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P7

BIOREACTOR OPTIMIZATIONFOR THE TREATMENT OF INDUSTRIAL WASTEWATERS BY MEANS OF A FUNGAL STRAIN

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Abstract

The wastewaters outgoing from the industries can cause serious environmental damages on the whole ecosystem. Both public opinion and institutions are becoming more and more aware about the risks and of course, they claim for deep controls on the effluents discharged. It stands to reason that appropriate wastewater treatments are mandatory. It should be also considered that the composition of these effluents changes continuously; so that a single approach, able to degrade always and each compound, seems to be unrealistic. From an applicative point of view, it should be hypothesized an approach combing different techniques, which could exploit their potential towards different molecules. At the moment, several processes are under investigation, but they often have some drawbacks in terms of economical and environmental sustainability.

In the present study, several fungal strains have been tested towards real industrial wastewaters. The efficacy of the treatment was monitored following the decolourisation percentage and the modification of other parameters as the chemical and biological oxygen demand. Since some abiotic parameters could deeply limit even the survival of living organism, in some cases their control is required. In this study, working with very alcaline effluents (pH up to 12), the pH control was often a necessary step. Moreover, since these wastewaters lack of organic compounds useful for the fungal growth, the addition, even in low amount, of nutrient could allow the development of a more active biomass, improving the final efficacy of the treatment.

From an applicative point of view, the potential of the fungus should be evaluated monitoring its capability to compete with the autochthonous bacterial microflora of the wastewaters. According to this, all the experiments were carried out with non sterile effluents and in not axenic working conditions.

Moreover, as above mentioned, any new technique should be able to work with the already existing ones, hopefully compensating the shortcomings shown by other processes. With this aim, in the present study, the fungal treatment was compared with the activated sludge one, already in use in the wastewater treatment plant of interest, in order to define if the two techniques could work in a synergic way.

Finally, anytime a process shows promising potential, it should be always considered whether it could be scaled-up to higher volumes than laboratories ones. Different reactor set-up' and operative strategies have been tested in order to find out the best solution which coupled interesting bioremediation efficiency with higher working volumes.