

Supplementary Materials:

Table S1. The chalcocite results of the concentration of NaHS, a and the reaction rate constant, b , without NaHS and with NaHS dosages of 50 g/t, 100 g/t, and 200 g/t at pH 8, 9, and 10.

pH	NaHS Dosage (g/t)			
	0	50	100	200
8	a	0	0.50	1.00
	b	0	13.23	5.55
9	a	0	0.50	1.00
	b	0	3.07	0.73
10	a	0	0.50	1.00
	b	0	1.04	0.73

Table S2. The bornite results of the concentration of NaHS, a and the reaction rate constant, b , without NaHS and with NaHS dosages of 50 g/t, 100 g/t, and 200 g/t at pH 8, 9, and 10.

pH	NaHS Dosage (g/t)			
	0	50	100	200
8	a	0	0.50	1.00
	b	0	2.61	2.23
9	a	0	0.50	1.00
	b	0	1.69	1.09
10	a	0	0.50	1.00
	b	0	1.04	0.97

Table S3. The chalcopyrite results of the concentration of NaHS, a and the reaction rate constant, b , without NaHS and with NaHS dosages of 50 g/t, 100 g/t, and 200 g/t at pH 8, 9, and 10.

pH	NaHS Dosage (g/t)			
	0	50	100	200
8	a	0	0.50	1.00
	b	0	2.61	2.23
9	a	0	0.50	1.00
	b	0	1.69	1.09
10	a	0	0.50	1.00
	b	0	1.04	0.97