

Understanding the haloalkaline biodesulfurization process

Background:

Dihydrogen sulfide (H₂S) is a malodorous and highly toxic compound. An economical and ecofriendly method to remove H₂S from gas streams is biodesulfurization. This process makes use of haloalkaliphilic sulfur-oxidizing bacteria to convert dissolved sulfide to elemental sulfur. Subsequently, this bio-sulfur can be recovered and used as fertilizer or fungicide. However, the biological production of elemental sulfur is often accompanied by the production of undesired sulfur compounds, such as sulfate (SO₄²⁻) and thiosulfate (S₂O₃²⁻). Recent technological advancements in the biodesulfurization process have increased the sulfur selectivity from 90% to 96.6%. However less is known about the microbiological mechanisms involved in the changed line up. Biological sulfur oxidation is done by a cascade of enzymatic reactions, which have been well studied for different haloalkaliphilic bacteria. Activity tests with biomass from a pilot biodesulfurization plant have indicated fluctuations in the activity of the bacteria during operation of the plant. We hypothesize that these fluctuations correspond to changes in the metabolic activity of the microbes involved.

Aims:

The overall aim is to understand the microbiological mechanisms behind the enhanced sulfur production and the microbial community involved. In this proposal, we aim to study the kinetics of the sulfide, thiosulfate and sulfur. The study will be conducted using substrate-dependent respiratory tests. The tests will be done in the presence/absence of compounds that may have inhibitory effect on the activity.

Your Tasks:

1. Literature review on kinetic studies involving oxidation of sulfur compounds (sulfide, thiosulfate and biologically produced sulfur).
2. Conduct respiratory tests with sulfide, thiosulfate and biologically produced sulfur as substrates.
3. Writing report

Your Profile:

- We are looking for a Bachelor/Master student with a background in biotechnology, microbiology or related area, seeking for thesis/internship.
- The student should be fluent in English both written and spoken.
- Laboratory experience in microbiology is preferred.

Important details:

- The duration of the project will be at least 4 months starting from December 2019.
- The research work will be conducted at Wetsus, Center of Excellence of Water Research, located in Leeuwarden, the Netherlands.
- Salary: 175 € per month.

Contact details:

For any questions and application please feel free to contact Suyash Gupta via email:

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