

Supplementary Table 1: Linear least squares modeled abundances, expressed as percent values, for the averaged thermal emission spectra for each group.

	Library Endmember	Quality	Group 1-1	Group 1-2	Group 1-3	Group 1-4	Group 2	Group 3	Group 4
¹	Amorphous silica (whole rock)	wc	-	-	-	-	-	-	-
¹	Amorphous silica (>63μm)	wc	-	-	-	-	-	-	-
¹	Amorphous silica (<63μm)	wc	0.43	2.72	1.32	-	-	18.58	-
¹	Microporous silica (whole rock)	wc	-	-	-	4.51	-	-	-
¹	Microporous silica (>63μm)	wc	-	-	-	-	-	-	-
¹	Microporous silica (<63μm)	wc	-	-	-	-	-	-	-
¹	Silica sinter (whole rock)	wc	15.75	26.10	-	75.23	-	-	39.77
¹	Silica sinter (>63μm)	wc	26.82	-	-	-	-	-	-
¹	Silica sinter (<63μm)	wc	-	-	5.87	-	-	0.93	-
²	Thenardite	wc	-	-	-	-	-	-	-
²	Aphthitalite	wc	1.11	1.72	2.46	-	-	2.36	-
²	Glauberite	wc	-	-	-	-	-	-	-
²	Anhydrite	wc	-	-	-	-	-	-	-
²	Barite	wc	-	-	-	-	-	-	-
²	Celestite	wc	-	-	-	-	-	-	-
^{2a}	Anglesite	wc	-	-	-	-	-	-	-
²	Antlerite	wc	-	-	-	-	-	-	-
²	Alunite	wc	-	-	-	-	-	-	2.22
^{2b}	Minamiite	wc	-	-	-	-	-	-	-
²	Sulfohalite	wc	-	-	-	-	-	-	-
²	Hanksite	wc	-	-	-	-	-	-	-
²	Szomolnokite	wc	-	-	-	-	-	-	-
²	Bloedite	wc	-	-	-	-	-	-	-
²	Polyhalite	wc	-	1.77	-	-	-	-	-
²	Bassanite	wc	-	-	-	-	-	-	-
²	Gypsum	wc	0.48	-	-	-	72.94	-	-
²	Zincobotryogen	wc	-	-	-	-	-	-	-
^{2c}	Coquimbite/Paracoquimbite	wc	26.25	24.26	23.54	-	-	23.80	0.58
³	Römerite	wc	-	-	-	-	-	-	-
³	Botryogen-Zn	wc	-	-	-	-	-	-	-
^{3d}	Copiapite	wc	-	-	-	-	-	-	-
³	Amarantite	wc	-	-	6.13	-	-	15.55	-

^{3e}	Butlerite	wc	-	-	-	-	-	-	-
³	Parabutlerite	wc	-	-	-	-	-	-	-
^{3f}	Jarosite	wc	-	-	-	-	-	-	-
³	Hydronium jarosite	wc	-	-	-	-	-	-	-
³	Goldichite	wc	-	-	-	-	-	-	-
³	Rhomboclase	wc	-	-	1.78	-	-	8.32	-
³	Kornelite	wc	-	-	-	-	-	-	-
³	Voltaite	wc	-	-	-	-	-	9.34	-
^{3g}	Beaverite	wc	-	-	-	-	-	-	-
³	Mg-copiapite	wc	-	-	-	-	-	-	-
³	Natrojarosite	wc	-	-	0.73	-	-	-	-
^{3h}	Sideronatrite	wc	-	1.58	4.20	-	-	-	-
³	Slavikite	wc	-	-	-	-	-	-	-
³	Yavapaiite	wc	-	-	-	-	-	5.22	-
¹	K-jarosite powder	wc	-	-	-	-	-	-	-
⁴	Anhydrite	wc	-	-	-	-	-	-	-
⁴	Anhydrous Magnesium Sulfate	wc	-	-	-	-	-	-	-
⁴	Bassanite	wc	-	-	-	-	-	0.32	-
⁴	Epsomite	wc	-	-	-	-	-	-	-
⁴	Gypsum	wc	-	-	-	-	-	-	-
⁴	Kieserite	wc	-	-	-	-	-	-	-
⁴	Pentahydrate	wc	-	-	-	-	-	-	-
⁴	Sanderite	wc	-	-	-	-	-	-	-
⁴	Starkeyite	wc	-	-	-	-	-	-	-
⁵	Halotrichite pellet	nc	-	-	-	-	-	-	-
⁵	Dietrichite pellet	nc	-	-	-	-	-	-	-
⁵	Leonite pellet	nc	-	-	-	-	-	-	-
⁶	Mikasaite	wc	-	-	-	-	-	-	-
⁶	Rozenite	wc	-	-	-	-	-	-	-
⁶	Amorphous ferrious sulfate	wc	-	-	-	-	-	-	-
⁶	MV amorphous	wc	-	-	-	-	-	-	-
⁶	LV amorphous	wc	-	-	-	-	-	-	-
⁶	MH amorphous	wc	-	-	-	-	-	-	-

⁶	LH amorphous	wc	-	-	-	-	-	-	-
⁶	Acros (lausenite)	wc	-	-	-	-	-	-	-
⁶	Melanterite	wc	-	-	-	-	-	-	-
⁶	Szomolnokite	wc	-	-	-	-	-	-	-
⁷	Al-Opal	wc	17.50	29.04	-	-	27.06	-	-
⁸	K-rich Glass	wc	8.62	-	3.71	-	-	-	-
⁸	SiO2 Glass	wc	-	-	-	-	-	-	-
⁹	elemental sulfur	wc	-	1.86	1.16	7.98	-	-	-
¹⁰	Goethite Powder GTS2	wc	1.14	-	4.52	-	-	-	-
¹¹	Akaganeite akg1	wc	0.60	0.50	11.65	-	-	-	14.78
¹¹	Lepidocrocite lps2	wc	-	-	-	-	-	-	-
¹²ⁱ	Hematite BUR-2600	wc	-	-	-	-	-	-	20.91
¹⁰	Hematite gtsh2-300	wc	-	-	-	-	-	-	-
¹⁰	Magnetite mts4	wc	-	-	-	-	-	-	-
¹⁰	Magnetite mts5	wc	-	-	-	-	-	-	-
^{2j}	Pickeringite	wc	-	-	-	-	-	-	-
^{2k}	Apjohnite	wc	-	-	-	-	-	-	-
²	Thaumasite	wc	-	-	-	-	-	-	21.74
²	Serpierite	wc	1.30	-	2.85	-	-	5.36	-
⁵	Alunogen	nc	-	-	23.01	-	-	7.87	-
⁵	Kaolinite	wc	-	-	-	-	-	-	-
⁵	Montmorillonite	wc	-	2.80	-	-	-	-	-
⁵	Montmorillonite (Ca)	wc	-	-	-	-	-	-	-
⁵	Montmorillonite (Na)	wc	-	-	-	-	-	-	-
⁵	Clinochlore	wc	-	-	-	-	-	-	-
⁵	Muscovite	wc	-	-	-	-	-	-	-
⁵	Nontronite	wc	-	-	-	-	-	-	-
⁵	Palygorskite	wc	-	-	-	-	-	-	-
⁵	Serpentine	wc	-	-	-	-	-	-	-
⁵	Smectite SWa-1	wc	-	7.51	-	-	-	-	-
⁵	Dickite	wc	-	-	-	-	-	-	-
⁵	Talc	wc	-	-	-	-	-	-	-
⁹	Augite	wc	-	0.14	7.07	-	-	-	-

⁹ Ilmenite	wc	-	-	-	12.28	-	-	-
⁹ Fayalite	wc	-	-	-	-	-	2.35	-
⁹ Forsterite	wc	-	-	-	-	-	-	-
⁹ Albite	wc	-	-	-	-	-	-	-
⁹ Andesine	wc	-	-	-	-	-	-	-
⁹ Anorthite	wc	-	-	-	-	-	-	-
⁹ Bytownite	wc	-	-	-	-	-	-	-
⁹ Diopside	wc	-	-	-	-	-	-	-
⁹ Enstatite	wc	-	-	-	-	-	-	-
⁹ Magnetite	wc	-	-	-	-	-	-	-
⁹ Oligoclase	wc	-	-	-	-	-	-	-
⁹ Labradorite	wc	-	-	-	-	-	-	-
Total		100	100	100	100	100	100	100

wc = well characterized

nc= not characterized

^acontains minor celestine

^b90% minamiite, 8% alunite, 2% other

^cequal amounts of coquimbite and paracoquimbite

^d25% ferricopiapite

^e5% parabutlerite

^ftrace amount of unknown phase

^gminor impurity ~5-7% anglesite

^hminor impurity of unknown phase

ⁱminor impurities

^jKalinite/Apjohnite/Halotrichite

^kcontains minor kalinite/halotrichite,pickeringite

¹Ruff et al., 2011

²Lane 2007

³Lane et al., 2015

⁴Baldrige 2008

⁵Lane unpublished

⁶Sklute 2015

⁷M.D. Kraft Personal Communication

⁸Wyatt et al., 2001

⁹A.D. Rogers Personal Collection

¹⁰Glotch et al., 2004

¹¹Glotch and Kraft 2008

¹²Christensen et al., 2000

S2: Quantitative elemental abundances as determined by hXRF.

Sample	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe
HI_15_MHY_001	0.38	6.80	73.46	0.40	0.28	4.62	2.02	0.23	13.98
HI_15_MHY_002a	0.32	9.18	73.75	0.56	0.34	1.51	1.95	0.13	12.28
HI_15_Solf_001_1	3.88	13.48	54.61	0.30	0.32	7.27	1.97	0.43	17.75
HI_15_Solf_002_1	0.61	11.96	59.24	0.42	0.38	5.88	2.11	0.26	19.15
HI_15_MHY_003	1.19	9.32	70.48	0.57	0.20	2.38	2.18	0.12	13.57
HI_15_MHY_005	9.67	7.30	62.67	0.63	0.12	0.00	2.72	0.05	17.36
HI_15_Solf_003_2	0.00	10.22	84.39	0.64	0.45	0.18	2.05	0.08	3.86
HI_15_Solf_003_3	0.00	9.41	80.00	0.76	0.04	0.76	2.38	0.07	14.67
HI_15_Solf_001_2	3.53	11.63	58.59	0.46	0.30	7.58	2.33	0.24	15.34
HI_15_Solf_002_3	3.16	6.37	87.44	0.56	0.10	0.00	1.84	0.05	0.94
HI_15_MHY_007a	8.38	6.91	72.55	0.61	0.20	0.03	2.40	0.07	8.86
HI_15_Solf_002_2	7.61	12.58	53.00	0.22	0.29	8.20	1.92	0.26	15.92
HI_15_MHY_006	8.22	6.84	73.13	0.67	0.49	0.00	2.21	0.10	8.88