

Table S3. Sulfur isotope data for sulfides in the Heihaibei deposit and some typical gold deposits in the EKO from the literature. $\delta^{34}\text{S}_{\text{H}_2\text{S}}$ means $\delta^{34}\text{S}_{\text{VCDT}}$ values for H_2S in equilibrium with sulfides. The assumed temperatures of equilibrium for different ore types are the same as Th [23] listed in Table 1.

No.	Sample Name	Rock Type	Ore Type	Mineral	$\Delta^{34}\text{S}_{\text{cdt}}(\text{‰})$	$\Delta^{34}\text{S}_{\text{H}_2\text{S}}(\text{‰})$	Ore District	References
1	HHBZK01-B3	brecciated smoky grey quartz vein	Qv2	Pyrite	8.5	7.0	Heihaibei	this study
2	HHBZK01-B5	brecciated smoky grey quartz vein	Qv2	Pyrite	8.0	6.5	Heihaibei	this study
3	HHBZK01-B6	brecciated smoky grey quartz vein	Qv2	Pyrite	7.7	6.2	Heihaibei	this study
4	HHBZK0603-B2	smoky grey quartz vein	Qv2	Pyrite	8.0	6.5	Heihaibei	this study
5	HHBZK0603-B3	brecciated smoky grey quartz vein	Qv2	Pyrite	7.6	6.1	Heihaibei	this study
6	HHBZK0603-B5	brecciated smoky grey quartz vein	Qv2	Pyrite	8.0	6.5	Heihaibei	this study
7	HHBZK1003-B11	brecciated smoky grey quartz vein	Qv2	Pyrite	7.6	6.1	Heihaibei	this study
8	HHBZK1002-B4-1	brecciated white quartz vein	Qv1	Pyrite	8.1	7.0	Heihaibei	this study
9	HHBZK1002-B4-2	brecciated white quartz vein	Qv1	Pyrite	8.0	6.9	Heihaibei	this study
10	HHBZK1002-B6	brecciated white quartz vein	Qv1	Pyrite	8.0	6.9	Heihaibei	this study
11	HHBZK1002-B8	brecciated white quartz vein	Qv1	Pyrite	8.1	7.0	Heihaibei	this study
12	HHBZK1002-B11	brecciated smoky grey quartz vein	Qv2	Pyrite	7.8	6.3	Heihaibei	this study
13	HHB08-JK02	smoky grey quartz vein	Qv2	Pyrite	8.5	7.0	Heihaibei	this study
14	HHB08-JK08	smoky grey quartz vein	Qv2	Pyrite	8.0	6.5	Heihaibei	this study
15	HHB08-JK13	smoky grey quartz vein	Qv2	Pyrite	8.3	6.8	Heihaibei	this study
16	HHB08-JK15	smoky grey quartz vein	Qv2	Pyrite	8.2	6.7	Heihaibei	this study
17	HHB08-JK17	white quartz vein	Qv1	Pyrite	8.7	7.6	Heihaibei	this study
18	K1	silicified monzogranite	Qv1+wall rocks	Arsenopyrite	8.5		Heihaibei	[23]
19	K5	smoky grey quartz vein	Qv2	Pyrite	7.7		Heihaibei	[23]
20	K8	smoky grey quartz vein	Qv2	Pyrite	7.9		Heihaibei	[23]
21	ZK5601-16	phyllic rock		Pyrite	7.5		Dazaohuo	[29]
22	ZK2417-12	phyllic rock		Pyrite	8.0		Dazaohuo	[29]
23	ZK1609-5	phyllic rock		Pyrite	6.0		Dazaohuo	[29]
24	ZK1609-11	phyllic rock		Pyrite	8.1		Dazaohuo	[29]
25	ZK3209-10	phyllic rock		Pyrite	6.7		Dazaohuo	[29]
26	ZK3209-17	phyllic rock		Pyrite	6.2		Dazaohuo	[29]
27	ZK0709-8	phyllic rock		Pyrite	4.4		Dazaohuo	[29]
28	XI-3390NCM11-B1Apy	phyllic brecciated granite		arsenopyrite	1.0		Shenshuitan	[4]
29	XI-3390NCM11-B1Po	phyllic brecciated granite		pyrrhotite	0.7		Shenshuitan	[4]
30	XI-3390NCM11-B1Py	phyllic brecciated granite		pyrite	-1.6		Shenshuitan	[4]
31	XI-3390NCM11-B2Apy	phyllic brecciated granite		arsenopyrite	1.3		Shenshuitan	[4]

32	XI- 3390NCM11- B2Po	phyllic brecciated granite	pyrrhotite	-0.7	Shenshuitan	[4]
33	XI- 3390NCM11- B2Py	phyllic brecciated granite	pyrite	-0.2	Shenshuitan	[4]
34	XI- 3390NCM11- B3Apy	phyllic brecciated granite	arsenopyrite	1.7	Shenshuitan	[4]
35	XI- 3390NCM11- B3Py	phyllic brecciated granite	pyrite	1.3	Shenshuitan	[4]
36	XI- 3390NCM17- B1Py	phyllic brecciated granite	pyrite	-7.3	Shenshuitan	[4]
37	XI- 3390NCM17- B2Apy	phyllic brecciated granite	arsenopyrite	0.2	Shenshuitan	[4]
38	XI- 3390NCM17- B2Po	phyllic brecciated granite	pyrrhotite	-2.6	Shenshuitan	[4]
39	XI- 3390NCM17- B2Py	phyllic brecciated granite	pyrite	-2.1	Shenshuitan	[4]
40	XI- 3390NCM27- B1Py	phyllic brecciated granite	pyrite	-3.7	Shenshuitan	[4]
41	XI- 3390NCM27- B2Apy	phyllic brecciated granite	arsenopyrite	4.9	Shenshuitan	[4]
42	XI- 3390NCM27- B3Apy	pyritized slate	arsenopyrite	5.4	Shenshuitan	[4]
43	XI- 3390NCM27- B3Po	pyritized slate	pyrrhotite	7.1	Shenshuitan	[4]
44	XI- 3390NCM29- B1Po	phyllic brecciated granite	pyrrhotite	6.3	Shenshuitan	[4]
45	XI- 3390NCM29- B1Py	phyllic brecciated granite	pyrite	6.2	Shenshuitan	[4]
46	XI- 3390NCM29- B2Apy	phyllic brecciated granite	arsenopyrite	1.8	Shenshuitan	[4]
47	XI- 3390NCM29- B2Py	phyllic brecciated granite	pyrite	3.0	Shenshuitan	[4]
48	XI- 3390NCM29- B3Apy	phyllic brecciated granite	arsenopyrite	0.7	Shenshuitan	[4]
49	XI- 3390NCM29- B3Py	phyllic brecciated granite	pyrite	0.5	Shenshuitan	[4]
50	XI- 3390NCM29- B4Apy	phyllic brecciated granite	arsenopyrite	1.6	Shenshuitan	[4]
51	XI- 3390NCM29- B4Po	phyllic brecciated granite	pyrrhotite	0.9	Shenshuitan	[4]

52	XI-3390NCM29-B4Py	phyllic brecciated granite	pyrite	0.3	Shenshuitan	[4]
53	XI-3390NCM29-B5Gn	quartz calcite vein in phyllic brecciated granite	galena	3.3	Shenshuitan	[4]
54	XI-3390NCM29-B5Py	quartz calcite vein in phyllic brecciated granite	pyrite	4.0	Shenshuitan	[4]
55	XI-3390NCM29-B5Sp	quartz calcite vein in phyllic brecciated granite	sphalerite	4.4	Shenshuitan	[4]
56	XI-3390NCM29-B6Po	pyritized slate	pyrrhotite	8.3	Shenshuitan	[4]
57	XI-3390NCM29-B6Py	pyritized slate	pyrite	9.6	Shenshuitan	[4]
58	XI-3390NCM29-B7Gn	quartz calcite vein in phyllic brecciated granite	galena	3.0	Shenshuitan	[4]
59	XI-3390NCM29-B7Py	quartz calcite vein in phyllic brecciated granite	pyrite	4.4	Shenshuitan	[4]
60	XI-3390NCM29-B7Sp	quartz calcite vein in phyllic brecciated granite	sphalerite	5.7	Shenshuitan	[4]
61	XI-3390NCM7-B1Apy	phyllic brecciated granite	arsenopyrite	2.8	Shenshuitan	[4]
62	XI-3390NCM7-B1Po	phyllic brecciated granite	pyrrhotite	3.5	Shenshuitan	[4]
63	XI-3390NCM7-B1Py	phyllic brecciated granite	pyrite	1.9	Shenshuitan	[4]
64	XI-3390NCM7-B2Py	phyllic brecciated granite	pyrite	3.1	Shenshuitan	[4]
65	XI-3390NCM7-B3Gn	pyritized slate	galena	2.8	Shenshuitan	[4]
66	XI-3390NCM7-B3Po	pyritized slate	pyrrhotite	5.8	Shenshuitan	[4]
67	XI-3390NCM7-B3Py	pyritized slate	pyrite	5.4	Shenshuitan	[4]
68	XI-3390NCM7-B3Sp	pyritized slate	sphalerite	6.6	Shenshuitan	[4]
69	XI-SDNCM3-B1	phyllic rock	pyrite	4.4	Shenshuitan	[7]
70	XI-SDNCM3-B2-1	phyllic rock	pyrite	3.7	Shenshuitan	[7]
71	XI-SDNCM3-B5	phyllic rock	pyrite	5.4	Shenshuitan	[7]
72	XI-SDNCM3-B7	phyllic rock	pyrite	5.9	Shenshuitan	[7]
73	XI-SDNCM3-B8	phyllic rock	pyrite	4.2	Shenshuitan	[7]
74	HLG-PD3450-19-S3	phyllic rock	pyrite	0.4	Shenshuitan	[7]
75	HLG-PD3450-25-S1	phyllic rock	pyrite	1.0	Shenshuitan	[7]
76	HLG-PD3450-3-S6	phyllic rock	pyrite	8.5	Shenshuitan	[7]
77	SZDG-ZK9104-S1	phyllic rock	pyrite	4.0	Shenshuitan	[7]

78	SZDG-ZK9104-S2	phyllic rock	pyrite	4.4	Shenshuitan	[7]
79	SZDG-ZK9302-S2	phyllic rock	pyrite	5.2	Shenshuitan	[7]
80	SZDG-ZK9302-S3	phyllic rock	pyrite	3.8	Shenshuitan	[7]
81	SZDG-ZK9302-S4	phyllic rock	pyrite	3.4	Shenshuitan	[7]
82	WL23-1	phyllic rock	Pyrite	3.6	Shenshuitan	[8]
83	WL23-1a	phyllic rock	Pyrite	3.4	Shenshuitan	[8]
84	WL24-3	phyllic rock	Pyrite	4.1	Shenshuitan	[8]
85	WL25-1	phyllic rock	arsenopyrite	2.7	Shenshuitan	[8]
86	WL25-1a	phyllic rock	arsenopyrite	2.7	Shenshuitan	[8]
87	WL27-1	phyllic rock	Pyrite	2.3	Shenshuitan	[8]
88	WL28-1	phyllic rock	Pyrite	1.0	Shenshuitan	[8]
89	WL28-2-1	phyllic rock	arsenopyrite	3.1	Shenshuitan	[8]
90	WL28-2-2	phyllic rock	arsenopyrite	2.7	Shenshuitan	[8]
91	WL29-1	phyllic rock	Pyrite	5.0	Shenshuitan	[8]
92	WL30-3	quartz vein	Galena	3.0	Shenshuitan	[8]
93	WL30-5	phyllic rock	Pyrite	6.9	Shenshuitan	[8]
94	WL31-1	phyllic rock	Pyrite	7.9	Shenshuitan	[8]
95	WL45-1	phyllic rock	Pyrite	5.4	Shenshuitan	[8]
96	WL43-1	phyllic rock	Pyrite	4.8	Shenshuitan	[8]
97	WL43-1a	phyllic rock	Pyrite	5.0	Shenshuitan	[8]
98	WL40-1	quartz vein	Galena	3.9	Shenshuitan	[8]
99	337000PD01-B2-Py	quartz vein	pyrite	11.94	Hongqigou	[60]
100	337000PD01-B3-Py	quartz vein	pyrite	10.53	Hongqigou	[60]
101	3810PD301-B1-Py	quartz vein	pyrite	4.50	Hongqigou	[60]
102	3810PD301-B3-Py	quartz vein	pyrite	11.76	Hongqigou	[60]
103	3810PD301-B4-Py	quartz vein	pyrite	11.62	Hongqigou	[60]
104	3810PD301-B5-Py	quartz vein	pyrite	12.87	Hongqigou	[60]
105	3810PD301-B6-Py	quartz vein	pyrite	9.31	Hongqigou	[60]
106	3810PD301-B7-Py	quartz vein	pyrite	12.17	Hongqigou	[60]
107	B2001-1-2		pyrite	5.2	Guoluolongwa	[15]
108	B2008-1-2		pyrite	2.8	Guoluolongwa	[15]
109	B2002-1-2		pyrite	3.4	Guoluolongwa	[15]
110	B2003-1-2		pyrite	4.1	Guoluolongwa	[15]
111	B2001-1-3		pyrite	3.1	Guoluolongwa	[15]
112	B2006-1-3		Galena	1.6	Guoluolongwa	[15]
113	B2007-1-3		pyrite	4.1	Guoluolongwa	[15]
114	ZK63-1-22	phyllic rock	pyrite	3.88	Guoluolongwa	[16]
115	GB3	quartz vein	pyrite	0.2	Guoluolongwa	[16]
116	GB11	quartz vein	pyrite	3.51	Guoluolongwa	[16]
117	GB30-py	quartz vein	pyrite	1.23	Guoluolongwa	[16]
118	GB31-py-1	quartz vein	pyrite	2.77	Guoluolongwa	[16]
119	GB31-py-2	quartz vein	pyrite	1.66	Guoluolongwa	[16]
120	ZK63-1-25	phyllic rock	Galena	-5.95	Guoluolongwa	[16]
121	GB30-Ga	quartz vein	Galena	-2.03	Guoluolongwa	[16]
122	GB31-Ga	quartz vein	Galena	-2.41	Guoluolongwa	[16]
123	GL-10	phyllic rock	pyrite	-1.53	Guoluolongwa	[17]
124	GL-11	phyllic rock	pyrite	-5.22	Guoluolongwa	[17]
125	GL-14	quartz vein	pyrite	0.07	Guoluolongwa	[17]

126	GL-15	quartz vein	pyrite	-5.82	Guoluolongwa	[17]
127	GL-16	quartz vein	pyrite	-5.24	Guoluolongwa	[17]
128	GL-24	quartz vein	pyrite	4.4	Guoluolongwa	[17]
129	GL-28	phyllic rock	pyrite	-1.8	Guoluolongwa	[17]
130	GL-31	quartz vein	pyrite	1.47	Guoluolongwa	[17]
131	GL-34	quartz vein	pyrite	3.09	Guoluolongwa	[17]
132	GL-36	phyllic rock	pyrite	4.5	Guoluolongwa	[17]
133	GL-39	quartz vein	pyrite	1.27	Guoluolongwa	[17]
134	GL-40	quartz vein	pyrite	1.56	Guoluolongwa	[17]
135	GL-42	quartz vein	pyrite	3.11	Guoluolongwa	[17]
136	GL-43	quartz vein	pyrite	-2.48	Guoluolongwa	[17]
137	GL-44	quartz vein	pyrite	3.9	Guoluolongwa	[17]
138	GL-45	quartz vein	pyrite	2.11	Guoluolongwa	[17]
139	GL-46	quartz vein	pyrite	-1.56	Guoluolongwa	[17]
140	GL-50	quartz vein	pyrite	1.14	Guoluolongwa	[17]
141	GL-51	quartz vein	pyrite	4.53	Guoluolongwa	[17]
142	GL-52	quartz vein	pyrite	4.42	Guoluolongwa	[17]
143	GL-53	quartz vein	pyrite	1.79	Guoluolongwa	[17]
144	GL-55	quartz vein	pyrite	5.23	Guoluolongwa	[17]
145	GL-59	phyllic rock	pyrite	0.83	Guoluolongwa	[17]
146	GL-60	quartz vein	pyrite	3.51	Guoluolongwa	[17]
147	GL-61	quartz vein	pyrite	1.70	Guoluolongwa	[17]
148	GL-67	quartz vein	pyrite	4.14	Guoluolongwa	[17]
149	GL-69	phyllic rock	pyrite	3.81	Guoluolongwa	[17]
150	GL-78	quartz vein	pyrite	3.52	Guoluolongwa	[17]
151	GW-py	quartz vein	pyrite	1.33	Guoluolongwa	[17]
152	GW-gn	quartz vein	Galena	-2.91	Guoluolongwa	[17]
153	GL12	quartz vein	Galena	0.56	Guoluolongwa	[17]
154	GL33	quartz vein	Galena	-1.3	Guoluolongwa	[17]
155	Shzg-4	quartz vein	pyrite	6.1	Kaihuangbei	[20]
156	Kx-200	phyllic rock	pyrite	3.2	Kaihuangbei	[20]
157	dqg-1	phyllic rock	pyrite	4.9	Kaihuangbei	[20]
158	dqg-2-Py	quartz vein	pyrite	4.8	Kaihuangbei	[20]
159	dqg-2-Ga	quartz vein	galena	3.0	Kaihuangbei	[20]