SUPPORTING INFORMATION

Evolution of fumarolic anhydrous copper sulfate minerals during successive hydration/dehydration

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Table S1. Crystallographic parameters, molar masses and structural complexity values of the fumarolic minerals used in hydration/dehydration experiments.

Mineral	Formula	Sp. group	*a* (Å), α (°)	*b* (Å), β (°)	*c* (Å), γ (°)	*V* (Å^3), R_1	Mol. mass	I_G	$I_{G.total}$	Ref
Chalcocyanite	$Cu(SO_4)$	*Pnma*	8.412	6.704	4.830	272.41 0.021	159.602	2.252	54.039	[1]
Dolerophanite	$Cu_2O(SO_4)$	*C*2/*m*	9.370	6.319 122.34	7.639	382.10 0.035	239.147	2.750	44.000	[2]
Alumoklyuchevskite	$K_3Cu_3AlO_2(SO_4)_4$	$P\bar{1}$	4.952 87.12	11.978 80.25	14.626 78.07	836.30 0.049	767.135	4.892	283.763	[3,4]
Itelmenite	$Na_2CuMg_2(SO_4)_4$	*Pbca*	9.568	8.790	28.715	2415.0 0.034	542.36	4.644	928.771	[5]
Euchlorine	$KNaCu_3O(SO_4)_3$	*C*2/*c*	18.131	9.386 113.22	14.353	2245.0 0.046	556.893	4.440	372.955	[6]

Table S2. Crystallographic parameters, molar masses and structural complexity values of the hydrated offsprings observed during the hydration experiments and anhydrous products obtained during successive dehydration experiments.

Mineral phase	Formula	Sp. group	*a* (Å) α (°)	*b* (Å) β (°)	*c* (Å) γ (°)	*V* (Å^3) R_1	Mol. mass	I_G	$I_{G.\ total}$	Ref
				Hydrated species						
«poitevinite»	$Cu(SO_4)\cdot H_2O$	$P\bar{1}$	5.040 108.39	5.157 108.99	7.569 90.40	175.19 0.034	177.617	3.281	59.059	[7]
«bonattite»	$Cu(SO_4)\cdot 3H_2O$	*Cc*	5.592	13.029 97.05	7.341	530.81 0.069	213.647	3.907	117.207	[8]
«chalcanthite»	$Cu(SO_4)\cdot 5H_2O$	$P\bar{1}$	6.14 82.27	10.7360 107.43	5.986 102.67	366.36 0.037	249.677	4.440	186.477	[9]
«kobyashevite»	$Cu_5(SO_4)_2(OH)_6\cdot 4H_2O$	$P\bar{1}$	6.073 102.88	11.060 92.35	5.509 92.60	359.87 0.040	683.944	4.362	170.13	[10]
«antlerite»	$Cu_3(SO_4)(OH)_4$	*Pnma*	8.244	6.043	11.987	597.17 0.031	354.722	3.500	224.00	[11]
«cyanochroite»	$K_2Cu(SO_4)_2\cdot 6H_2O$	$P2_1/a$	9.085	12.130 104.45	6.167	658.17 0.030	441.944	3.986	247.160	[12]
«kröhnkite»	$Na_2Cu(SO_4)_2\cdot 2H_2O$	$P2_1/c$	5.807	12.656 108.32	5.517	384.91 0.031	337.668	3.301	125.421	[13]
«kaliochalcite-natrochalcite»	$(K,Na)Cu_2(SO_4)_2(OH)\cdot H_2O$	*C*2/*m*	8.935/8.809	6.252/6.187 117.318/118.74	7.602/7.509	377.30/358.83 0.100/0.038	377.216/ 393.324	3.059	55.059	[14,15]
«brochantite»	$Cu_4(SO_4)(OH)_6$	$P2_1/n$	12.776 90.15	9.869	6.026	759.79 0.049	452.282	4.392	368.955	[16]
«pentahydrite»	$Mg(SO_4)\cdot 5H_2O$	$P\bar{1}$	6.314 81.12	10.565 109.82	6.030 105.08	364.42 0.057	210.436	4.440	186.477	[17]
«starkeyite»	$Mg(SO_4)\cdot 4H_2O$	$P2_1/n$	5.922	13.604 90.85	7.905	636.78 0.078	192.421	4.170	300.235	[18]
«sanderite»	$Mg(SO_4)\cdot 2H_2O$	$P2_12_12_1$	8.893	8.488	12.440	939.06 0.019	156.391	4.000	256.000	[19]
«brucite»	$Mg(OH)_2$	*P*-3*m*	3.042		4.283	34.32	58.319	1.522	7.610	[20]
«hexahydrite»	$Mg(SO_4)\cdot 6H_2O$	*C*2/*c*	10.110	7.212 98.30	24.410	1761.17 0.115	228.451	4.627	444.156	[21]
«alpersite»	$(Mg,Cu)(SO_4)\cdot 7H_2O$	$P2_1/c$	14.166	6.534 105.922	10.838	964.69	266.087	3.777	196.423	[22]
«epsomite»	$Mg(SO_4)\cdot 7H_2O$	$P2_12_12_1$	11.887	12.013	6.861	979.74 0.030	246.466	4.755	513.528	[23]
«konyaite»	$Na_2Mg(SO_4)_2\cdot 5H_2O$	$P2_1/c$	5.769	23.951 95.43	8.046	1106.76 0.033	352.472	4.807	538.424	[22]
«Cu-pentahydrite»	$(Mg_{0.4},Cu_{0.6})(SO_4)\cdot 5H_2O$	$P\bar{1}$	6.2470 82.530	10.5995 109.408	6.0395 104.794	364.23	233.981	4.440	186.477	[22]

Mineral phase	Formula	Sp. group	*a* (Å) α (°)	*b* (Å) β (°)	*c* (Å) γ (°)	*V* (Å^3) R_1	Mol. mass	I_G	$I_{G.\ total}$	Ref
Anhydrous species										
«tenorite»	CuO	*C*2/c	4.683	3.421 99.57	5.129	81.03 0.070	79.545	1.000	4.000	[24]
	$K_2Cu(SO_4)_2$						333.854			[25]
«wulffite»	$K_3NaCu_4O_2(SO_4)_4$	*Pn*2$_1$*a*	14.281	4.948	24.113	1703.79 0.075	810.69	4.907	588.827	[26]
	$Mg(SO_4)$	*Cmcm*	5.182	7.893	6.506	266.11	120.361	1.918	23.020	[27]
	MgO	*P*6$_3$*mc*	3.279		4.874	45.37	40.304	1.000	4.000	[28]
«metathenardite»	$Na_2(SO_4)$	*P*6$_3$/*mmc*	5.394		7.247	182.56 0.045	142.036	2.156	34.490	[29]
«vanthoffite»	$Na_6Mg(SO_4)_4$	*P*2$_1$/*c*	9.797	9.217 113.50	8.199	678.96 0.064	546.469	3.792	204.764	[30]

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