

## Mercury reduction by vivianite

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Mercury (Hg) is a toxic element of global environmental concern, released into the environment by human activities since the late 1700s. In aquatic/terrestrial systems, Hg can be converted by anaerobic microorganisms to monomethylmercury (MeHg), a potent neurotoxin bioaccumulated and bioamplified in food webs. In iron-rich sediments of eutrophicated lakes, where Hg is methylated, vivianite, a ferrous phosphate mineral, commonly occurs in immediate vicinity of organic remains. However, Fe<sup>II</sup>-bearing minerals such as magnetite [1] or green rusts [2] are recognized as Hg<sup>II</sup> reducers. Here, the reduction of Hg<sup>II</sup> to Hg<sup>0</sup> by vivianite (Fe<sup>II</sup><sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>·8H<sub>2</sub>O) was investigated by fluctuating Hg/Fe ratios (0.1, 1, 100) at circumneutral pH under anoxic conditions to illuminate kinetic parameters and the nature of the Fe<sup>III</sup>-bearing minerals formed. The ability of vivianite to reduce inorganic divalent Hg is of high importance to better understand (i) the interplay between the Hg and Fe biogeochemical cycles, and to (ii) its potential role in limiting the production of MeHg in suboxic/anoxic sediments by the formation of elemental Hg, less available for methylating bacteria.

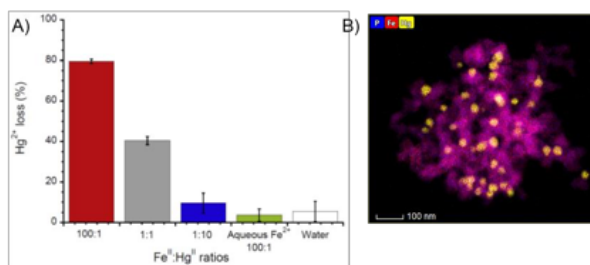


Figure 1. Percentage of inorganic divalent mercury (Hg<sup>2+</sup>) reduced by vivianite with various Fe/Hg ratios (100:1, 1:1, 1:10); (A). Elemental distribution map of vivianite nanoparticles after mercury reduction (B).

### REFERENCES

- [1] Wiatrowski H.A., et al. (2009) *Environ. Sci. Technol.*, 43:5307-5313. [2] Remy P.-Ph., et al. (2015) *Water Res.*, 70:266-278.