Variable Stoichiometry of Two Thiomicrospira Strains Grown Under a Range of Environmental Conditions

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Recommended Citation
Wills, Emily, "Variable Stoichiometry of Two Thiomicrospira Strains Grown Under a Range of Environmental Conditions " (2012). Washington University Undergraduate Research Digest, Volume 8, Issue 1.
http://openscholarship.wustl.edu/vol8_iss1/162
The cycling of sulfur in global oceans is impacted by the microbial processes involving sulfur oxidation occurring at deep sea hydrothermal vent systems. These reactions work to redistribute sulfur-containing compounds throughout the world’s oceans. Here we examine the effects of a range of temperatures and pH on sulfur speciation in two separate strains of sulfur-oxidizing bacteria. *Thiomicrospira thermophila* and *T. crunogena* were both isolated from hydrothermal systems of the East Pacific Rise and obtain energy for cellular processes from the oxidation of partially reduced sulfur compounds. Both were grown using thiosulfate (S\textsubscript{2}O\textsubscript{3}\textsuperscript{2-}) as the electron donor under aerobic conditions with variations in the pH and temperature. Under optimal temperature (35°C) and pH (initially 7, unbuffered) with exponential growth, *Thiomicrospira* produce a ≥1:1 molar ratio of thiosulfate consumed: sulfate produced while generating a small, stoichiometric portion of elemental sulfur indicating the production of another oxidized, sulfur-containing compound, possibly sulfur dioxide. When pH is buffered at 5.6 with a range in temperatures from 35-45°C, the reproducible ratio obtained of 1:2 indicates a stoichiometric balance of thiosulfate and sulfate with negligible elemental sulfur production. In both strains, sulfate production is dependent on pH with a reduction in the rate as the net change in pH is increased. Future work analyzing stable isotopic fractionation of sulfur compounds produced by microbial growth can be used to better understand microbial activity under variable environmental conditions.