



Sources and sinks of dissolved phytochelatin in natural seawater

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ABSTRACT: We modeled dissolved phytochelatin concentrations by studying its exudation from phytoplankton and its removal from seawater. Exudation rates were obtained from experiments in which a marine diatom, *Thalassiosira pseudonana*, was grown in Cd-containing medium. Dissolved phytochelatin in the culture medium was measured as a function of time, and a first-order model was fit to the data to derive exudation rate constants. A synthetic phytochelatin standard was used to study phytochelatin removal from natural seawater. The addition of Cd or Cu, as well as decreasing temperature, significantly decreased phytochelatin removal rates. An acclimation period followed by rapid removal was observed; subsequent incubations showed no acclimation. Using rate constants derived from these experiments and some assumptions regarding the particulate phytochelatin pool, we used a model to calculate the steady state concentration of dissolved phytochelatin in the field and obtained values that are close to field measurements of dissolved phytochelatin in the Elizabeth River estuary, Norfolk, Virginia, where metal concentrations are high.

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