

BIOTECHNOLOGY APPLIED FOR REMOVAL OF ORGANIC COMPOUNDS BY PHYCOREMEDIATION

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ABSTRACT

The chemical residues generated by research and/or teaching laboratories at universities and research centers raise a serious concern due to risks posed to the environment if not handled properly. Residues of some organic compound are discarded incorrectly because of inappropriate glass washing and equipment cleaning. Ethidium Bromide (EtBr) is an organic compound widely used as a DNA intercalator in molecular biology procedures and the EtBr ability of intercalating itself in the DNA molecule, makes it a toxic substance. Among biological wastewater treatment strategies, the use of microalgae (phycoremediation) has been appreciated as a potentially effective option to remove target contaminants from water. The objective of this study was to evaluate the removal of EtBr from water by three species of unicellular microalgae individually (*Chlorella vulgaris*, *Desmodesmus subspicatus*, and *Raphidocelis subcapitata*) and in a mixture (Mix). No large variations in the number of algae/mL were observed after 3 hours of exposure to a 0.5 mg/L solution of EtBr in mineral water, starting and ending with 10^6 algae/mL, excepting for *R. subcapitata* that ended with 10^7 algae/mL. The results in absolute values of EtBr removal (measured by fluorescence) after 1 h of treatment were: Mix > *D. subspicatus* > *C. vulgaris* > *R. subcapitata*. After 3 h the best result in absolute values (mg of EtBr) were: Mix > *D. subspicatus* > *R. subcapitata* > *C. vulgaris*. However, if relative microalgae density (mg/algae/mL) data are considered, the ranking after one hour was: *C. vulgaris* > Mix > *D. subspicatus* > *R. subcapitata*; after 3 h the ranking was: *D. subspicatus* > *C. vulgaris* > Mix > *R. subcapitata*. Therefore, it was concluded that, despite the low percentage of EtBr removal (<11%) achieved with Mix, this was due to the low microalgae density 10^6 algae/mL in the treatment assays. Based on these results, it was possible to estimate the density of each microalgae species required for the total EtBr removal as following: 10^{10} algae/mL for *C. vulgaris*, *D. subspicatus* and Mix; and 10^{11} algae/mL for *R. subcapitata*.

KEYWORDS

Phycoremediation; Laboratory effluent; Ethidium bromide; Tertiary effluent treatment; Algal biomass, Microalgae density.