



## **Implications of phosphorus redox geochemistry**

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Phosphorus is the limiting nutrient in many environments. Until recently, redox changes to phosphorus speciation have been confined to the realm of chemical laboratories as phosphorus was considered to be synonymous with phosphate in the natural environment. The few known phosphorus species with a reduced redox state, such as phosphine gas, were considered novelties. Recent work has revealed a surprising role for low redox state organophosphorus compounds—the phosphonates—in biogeochemistry. Additionally, phosphite and hypophosphite (the lower oxyanions of phosphorus) have been identified from natural sources, and microbial genomics suggests these compounds may be ubiquitous in nature. Recent work from our laboratory suggests that reduced phosphorus compounds such as phosphite and hypophosphite may be ubiquitous (Pasek et al. 2014). If so, then these species may be important in the global phosphorus biogeochemical cycle, and could influence global phosphorus sustainability. Additionally, these compounds could have been relevant on the early earth environment, priming the earth with reactive phosphorus for prebiotic chemistry.

### Reference:

Pasek, M. A., Sampson, J. M., & Atlas, Z. (2014). Redox chemistry in the phosphorus biogeochemical cycle. *Proceedings of the National Academy of Sciences*, 111(43), 15468-15473.