

XVII
CONGRESSO NACIONAL DE
BIOQUÍMICA
15, 16 e 17 DEZEMBRO 2010, PORTO

XVII Congresso Nacional de Bioquímica
Poster Abstract Submission

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Abstract

Title: Biodegradation of textile azo dyes by a facultative *Staphylococcus arlettae* strain VN-11 using a sequential microaerophilic/aerobic process

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Themes: Biotechnology

Type of Presentation: Poster

Text:

Background

To overcome the accumulation of toxic aromatic amines in reductive azo dye biodecolourization, recent studies included combinations of anaerobic and aerobic steps in an attempt to achieve their degradation. However, very few studies have been performed using sequential microaerophilic/aerobic conditions with the same microorganism.

Objectives

1. Azo dye decolourization under reductive conditions using a facultative *Staphylococcus arlettae* strain.
2. Biodegradation by stirring aeration to promote aromatic amines oxidation into non-toxic metabolites.

Methods

Strain identification was performed by 16S rRNA gene sequence analysis. Dye decolourization and degradation products were studied by direct measures, UV-Vis and FT-IR analysis. Total Organic Carbon

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was measured by TOC analyzer. Acute toxicity tests were carried using *Daphnia magna*.

Results

A facultative *Staphylococcus arlettae* bacterium, isolated from an activated sludge process in a textile industry, was able to successfully decolourize four different azo dyes under microaerophilic conditions (decolourization percentage >97%). Further aeration of the decolourized effluent was performed to promote oxidation of the degradation products. The degradation products were characterized by FT-IR and UV-vis techniques and their toxicity with respect to *Daphnia magna* was measured. The amine concentrations as well as the total organic carbon (TOC) levels were monitored during the biodegradation process. The presence of aromatic amine in the microaerophilic stage and its absence in the aerobic stage indicated the presence of azoreductase activity and an oxidative biodegradation process, respectively. TOC reduction was 15% in the microaerophilic stage and ~70% in the aerobic stage.

Conclusions

The results provided evidence that, using a single *Staphylococcus arlettae* strain in the same bioreactor, changing the agitation conditions, the sequential microaerophilic/aerobic stages were able to form aromatic amines by reductive break-down of the azo bond and to oxidize them into non-toxic metabolites with low running and maintenance costs.