Determination of the Growth Curve of the Selenium-reducing Bacteria 

**Thauera selenatis** sp. 

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**Abstract**

The biogeochemical behavior of selenium (Se) is highly complex. It occurs naturally in four oxidation states: Se (-II), Se (0), Se (IV), and Se (VI) that vary widely in terms of solubility, mobility, biodegradability. The primary oxidation states associated with environmental selenium toxicity, Se (VI) precipitated forms (Losi and Frankenberger, 1997). Microorganisms have been shown to remove selenium from drainage water, with the selenate-reducing bacterium *Thauera selenatis* (Macy et al., 1996). A pilot-scale biological reactor system at the Benicia Water District, San Joaquin Valley, California, was found to be effective in bioremediation of selenium from drainage water, with the selenate-reducing bacterium *Thauera selenatis* (Huntgate’s Media with the following composition: NaCl, KCl, NH4Cl, KH2PO4, Na2SO4, NaHCO3, Yeast extract, trace elements, vitamins, 40% MgCl2, 15% CaCl2, 1.3 M Acetate, 1 M Selenate). From a one-day old broth was pipetted to 3 replicate erlenmeyer flasks, labelled as I, II, III, containing 250 ml *T. selenatis* samples for dilutions 10-7, 10-8, and 10-9 were then spread using glass beads on the plates.

**References**


Pallud, C. 2006. Impact of scale aggregate heterogeneity of transport and biogeochemical processes on water mobility in soil. Research Project, UC Berkeley, Berkeley, CA, USA


**Conclusions**

- The late exponential growth phase of *T. selenatis* at 26°C was determined to be between the 15th and 20th hour. This result is crucial for proper timing in cell harvesting.

- The late exponential growth phase of *T. selenatis* is between the 15th and 20th hour with optimal optical density at 600 nm.

- At 15th and 20th, hour optical density at 600 nm was determined to be between 0.15 and 0.25, and 0.20-0.25 considered the optimal point to harvest *T. selenatis* cells in the exponential phase.

- At optical density of 0.20, which is approximately between the 15th and 20th hour of inoculation, cell density of *Thauera selenatis* was 2.5 (CFU/mL).

**Figure 1.** Transmission Electron Microscopy (TEM) images of *Thauera selenatis* showing spherical (a), selenate-reducing micrographs (b) and the isolate in suspension (c).

**Figure 2.** Serial dilution/Plate Count Diagram (modified from Gary K. Keller, Oregon State University, 2008).

**Figure 3.** Bacterial growth curve based on absorbance at 600 nm of *Thauera selenatis* sp. at 26°C showing cell density (CFU/mL) at different time points from experiment done on June 15-19, 2003.

**Figure 4.** Bacterial growth curve based on absorbance at 600 nm of *Thauera selenatis* sp. showing optical density at six different time points from experiment done on June 15-19, 2003.

**Figure 5.** Visible isolated colonies of *Thauera selenatis*.
Thauera selenatis
Sample of Thauera selenatis