The Reduction and Surface Complexation of Mercury by Anaerobic Microorganisms

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We systematically examined reactions between mercury (Hg) and washed cells of anaerobic microorganisms such as *G. sulfurreducens* PCA as influenced by cell growth stage, density, the presence or absence of thiolate ligands. We found that Hg(II) can be rapidly reduced to Hg(0) upon contacting with cells, but reduction rates and extents are influcenced by not only the cell growth stage but also the density. An optimal reduction of Hg(II) (50 nM) was observed at a cell density of ~ 10^{11} L^{-1}; either an increase or decrease in cell density inhibited the reduction of Hg(II) due to competing surface adsorption or complexation of Hg(II) on bacterial cells through thiolate functional groups. Our findings explain some previously observed inconsistencies with respect to the roles of microorganisms in Hg(II) reduction and may have important implications to the availability and bioaccumulation of Hg in the aquatic food web.