

Mending of contaminated seawaters using marine cyanobacteria. Evaluation of the trace metals removal rates and chemical speciation of the medium.

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In the past years much concern over the presence of heavy metals in the aquatic environment and its cumulative toxicity and environmental impact has lead to extensive research into developing effective alternative technologies for the removal of these substances from effluents and industrial wastewater (1,2).

The conventional physical and chemical techniques currently used for the removal of heavy metals from industrial wastewater become inefficient and expensive especially when the heavy metals are present in huge volumes at relatively low concentrations.

The ability of many microorganisms to grow at high metal concentrations and sorb metals is well known and there is considerable potential for using them to treat wastewaters (3).

The use of microbial biomass for the removal of toxic metal ions from polluted effluents (biosorption) is being studied, as a potential alternative (or combined) to conventional processes and several algae have been shown to possess excellent ability to concentrate metals.

Cyanobacteria (bluegreen algae) are widespread organisms, with specific properties, such as high nutrient removal capacity and toleration to the highly variable conditions (that characterize polluted effluents) being well-suited for wastewater and remediation purposes. Cyanobacteria can be easily cultivated and hence could be valuable in metal bioremediation (4,5). Many studies have already described the use of freshwater cyanobacteria for metals removal (6-8). Nevertheless, the chemical speciation of marine cyanobacteria is still scarcely described in the literature.

In this context, the main aim of this work was to evaluate the use of different strains of marine cyanobacteria, collected from the Portuguese northern border, for the removal of selected trace metals when in natural seawater culture medium. Results were analyzed in order to establish an approach of these systems, looking forward for a potential application of these microorganisms in environmental protection, throughout the (a) selection and characterization of cyanobacteria strains to be used in metal sorption; (b) determination of the removal rates (regarding to each metal); (c) chemical speciation of the culture medium and its correlation to each studied system and (d) optimization of the parameters in metal removal.

Moreover, the use of biological processes for the treatment of metal enriched wastewaters can overcome some of the limitations of physical and chemical treatments and provide a means for cost-effective removal of metals.

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