Table 1 Experimental conditions and compositions of quenched sulfide melts and equilibrium *mss* from LA-ICP-MS analysis.

Sample	T (°C)	fO_2 (log) (bars)	fS_2 (log) (bars)	Run time (h)	Compositions of initial Fe-Ni-Cu-S mixture (wt%)					Compositions of quenched sulfide melts and equilibrium *mss* (wt%)[a]									$PtAs_2$ solubility in melt and equilibrium *mss* (ppm)	
					Fe	Ni	Cu	S	Atomic Metal/S	Fe	Ni	Cu	S	As[b]	Pt[b]	Total	Atomic Metal/S	Atomic As/Pt		
SPT20	1000	-12.02	-2.74	46.5	48.88	7.02	8.11	35.99	1.0	49.82±2.43	6.67±0.09	9.84±1.62	32.83±0.49	0.2276±0.02	0.3628±0.02	99.75	1.14	1.63	5620.7	**melt**
SPT17	1060	-11.10	-2.21	43	48.88	7.02	8.11	35.99	1.0	49.51±1.05	6.6±0.13	8.8±1.52	33.67±0.15	0.414±0.06	0.645±0.11	99.64	1.09	1.67	10159.3	**melt**
SPT15	958	-12.71	-3.13	57	46.09	7.26	9.66	36.98	0.95	36.41±0.67	8.04±0.24	21.04±0.99	31.77±0.38	0.9835±0.16	1.372±0.20	99.62	1.14	1.87	23266.5	**melt**
										49.18±0.56	7.34±0.26	4.88±0.15	38.34±0.77	135.5±2.99	1650.2±67	99.92	0.91	0.22	658.5	***mss***
SPT21	1000	-12.02	-2.74	46.5	46.97	7.18	8.58	37.01	0.95	46.21±0.53	7.28±0.11	11.1±0.73	33.6±0.27	0.5092±0.03	0.865±0.06	99.56	1.08	1.53	12876.7	**melt**
SPT16	1060	-11.10	-2.21	43	46.09	7.26	9.66	36.98	0.95	45.11±0.59	7.52±0.15	9.93±0.53	33.75±0.24	1.502±0.19	1.653±0.09	99.47	1.05	2.37	32830.0	**melt**
SPT5[c]	910	-13.56	-3.59	167.3	43.77	7.31	10.98	37.94	0.91	31.72±0.39	4.35±0.18	30.6±0.85	31.54±0.41	0.0261±0.01	0.874±0.28	99.11	1.15			**melt**
										50.88±0.82	7.18±0.21	6.87±0.47	36.76±0.56	15.44±0.66	1129.6±45	101.8	1.00			***mss***
SPT12	930	-13.20	-3.40	12.4	43.93	8.8	9.17	38.1	0.91	32.8±1.86	4.67±1.04	28.8±2.33	32.1±0.98	2.45±0.56	1.54±0.433	102.36	1.13	4.14	43041.1	**melt**
										44.1±1.1	9.61±0.61	6.73±0.38	37.82±1.15	191.8±67.7	1831.3±13	98.46	0.90	0.27	872.2	***mss***
SPT3	1000	-12.02	-2.74	186	43.77	7.31	10.98	37.94	0.91	41.5±0.65	6.7±0.24	18.5±1.85	33±0.49	0.8773±0.14	1.15±0.15	101.73	1.12			**melt**
										49.7±0.79	7.26±0.30	4.37±0.17	38.5±0.51	81.6±2.5	1064.7±51	99.94	0.90			***mss***
SPT14	1005	-11.94	-2.69	24	43.93	8.8	9.17	38.1	0.91	38.5±1.08	6.77±0.95	17.5±2.14	32.4±1.47	4.03±0.72	3.23±0.80	102.43	1.09	3.25	76572.9	**melt**
										47.38±1.5	9.33±0.48	4.5±0.46	38±1.04	279.6±30.2	3370.8±647	99.58	0.91	0.22	1360.5	***mss***
SPT9	910	-13.56	-3.59	30	40.89	7.66	8.26	43.18	0.74	32.41±1.64	3.51±0.50	29.08±2.75	32.03±1.01	2.192±0.59	1.907±0.49	101.13	1.11	2.99	43487.4	**melt**
										45.2±1.04	9.27±0.49	7.46±0.27	38.3±1.57	153.3±12.8	3936±231.4	100.64	0.91	0.10	950.3	***mss***
SPT10	930	-13.20	-3.40	24	40.89	7.66	8.26	43.18	0.74	30.85±1.45	4.32±0.68	29.02±2.95	32±0.93	3.299±0.44	1.9901±0.36	101.48	1.10	4.32	57574.7	**melt**
										49.79±1.69	8.55±0.41	6.78±0.47	36.94±2.11	216.3±34.9	2805±233.6	102.36	0.99	0.20	1048.6	***mss***
SPT11	950	-12.85	-3.20	12	40.89	7.66	8.26	43.18	0.74	32.2±1.05	5.23±0.57	23.61±2.11	33.1±1.42	3.453±0.64	2.657±0.51	100.25	1.02	3.38	66169.4	**melt**
										47.66±1.41	8.91±0.32	5.65±0.26	36.76±2.17	251.7±33.7	3578±307.4	99.36	0.96	0.18	1297.0	***mss***
SPT13	980	-12.34	-2.92	14	40.89	7.66	8.26	43.18	0.74	36.48±1.47	5.61±0.94	21.19±2.46	30.8±0.72	4.41±0.71	2.82±0.67	101.31	1.14	4.07	78456.5	**melt**
										51.73±1.59	8.39±0.36	5.05±0.39	35.96±1.24	287.6±68.6	2642±586	101.42	1.03	0.28	1254.0	***mss***

a: The standard derivation was calculated from results of total 3-22 analyzed laser lines for each sample.
b: The unit for As and Pt compositions in equilibrium *mss* is ppm.
c: $PtAs_2$-undersaturated experiment, because the original loaded $PtAs_2$ crystal was completely dissolved into the sulfide.

Table 2 Compositions of each phase in quenched sulfide melts from microprobe analysis (wt%).

Phase	Element	SPT20	SPT17	SPT15	SPT21	SPT16	SPT5	SPT12	SPT3	SPT14	SPT9	SPT10	SPT11	SPT13
q-*iss*	Fe	37.18±0.78	40.03±1.47	36.87±0.53	37.46±0.37	40.43±1.14	34.3±1.07	34.12±2.03	38.07±0.36	37.38±0.42	32.03±2.0	32.42±1.2	35.7±1.14	38.46±0.65
	Ni	2.48±0.80	5.85±1.22	3.4±0.27	3.18±0.28	6.26±1.04	3.1±0.67	3.88±0.22	3.5±0.83	2.1±0.16	4.0±0.6	3.47±0.66	3.7±0.09	2.25±0.23
	Cu	27.98±0.77	21.05±1.93	26.12±0.78	25.74±0.51	17.78±1.49	30.11±0.81	27.51±1.95	23.49±0.39	24.3±0.32	28.8±2.2	28.88±1.63	26.4±0.82	25±0.47
	S	30.62±0.52	32±0.04	31.61±0.41	32.92±0.25	33.04±0.43	31.76±0.88	33.93±0.54	33.09±1.01	35.22±0.16	34.0±0.5	34.03±0.38	33.4±1.64	33.53±0.33
	As	0.032±0.007	0.028±0.01	0.041±0.007	< 80 ppm[a]	0.028±0.006	0.01±0.004	0.046±0.022	0.26±0.155	0.018	0.015±0.008	0.094±0.036	0.062±0.036	0.223±0.045
	Pt	0.046±0.012	0.126±0.025	0.196±0.088	0.158±0.0978	1.385±0.035	0.085±0.034	0.369±0.187	0.67±0.188	0.235±0.04	0.248±0.165	0.25±0.04	0.109±0.015	0.545±0.14
	Total	98.33±0.50	99.21±1.21	98.23±0.5	99.48±0.38	98.91±1.08	99.3±0.75	99.86±0.64	99.07±0.82	99.1±0.51	99.31±0.89	99.02±0.44	99.4±1.21	100±0.67
q-*mss*	Fe	52.68±0.19	53.39±1.57	q-*mss* is too small to analyze	50.24±0.16	52.10±1.56	q-*mss* is too small to analyze	32.68±2.73	47.18±0.48	42.08±1.37	q-*mss* is too small to analyze	q-*mss* is too small to analyze	30.63±1.31	42.55±1.35
	Ni	7.80±0.28	7.64±0.99		9.85±0.15	8.57±1.03		26.71±1.23	11.26±0.37	17.66±1.26			26.49±1.65	17.87±1.36
	Cu	3.66±0.25	3.69±0.51		3.41±0.11	3.34±0.42		5.03±1.32	4.57±0.38	3.45±2.38			9.03±0.64	1.99±0.37
	S	34.78±0.1	32.4±2.77		35.93±0.20	32.4±1.56		35.76±0.113	36.03±0.14	37.5±0.21			34±0.6	37.13±0.11
	As	0.02±0.0075	0.023±0.01		0.012±0.0063	0.017±0.005		0.016±0.004	< 80 ppm[a]	0.137±0.055			0.014±0	0.015±0.0035
	Pt	0.043±0.019	0.071±0.037		0.104±0.031	0.187±0.035		0.419±0.21	0.23±0.0758	0.194±0.083			0.195±0.003	0.557±0.125
	Total	98.97±0.24	97.32±2.24		99.56±0.23	96.62±1.35		100.52±0.12	99.27±0.48	99.96±0.43			100.4±0.36	100.11±0.36
BMS-l	Fe	35.82	38.21	35.72±0.0.83		48.43±1.04	33.04±0.74	32.04±2.06	11.27±2.39	36.27±0.94	29.3±1.1	30.1±0.76	31.55±0.7	33.81±0.89
	Ni	8.08	4.26	3.77±0.52		8.09±0.55	6.74±0.43	3.83±0.52	0.88±0.13	2.15±0.22	3.4±0.71	3.45±0.33	3.74±0.04	2.56±0.53
	Cu	23.18	22.89	24.16±1.3		6.43±1.64	27.63±0.86	24.24±0.86	6.51±0.16	20.19±0.62	26.63±0.74	25.15±0.99	25.4±0.71	23.78±0.25
	S	29.35	31.12	30.96±0.29	no BMS-l	32.46±2.0	32.86±0.19	30.52±0.47	9.3±1.34	30.20±0.32	30.03±0.88	30.64±0.34	31.8±0.37	31.36±0.54
	As	0.11	0.2	1.47±0.31		0.49±0.12	< 80 ppm[a]	3.59±0.65	33.35±0.11	3.86±0.45	4.00±0.41	4.12±0.85	2.96±0.38	2.7±0.71
	Pt	2.59	2.53	2.44±0.5		1.13±0.42	0.07±0.037	4.42±0.53	43.41±2.86	5.8±0.66	5.48±0.65	5.1±0.19	4.2±0.05	3.7±0.41
	Total	99.13[b]	99.21[b]	98.52±0.34		97.03±1.25	100.33±0.23	98.64±0.30	104.7±1.05[c]	98.5±0.78	98.81±1.05	98.6±0.4	99.6±0.18	97.9±0.72
As droplet	Fe	7.22±1.72	3.09±0.77		2.98±0.99		27.69±0.57		9.11±0.67	14.91				
	Ni	17.82±0.15	11.51±0.83		2.51±1.19		2.45±0.4		0.81±0.03	6.27				
	Cu	4.47±0.39	4.59±0.14		2.4±0.23		24.31±0.65		5.72±0.95	1.58				
	S	0.22±0.04	0.10±0.014	As droplet is < 1 mm	0.224±0.05	As droplet is < 1 mm	24.94±0.29	no As droplet	6.87±2.1	14.83		no As droplet		
	As	18.78±0.63	21.6±1.07		26.8±2.02		0.038±0.012		31.52±2.71	25.14				
	Pt	52.63±0.16	61.08±0.72		66.07±2.21		21.58±0.47		49.52±5.78	37.28				
	Total	101.13±0.66	101.97±0.86		101±1.71		101.01±0.26		103.5±0.6	100.01[b]				

a: The As concentration is below the detection limit of 80 ppm.
b: Most quenched base metal sulfide liquids or quenched As droplets in this sample are too small, only one analysis was done.
c: This is composition of quenched $PtAs_2$ crystal in SPT3.
q-*iss*, quenched *iss*; **q-*mss***, quenched *mss*; **BMS-l**, quenched base metal sulfide liquid rich in As and Pt.