SOLAR AND BIOLOGICAL OXIDATION PROCESSES FOR TREATING WASTEWATER CONTAINING PESTICIDES: FOTOBIOX PROJECT

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Although there is some information on the possibility of using chemical oxidation treatments for non-biodegradable pollution until they become biodegradable, most of it is limited to the evaluation of overall parameters such as BOD_5, COD and TOC, and the use of activated sludge from treatment plants in small laboratory devices. The information on kinetics in the two integrated processes (chemical and biological) and the toxic and inhibitory properties of the different compounds that are generated during the oxidative pre-treatment is quite scarce. Besides, the little experimentation performed in pilot plants has been one of the main reasons for the absence of industrial applications in this field. This work attempts to serve as a step forward in this subject. The specific objectives are the following:

1. Study the detoxification of pesticide mixtures by homogeneous photocatalysis using experimental design modeling techniques.
2. Study the degradation pathways of pollutants and the influence of intermediates formed during detoxification and increased biodegradability of water treated.
3. Design a specific biological treatment system based on microorganisms adapted to the chemical nature of pollutants pretreated by photo-Fenton.
4. Design and erect an integrated photocatalytic-biological pilot plant. And study the process variables.
5. Evaluate system operability and economics.

The photo-Fenton degradation of a mixture of five watersoluble commercial pesticides (Couraze, Metomur, Ditimur-40, Vydate and Scala) has been studied in a 35-L solar pilot plant with three Compound Parabolic Collectors (CPCs). The initial TOC concentration studied was 500 $mg.L^{-1}$ and the catalyst concentration employed was 20 $mg.L^{-1}$ of Fe (II). Both toxicity (Vibrio fischeri) and biodegradability (Zahn-Wellens test) analysis were performed. Total disappearance of the parent compounds, nearly complete mineralization and biodegradability enhancement of the pesticide mixture were attained.

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