

Production of Extracellular Sulfite by *Shewanella oneidensis* MR1

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INTRODUCTION: Sulfite is a highly reactive sulfur species that can strongly interact with metals and minerals in the environment. In geochemically-relevant microorganisms, descriptions of sulfite production have been mainly limited to dissimilatory sulfate-reducing bacteria. In this study, we measured sulfite production by the model organism *Shewanella oneidensis* MR1. Our results indicate that *S. oneidensis* MR1 produces significant quantities of sulfite under varying growth conditions.

EXPERIMENTAL APPROACH: *S. oneidensis* MR1 was grown under aerobic and anaerobic conditions with fumarate as an electron acceptor. Samples were collected at various time points during growth. Filtered samples were derivitized with the fluorescent probe monobromobimane (mBBr) and analyzed for sulfite, thiosulfate, cysteine, and glutathione using HPLC coupled to fluorescence detector. UHPLC-TOF-MS was used to measure the sulfur isotopic composition of the biogenic sulfite.

RESULTS AND DISCUSSION: *S. oneidensis* MR1 produces significant quantities of extracellular sulfite during both aerobic and anaerobic growth. Cysteine, glutathione, and thiosulfate were not detected in the spent medium. Normalized against cell density, sulfite concentrations were 20 fold higher in anaerobic cultures compared to aerobic cultures. This difference is only partially accounted for by differences in rates of abiotic oxidation of sulfite by oxygen during aerobic vs anaerobic growth. Calculations performed predict significant complexation of sulfite with Cu(I), Hg(II), and Ag(I). The results of this work suggest that sulfite produced by non-dissimilatory sulfate-reducing bacteria is a potentially underappreciated extracellularly-secreted cellular metabolite with the potential to significantly alter the solubility of various metals in its environs. The isotopic composition of sulfite produced by *S. oneidensis* MR1 will be discussed in the presentation.