

Sulfate production by *Paracoccus pantotrophus* ATCC 35512 from three sulfur

substrates: sodium thiosulfate, sulfite and sulfide

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Abstract: One of the problems in waste water treatment plants (WWTPs) is the increase in emissions of hydrogen sulfide (H₂S), which can cause damage to the health of human populations and ecosystems. To control the emissions of this gas, sulfur-oxidizing bacteria can be used to convert H₂S to sulfate. In this work, sulfate detection was performed by spectrophotometry, ion chromatography and atomic absorption spectrometry, using *Paracoccus pantotrophus* ATCC 35512 as a reference strain growing in inorganic broth supplemented with sodium thiosulfate (Na₂S₂O₃·5H₂O), sodium sulfide (Na₂S) or sodium sulfite (Na₂SO₃), separately. Sulfur-containing substrates were added to an inorganic broth (sodium sulphide, sulphite or thiosulphate), serving as an analogous compound to hydrogen sulfide (H₂S) in solution. Furthermore, ultrapure deionized water (MilliQ) was used to avoid the ions present in the water, which could interfere with the results. The flasks were incubated for 9 days without shaking at 37°C. The experiments were performed in triplicate, including the negative abiotic control (no addition of microorganisms). The strain was metabolically competent in sulfate production. However, it was only possible to observe significant differences in sulfate production, compared to abiotic control, when the inorganic medium was supplemented with sodium thiosulfate. The three methods for sulfate detection showed similar patterns, although the chromatographic method was the most sensitive for this study. In this context, the strain *P. pantotrophus* ATCC 35512 can be used as a reference standard for the study of microbial production of sulfate from sodium thiosulfate. These results can be useful to compare with sulfur

oxidizing bacteria, prospected from environmental samples of wastewater treatment plants, in order to compose a bacterial consortium potentially able to convert H₂S into sulfate.

Keywords: sulfur oxidizing bacteria, H₂S, sulfate, *Paracoccus pantotrophus*