4 anions pfu																												
Si	0.03	0.00	0.02	0.03	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.16	0.00	0.02	0.03	0.00	0.01	0.00	0.02	0.00	0.00
Al	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.02	0.01	0.03	0.03	0.03	0.03
Fe	0.02	0.01	0.03	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.10	0.15	0.16	0.16	0.05	0.05	0.05	0.02	0.00	0.00	0.01	0.04	0.02	0.00	0.02	0.00	0.08	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.06	0.00	0.06	0.06	0.00	0.01	0.09	0.01	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
K	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Cu	1.78	1.82	1.68	1.68	1.90	1.90	1.84	1.94	1.94	1.96	1.95	1.92	1.92	1.90	1.94	2.00	1.92	1.86	1.76	2.00	1.94	1.91	1.95	1.93	1.95	1.96	1.96	1.96
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.01	0.03	0.01	0.00	0.00	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
V	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.01
Mo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₂	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cl	0.97	0.97	1.05	1.11	1.07	1.06	1.03	1.06	1.08	1.09	1.15	1.12	1.02	0.96	1.18	1.03	1.02	0.99	0.99	0.97	1.03	1.06	1.07	0.98	1.03	1.04	1.08	1.12
OH	2.95	3.02	2.83	2.73	2.87	2.91	2.83	2.93	2.84	2.87	2.79	2.83	2.84	2.82	2.73	2.96	2.97	3.01	2.78	3.03	2.92	2.90	2.88	2.99	2.92	2.87	2.83	2.80

Analyses [†] and ^{††} respectively correspond to Ata-1 and Ata-2 of Fig. 4i.

* Calculated from stoichiometry; pfu, per formula unit.

Table S6

Selected compositions of miscellaneous minerals (EDS).

	chrysocolla				diopase				wulfenite - stolzite				starovaite-like*					
	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group I	Group I	Group II	Group II	Group II	Group II	Group I	Group I	Group I	Group I	Group I
	P18	P18	P18	912R	912R	998R	998R	911R-b	911R-b	911R-T	911R-T	998R	998R	911R-b	911R-b	911R-b	911R-b	911R-b
SiO ₂	35.19	33.37	32.62	34.2	36.6	36.86	37.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.78	0.00	0.00
Al ₂ O ₃	3.33	3.49	3.29	3.66	3.75	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	1.18	0.96
FeO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.27	0.67	0.09	0.07	0.12	0.00	0.00	0.00	0.00	0.00
MnO	0.42	0.95	0.00	0.00	0.00	0.00	0.00	0.34	0.07	0.54	0.13	0.08	0.15	0.86	1.25	0.77	1.45	5.86
MgO	0.28	0.76	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CaO	0.00	0.00	0.00	0.00	0.00	0.49	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Na ₂ O	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
K ₂ O	0.00	0.76	0.00	0.31	0.09	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.70	5.07	7.14	7.90	8.13
CuO	40.69	41.33	42.90	42.12	39.35	50.09	52.18	0.00	0.00	0.00	0.00	2.31	2.59	41.13	42.85	42.90	41.37	37.57
ZnO	0.00	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PbO	1.23	4.01	0.00	0.00	0.00	0.00	0.00	57.20	56.64	36.75	34.77	53.29	53.13	0.00	3.63	0.00	0.00	0.00
As ₂ O ₅	0.38	0.31	0.00	0.23	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	1.27	0.00	0.74
V ₂ O ₅	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.40	34.02	35.73	37.88	38.54
MoO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.75	42.24	8.08	10.56	32.68	29.66	0.00	0.00	0.00	0.00	0.00
WO ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.00	54.67	11.71	14.62	0.00	0.00	0.00	0.00	0.00
P ₂ O ₅	0.00	0.00	0.00	0.41	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SO ₃	0.00	0.00	0.00	0.05	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sum	81.70	86.38	79.23	81.19	80.95	88.07	89.92	100.40	99.35	100.04	100.47	100.15	100.27	86.09	90.07	88.59	89.78	88.77
	4 cations				2 cations				4 oxygens									
Si	2.01	1.94	1.89	1.95	2.07	0.99	0.97	0.00	0.00	0.00	0.00	0.00	0.00					
Al	0.22	0.24	0.23	0.25	0.25	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Fe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.00	0.00	0.01					
Mn	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.01	0.00	0.01					
Mg	0.02	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Ca	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00					
Na	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
K	0.00	0.06	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Cu	1.76	1.82	1.88	1.81	1.68	1.01	1.03	0.00	0.00	0.00	0.00	0.00	0.00					
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00					
Pb	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.89	0.87	0.63	0.57	0.87	0.88					
As	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
V	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
Mo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	1.00	0.21	0.27	0.82	0.76					
W	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.87	0.18	0.23					
P	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
SO ₂	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					

* Up to 2.19 wt% Cl.

Table S7

Selected compositions of azurite and malachite from the studied samples (EDS).

	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II	Group II
	azurite					malachite							
	c26	c26	911R-T	911R-T	911R-T	912R	912R	912R	912R	998R	998R	998R	998R
SiO ₂	1.36	0.58	0.00	0.00	0.00	0.00	0.08	0.04	0.00	0.00	0.00	0.00	0.00
Al ₂ O ₃	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00
FeO	0.00	0.13	0.00	0.22	0.16	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
MnO	0.22	0.27	0.00	0.87	0.35	0.18	0.00	0.15	0.12	0.00	0.00	0.00	0.00
MgO	0.30	0.00	0.00	0.00	0.00	0.00	0.20	0.02	0.00	0.00	0.00	0.00	0.00
CaO	0.00	0.17	0.00	0.00	0.00	0.18	0.20	0.16	0.10	0.00	0.00	0.00	0.00
K ₂ O	0.00	0.00	0.00	0.00	0.00	0.23	0.02	0.00	0.00	0.00	0.00	0.00	0.00
CuO	66.02	65.38	68.23	67.38	67.12	70.30	70.03	70.28	69.75	70.92	70.21	70.36	71.02
ZnO	0.00	1.23	0.00	0.00	0.00	0.00	0.28	0.09	0.00	0.00	0.00	0.00	0.00
PbO	0.32	0.00	0.00	0.00	0.25	1.06	0.65	0.50	0.73	0.99	1.13	0.89	0.62
As ₂ O ₅	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.00	0.00
V ₂ O ₅	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.43	0.54	0.98	0.73	0.54
P ₂ O ₅	0.00	0.00	0.00	0.00	0.00	0.04	0.27	0.22	0.58	0.00	0.00	0.00	0.00
CO ₂ *	23.93	24.69	24.33	24.16	24.08	20.32	20.58	20.45	19.91	20.21	20.04	20.03	20.16
H ₂ O*	5.02	4.99	5.15	5.21	5.14	8.03	7.99	8.00	7.95	8.07	8.00	8.01	8.07
sum	97.17	98.24	97.71	97.84	98.81	100.46	100.54	100.41	99.62	100.73	100.35	100.02	100.41
	8 anions pfu					5 anions pfu							
Si	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.00	0.00	0.00	0.00
Al	0.09	0.04	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.00
Fe	0.00	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Mn	0.01	0.01	0.00	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mg	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Ca	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cu	2.95	3.00	3.05	3.01	3.02	1.95	1.92	1.93	1.94	1.96	1.94	1.95	1.96
Zn	0.00	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Pb	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.03	0.05	0.05	0.00
As	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
V	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.01
P	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.00	0.00
C	1.93	1.96	1.97	1.95	1.96	1.02	1.02	1.01	1.00	1.01	1.00	1.01	1.01
OH	1.98	1.94	2.03	2.06	2.05	1.96	1.94	1.94	1.95	1.97	1.96	1.96	1.97

* Calculated from stoichiometry; pfu. per formula unit.