

## Supplementary material

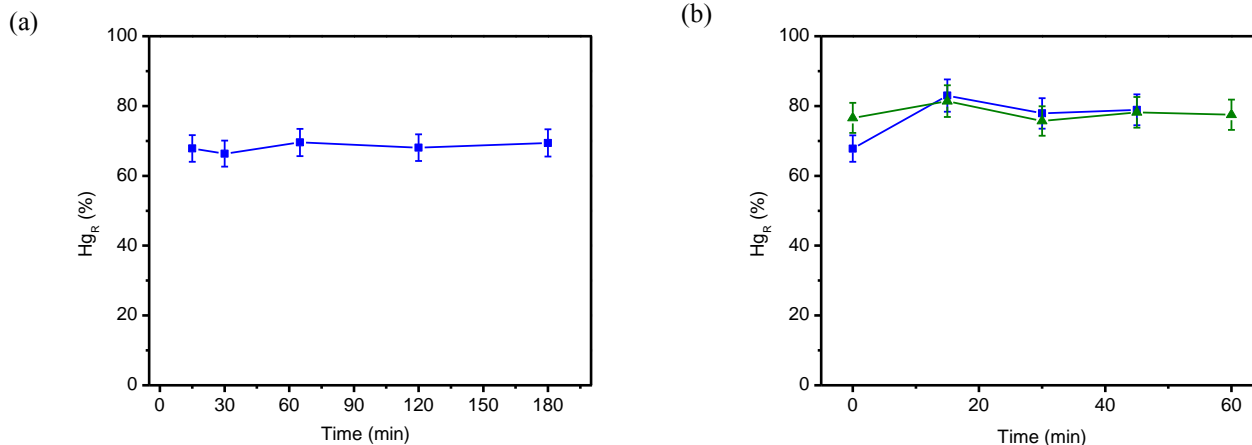
### Competitive ligand exchange reveals time dependant changes in the reactivity of Hg-dissolved organic matter (DOM) complexes

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Several experiments were conducted to determine the optimal reaction time between the Hg–DOM solutions and glutathione (GSH). The first experiment examined a solution of Hg equilibrated with Suwannee River natural organic matter (SR-NOM) ( $5 \text{ mg C L}^{-1}$ ) for 4 h in which  $5 \text{ }\mu\text{M}$  GSH was added to the solution, and  $\text{Hg}_R$  measurements were made between 5 and 180 min. The percentage of Hg presents as  $\text{Hg}_R$  was 68 % ( $\pm 1.3$ ) for all measurements, showing that the formation of the Hg–GSH complex was rapid (within 5 min) and stable (up to 180 min) (Fig. S1a). Similar results were obtained for additional experiments, where the  $\text{Hg}_R$  concentration did not change in a SR-NOM solution equilibrated with Hg for 1 h. Here two GSH concentrations ( $50$  and  $100 \text{ }\mu\text{M}$ ) were used for reaction time from 0 to 60 min (Fig. S1b). Based on the results (Fig. S1) a reaction time of GSH with the experimental solutions between 30 and 60 min was chosen. These results are consistent with the observed stability of Hg–GSH complexes for several days under oxidising conditions.<sup>[1]</sup>



**Fig. S1.** Formation and stability of stannous chloride reducible mercury (Hg<sub>R</sub>) after the addition of glutathione (GSH) (5 μM) was added to a solution of mercury (0.5 nM) equilibrated with 5 mg C L<sup>-1</sup> of Suwannee River natural organic matter (SR-NOM) for 4 h (a). The glutathione was added to the Hg-NOM solutions at time zero. The stability of the Hg-GSH complex was also examined in a solution containing Hg equilibrated with SR-NOM for 1 h before GSH titration. Two concentrations are used: 50 μM (■) and 100 μM (▲) (b).

## References

- [1] H. Hsu-Kim, Stability of metal-glutathione complexes during oxidation by hydrogen peroxide and Cu<sup>II</sup>-catalysis. *Environ. Sci. Technol.* **2007**, *41*, 2338. [doi:10.1021/es062269+](https://doi.org/10.1021/es062269+)