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Data Article

Data set on the bioprecipitation of sulfate and trivalent arsenic by acidophilic non-traditional sulfur reducing bacteria

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ABSTRACT

Data presented here are related to the original paper “Simultaneous removal of sulfate and arsenic using immobilized non-traditional sulfate reducing bacteria (SRB) mixed culture and alternative low-cost carbon sources” published by same authors (Matos et al., 2018) [1]. The data set here presented aims to facilitate this paper comprehension by giving readers some additional information. Data set includes a brief description of experimental conditions and the results obtained during both batch and semi-continuous reactors experiments. Data confirmed arsenic and sulfate were simultaneously removed under acidic pH by using a biological treatment based on the activity of a non-traditional sulfur reducing bacteria consortium. This microbial consortium was able to utilize glycerol, powdered chicken feathers as carbon donors, and proved to be resistant to arsenite up to 8.0 mg L⁻¹. Data related to sulfate and arsenic removal efficiencies, residual arsenite and sulfate contents, pH and Eh measurements obtained under different experimental conditions were depicted in graphical format.

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Specifications Table

Subject area	Chemistry, Biology, Engineering
More specific subject area	Biotechnology processes, Bioremediation.
Type of data	Table, image, graph, figure
How data was acquired	pH and Eh measurements: digital potentiostat with a combined platinum electrode (Digimed, DM-22). Residual sulfate concentration: turbidimetric method [2]. Total arsenic content: determined by inductively coupled plasma optical emission spectroscopy (ICP-OES) (Varian, 725-ES).
Data format	Analyzed. Averaged data
Experimental factors	Brief description of any pretreatment of samples
Experimental features	Culture media was prepared as previously described [1,3] and incubated in an oven (Fanem, model A-LT). Samples were centrifuged (10,000 rpm, 15 min, Fiberlite F155-8×50cy, Thermo, Multifuge X1R) and filtered (0.45 μm acetate cellulose membrane - Sartorius-Stedium) and acidified with nitric acid (50 μL) before residual As(III) measurements.
Data source location	Ouro Preto, Brazil
Data accessibility	All data are included in this document.
Related research article	L. P. Matos, P. F. Costa, M. Moreira, P. C. S. Gomes, S. Q. Silva, L. V. A. Gurgel, M. C. Teixeira, Simultaneous removal of sulfate and arsenic using immobilized non-traditional SRB mixed culture and alternative low-cost carbon sources, Chemical Engineering Journal, 334 (2018), 1630–1641.

Value of the Data

- Different experimental conditions were compared. Free and immobilized bacterial cells were used. Different organic electron donors were tested including some low cost waste material.
- Data compare results obtained under batch and semi-continuous experimental conditions.
- Semi-continuous experiments were carried out for a long time. Data were collected for more than 150 days.
- Arsenite (bio)precipitation by sulfate reducing microorganisms was achieved under acidic pH.

1. Data

Data described simultaneous SO_4^{2-} and As(III) removal obtained by using a non-traditional SRB microbial consortium previously adapted to the growth under acidic pH using Glycerol and PCF as electron donors. The main bacterial species identified are: *Pantoea agglomerans*, *Enterobacter* sp., *Citrobacter* sp., *Cupriavidus metallidurans*, *Ralstonia* sp. and *Burkholderia cepacia*. Arsenic and sulfate are commonly found as contaminants in industrial effluents from mining and metallurgical industries.

Arsenic and sulfate removal were obtained under batch and semi-continuous culture conditions. Semi-continuous up-flow reactors were constructed and operated for more than 150 days to prove their efficiency. At the final, effluent pH was neutralized and, depending on the operational conditions, SO_4^{2-} and As(III) ions were removed with 74.8% and 80% efficiency, respectively.

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