



Bench-scale Microbial assisted arsenic removal using *Acidothiobacillus ferrooxidans* mediated by iron oxidation



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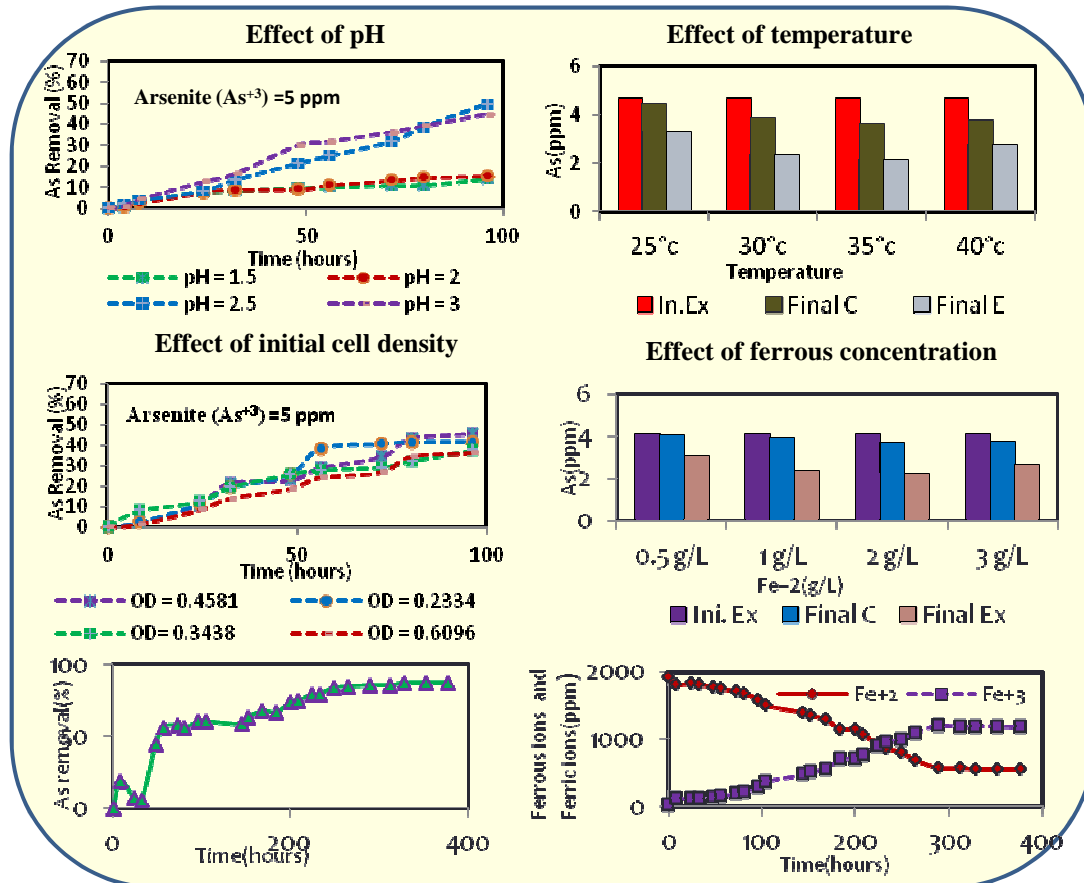
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ABSTRACT

Oxidation of ferrous ions using *Acidothiobacillus ferrooxidans* has an important application in removal of arsenic (As) by chemo-biochemical process. Arsenite (As⁺³) was found to be oxidised to arsenate (As⁺⁵) in presence of *A. ferrooxidans* and ferric (Fe⁺³) ions. The resulting arsenate can be removed by precipitation and filtration. The aim of present work was to establish the effect of basic parameters namely temperature, pH, initial cell density and Fe⁺² concentration on microbial assisted arsenic removal using bio-oxidation of ferrous to ferric at bench scale.

INTRODUCTION

Arsenic is a toxic element that shows detrimental effects on the environment and exposure in human beings is linked to ailments such as skin and lung cancer and other diseases. *Acidothiobacillus ferrooxidans* are chemolithoautotrophic cells that can extract energy from the oxidation of ferrous ions to ferric ions. These ferric ions act as oxidising agent which also helps in oxidation of arsenite to arsenate. This chemo-biochemical process is a chemically bio-mediated process in which ferric ion and microorganism enhanced the process of oxidation of arsenite as well as help in improved precipitation and removal of arsenic species. This work is based on principle of green chemistry using microorganism.



Result
Observed process parameters
pH - 2.5, Temperature - 35°C,
Ferrous conc. - 2 gm/L, Time-8days
Initial cell density - 0.4584 OD,
Culture inoculum size - 10%,

Discussion
• Highest arsenic removal was obtained 80-85% in 8 days
• Assessment of culture medium, environmental factors for the growth of *A. ferrooxidans* for effective microbial-ferric ion assisted oxidation of arsenite to arsenate showed that pH-2.5, Temperature - 35°C, Ferrous conc.-2gm/L, cell density-0.4584 were observed process parameters

References
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Zouboulis et al.(2005), Environmental International, 31:213-219
Chong Thomas et al.(2007), Desalination, Volume 217:139-166

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