Supporting information

Eq(S1)- Eq(S5)

$$Na_2S + 2H_2O \rightarrow 2NaOH + H_2S \qquad (S1)$$

$$H_2S \rightarrow HS^- + H^+ \qquad (S2)$$

$$HS^- \rightarrow S^{2-} + H^+ \qquad (S3)$$

$$NaClO + H_2O \rightarrow NaCl + HClO \qquad (S4)$$

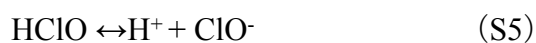$$HClO \leftrightarrow H^+ + ClO^- \qquad (S5)$$

Table Captions

Table S1. The water characteristics of three lakes

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Items	H_2S (mg/L)	pH	Turbidity (NTU)	DOC (mg/ L)	Ammonia (mg/ L)	Nitrite (mg/ L)	Nitrate (mg/ L)	TN (mg/ L)	DON (mg/ L)
A	0	7.7	3.5	4.68	0.11	0.005	0.23	0.91	0.565
B	0	8.2	16.1	3.58	0.07	0.001	0. 97	1.24	0.199
C	0	7.5	5.9	5.15	0.22	0.073	1.21	1.902	0.399

Figure Captions

Fig. S1 Sulfide species distribution diagram
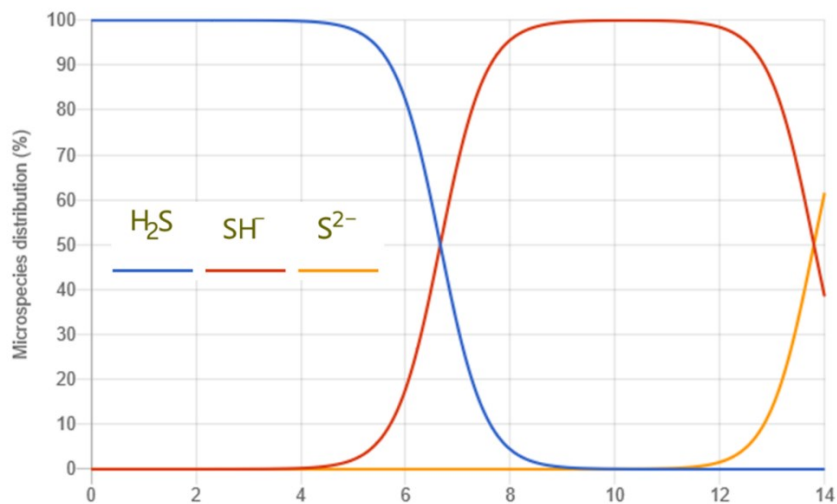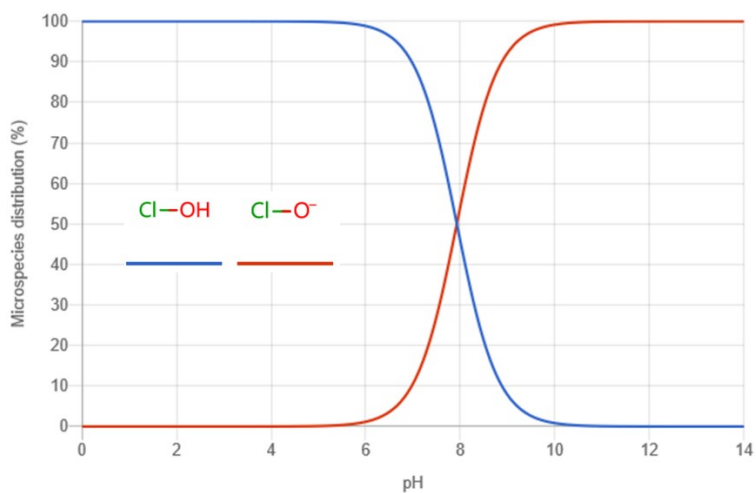**Fig. S2** HClO species distribution diagram

Fig. S1 Sulfide species distribution diagram

Fig.S2 HClO species distribution diagram