Appendix

Fluid inclusion studies of barite disseminated in hydrothermal sediments of the Mohns Ridge

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Table A1. XRF major element composition and Ba (wt.%) of the surface sediment samples and hyaloclastites.

Sample	Lyer, cm	N	W	LOI	Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	MnO	Fe_2O_{3tot}	P_2O_5	S_{tot}	Total	Ba	Rock type
5535	0-5	73°33.0'	08°09.0'	0.03	2.32	8.63	14.40	51.34	0.14	11.04	1.36	0.17	10.19	0.10	0.11	99.83	0.01	hyaloclastite
6446	0-3			0.33	2.21	8.72	16.13	49.60	0.68	12.73	1.33	0.13	7.54	0.22	0.11	99.73	0.03	-//-
6131	0-10	71°17.9'	05°46.4'	0.74	2.96	4.66	15.52	52.81	0.69	10.68	1.89	0.15	9.27	0.20	0.18	99.75	0.07	-//-
6138	0-3	71°15.7'	05°48.9'	0.12	2.86	4.53	14.90	51.30	0.96	9.93	2.15	0.23	12.32	0.29	0.17	99.76	0.05	-//-
6130	0-3	71°16.2'	05°48.1'	9.69	2.35	4.47	12.01	46.65	0.93	9.30	2.00	0.19	11.76	0.26	0.19	99.80	0.04	-//-
6130	0-2	-//-	-//-	0.60	2.71	5.40	14.16	51.52	0.96	9.86	2.08	0.19	11.85	0.27	0.18	99.78	0.04	-//-
6131	1-8	71°17.9'	05°46.4'	6.75	1.98	5.01	16.21	47.73	0.79	5.63	1.84	0.11	12.24	0.27	1.20	98.76	0.65	sediment
6131	0-7	-//-	-//-	16.32	1.01	3.89	21.46	41.74	0.57	1.02	2.19	0.03	7.67	0.13	3.76	98.79	0.11	-//-
6131	1-7	-//-	-//-	19.54	0.33	1.27	22.23	32.60	0.58	1.22	2.18	0.07	11.98	0.27	5.75	98.02	0.13	-//-
6130	0-2	71°16.2'	05°48.1'	10.37	1.32	3.57	12.08	46.42	1.49	14.27	1.60	0.21	7.76	0.39	0.30	99.53	0.07	-//-
6132	0-2	71°18.0'	05°42.0'	5.26	1.52	3.64	12.46	48.96	1.32	11.95	2.21	0.29	11.15	0.50	0.54	98.80	0.30	-//-
6133	0-2	71°17.8'	05°41.9'	11.35	2.36	2.75	8.86	39.37	1.12	10.04	1.26	0.49	20.97	0.77	0.45	98.79	0.30	-//-
6133	0-3	-//-	-//-	10.96	2.40	2.68	8.67	37.43	1.03	12.79	1.50	0.60	20.46	0.83	0.43	98.78	0.28	-//-
6146	0-2	71°18.5'	05°40.3'	4.54	1.45	4.30	12.08	48.68	1.35	16.17	1.63	0.23	8.56	0.43	0.37	98.79	0.13	-//-
6146	2-6	-//-	-//-	0.10	1.51	7.88	15.70	48.67	0.88	13.40	1.59	0.15	8.81	0.26	0.31	99.26	0.04	-//-
6137	0-1	71°17.8'	05°46.9'	6.44	2.12	6.18	16.15	48.82	1.13	5.24	1.81	0.31	10.47	0.29	0.83	98.79	0.88	-//-
6137	1-3	-//-	-//-	6.59	1.89	5.32	15.36	49.06	1.13	5.18	1.71	0.25	12.21	0.36	0.72	98.78	0.76	-//-
6137	3-4	-//-	-//-	3.56	2.39	5.16	15.06	50.02	1.07	6.14	1.81	0.17	13.27	0.34	0.78	98.77	0.83	-//-
6137	4–10	-//-	-//-	6.64	1.88	4.72	15.26	49.14	1.12	5.24	1.74	0.12	12.79	0.33	0.81	98.79	0.86	-//-
6131	0-1	71°17.9'	05°46.4'	6.61	1.94	4.56	18.44	47.03	0.84	5.11	1.96	0.11	11.62	0.20	1.36	98.78	0.56	-//-
6131	1-2	-//-	-//-	5.40	1.42	4.74	18.50	47.40	0.85	5.83	1.96	0.12	12.12	0.23	1.24	98.81	0.57	-//-
6131	2-3	-//-	-//-	5.32	1.92	5.05	17.78	47.81	0.79	6.17	1.87	0.12	11.48	0.22	1.25	98.78	0.53	-//-
6131	3-4	-//-	-//-	5.56	1.80	5.26	17.09	48.02	0.83	6.33	1.93	0.11	11.34	0.22	1.28	98.77	0.44	-//-
6131	4-5	-//-	-//-	6.53	1.97	5.45	16.88	48.07	0.85	5.33	1.93	0.10	11.17	0.20	1.31	98.79	0.40	-//-
6131	5-6	-//-	-//-	6.56	1.96	4.71	16.36	47.18	0.86	6.67	1.87	0.12	11.51	0.20	1.78	98.78	0.65	-//-
6131	6-7	-//-	-//-	5.65	1.87	5.34	17.69	47.85	0.80	5.99	1.85	0.11	10.86	0.20	1.58	98.79	0.58	-//-
6131	0-10	-//-	-//-	5.46	1.40	5.82	16.71	48.44	0.84	5.39	1.94	0.11	11.70	0.24	1.73	98.78	0.72	-//-
5516	0-3	71°17.9'	05°46.2'	2.10	2.45	6.08	15.72	51.08	0.82	8.88	1.83	0.13	9.47	0.15	0.30	99.01	0.08	-//-
5516	0-3	-//-	-//-	6.80	1.38	5.21	15.30	42.06	0.44	0.81	2.33	0.01	9.28	0.18	9.80	93.60	5.85	-//-
5516	0-3	-//-	-//-	7.60	1.95	5.31	15.11	52.09	1.56	3.24	1.65	0.04	5.54	0.19	2.40	96.68	2.41	-//-
6147	0-10	73°34.0'	08°09.8'E	10.97	2.51	23.19	1.59	45.04	0.16	0.43	0.05	0.12	12.51	0.09	2.63	98.29	1.65	sediment

Table A2. EDS data of volcanic glasses collected from hydrothermally altered sediments of the Jan Mayen vent field area.

Sample	5516	6130-I	6130-II	6131-I	6131-II	6131-III	6138-I	6146-II
Number of glasses	24	23	6	14	12	52	3	11
	Mean content, wt. %							
Na_2O	0.95	2.94	2.88	2.80	2.90	2.87	3.03	2.44
MgO	1.13	5.19	5.21	6.11	6.24	5.63	4.19	7.46
Al_2O_3	1.75	13.94	13.88	14.10	15.27	13.78	13.08	15.11
SiO_2	39.32	54.87	54.76	54.46	54.94	54.70	55.35	53.28
P_2O_5	1.58	0.37	0.36	0.15	0.20	0.28	0.43	0.26
K_2O	0.15	1.08	1.07	0.68	0.63	0.83	1.14	0.86
CaO	4.46	9.25	9.56	10.25	11.61	9.74	8.46	12.44
TiO_2	0.08	1.97	1.95	1.64	1.46	1.90	2.42	1.39
MnO	0.00	0.18	0.21	0.16	0.11	0.19	0.20	0.10
FeO	50.58	10.20	10.28	9.54	6.59	9.95	11.73	7.13
Total	100.00	100.00	100.16	99.89	99.95	99.87	100.03	100.49

Table A3. EDS data of dominated sulfides (wt. %) in hydrothermally altered sediments of the Troll Wall vent field after [74].

Sample	Fe	Co	Cu	Zn	As	Cd	In	Sb	S	Total
Pyrite										
1	44.49	n.d.*	n.d.	n.d.	n.d.	n.d.	n.d.	0.24	54.43	99.2
2	44.64	0.25	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	54.16	99.0
3	44.46	0.27	n.d.	0.21	n.d.	n.d.	n.d.	n.d.	55.91	100.8
4	44.46	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	54.63	99.1
5	44.37	0.47	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	56.59	101.4
Mean	44.67	0.33		0.21					55.14	100.3
Marcasite-I										
1	44.89	0.36	n.d.	0.22	n.d.	n.d.	n.d.	n.d.	55.53	101.0
2	41.92	n.d.	n.d.	n.d.	0.74	n.d.	n.d.	n.d.	56.54	99.2
3	43.63	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	56.41	100.0
4	43.24	0.22	n.d.	0.20	1.03	n.d.	n.d.	n.d.	55.00	99.7
5	40.79	0.30	n.d.	n.d.	1.37	n.d.	n.d.	n.d.	58.60	101.1
6	40.06	0.30	n.d.	n.d.	1.42	n.d.	n.d.	0.27	57.59	99.6
7	40.02	n.d.	n.d.	n.d.	1.09	n.d.	0.22	n.d.	58.22	99.5
8	42.98	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	57.39	100.4
9	41.12	0.22	n.d.	n.d.	0.24	n.d.	0.27	n.d.	58.18	100.0
10	41.93	0.23	n.d.	n.d.	n.d.	n.d.	0.27	n.d.	58.02	100.4
11	40.28	n.d.	0.63	n.d.	n.d.	0.23	n.d.	n.d.	58.40	99.5
Mean	41.88	0.27			0.98		0.25		57.26	100.6
Sphalerite-I: 87.4 ZnS mol % + 9.7 FeS mol % + 2.9 S mol %										
1	6.04	n.d.	n.d.	56.82	n.d.	n.d.	n.d.	n.d.	37.89	100.7
2	4.39	n.d.	n.d.	61.57	0.42	n.d.	n.d.	n.d.	34.55	100.9
3	7.27	n.d.	n.d.	57.75	n.d.	0.26	n.d.	n.d.	34.67	99.9
4	3.71	n.d.	n.d.	63.17	n.d.	n.d.	n.d.	n.d.	32.20	99.1
5	2.74	n.d.	n.d.	62.88	0.20	n.d.	n.d.	n.d.	35.20	101.0
Mean	4.83			60.44	0.31	0.26			34.90	100.7
Sphalerite -II: 77.6 ZnS mol % + 3.7 FeS mol % + 4.7 CuS mol % + 14 S mol %										
1	3.57	n.d.	4.88	54.63	n.d.	0.87	n.d.	n.d.	35.86	99.8
2	2.07	n.d.	2.38	57.85	n.d.	0.90	n.d.	n.d.	36.65	99.8
3	1.89	n.d.	2.18	58.82	0.27	1.04	n.d.	n.d.	35.79	100.0
4	4.01	n.d.	4.98	52.73	0.37	0.87	n.d.	n.d.	37.04	100.0
5	1.22	n.d.	1.13	63.33	n.d.	0.99	n.d.	n.d.	33.34	100.0
6	2.45	n.d.	2.86	56.28	n.d.	0.91	n.d.	n.d.	37.42	99.9
Mean	2.54		3.07	57.27	0.32	0.93			36.02	100.1
Chalcopyrite-I										
1	30.68	n.d.	32.90	n.d.	n.d.	n.d.	n.d.	n.d.	36.90	100.5
2	30.45	n.d.	32.31	0.22	n.d.	n.d.	n.d.	n.d.	37.04	100.0
3	30.67	n.d.	31.85	n.d.	n.d.	n.d.	n.d.	n.d.	36.76	99.3
4	30.40	n.d.	32.60	0.23	n.d.	n.d.	n.d.	n.d.	37.02	100.2
5	30.26	n.d.	32.65	0.28	n.d.	n.d.	n.d.	n.d.	36.88	100.1
6	30.95	n.d.	33.14	n.d.	n.d.	n.d.	n.d.	n.d.	37.05	101.1
7	30.43	n.d.	31.90	n.d.	n.d.	n.d.	n.d.	n.d.	36.44	98.8
Mean	30.55		32.48	0.24					36.87	100.1
Chalcopyrite -II										
1	29.79	n.d.	31.68	1.17	n.d.	n.d.	n.d.	n.d.	38.06	100.7
2	26.24	n.d.	30.27	1.60	1.48	n.d.	n.d.	n.d.	40.41	100.0
3	26.33	n.d.	28.79	1.75	1.42	n.d.	n.d.	n.d.	41.71	100.0

4	26.49	n.d.	29.79	3.22	1.09	n.d.	n.d.	n.d.	39.29	99.9
5	26.77	n.d.	30.13	2.5	0.34	n.d.	n.d.	n.d.	40.27	100.0
Mean	27.12		30.13	2.05	1.08				39.95	100.3

*n.d. – element not detected.
**mol % – calculation of impurity content in sphalerite based on average composition.