

DEVELOPMENT OF EQUIPMENT FOR DESTRUCTION OF PESTICIDE WASTE IN WATER USING NANOSTRUCTURED PHOTOCATALYSTS

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Organic pesticide residues are one of the most recent sources of water contamination, due their great persistence in the environment and cumulative effects on the human body. Ultraviolet (UV) photodegradation has been identified as one of the best alternatives for treatment, however, the high cost and / or the low efficiency of the process is a challenge for its use on large scales. Despite those difficulties, a photodegradation equipment focused to small scale use may be viable, in order to treat the waste at sourceplace, avoiding its access to the environment. In order to evaluate this possibility, a low-cost operation equipment was developed, to the treatment of waste from the washing of clothes and equipment used in agricultural pesticide spraying. The equipment was optimized with the development and testing of photocatalysts. The experiments were done using a nanostructured TiO₂ thin film obtained by the polymeric precursors method, deposited on glass substrate through common dip-coating and calcined to 450°C. The film obtained showed good surface adherence and mechanical strength for their use in the prototype, and presented also lower manufacturing costs when compared with commercial photocatalysts. Preliminary tests about the degradation of pesticides mixtures, in solution with similar concentrations to those commercially used in agriculture, showed a significant increase in the efficiency of photodegradation, when compared to the simple photolysis system. Other parameters, such as layer thickness, waste residence time, energy and intensity of UV radiation, were investigated, in order to optimize the apparatus. The ultimate goal is a commercially viable prototype, regarding the costs of acquisition, operation, and the effectiveness of treatment carried out.

Acknowledgement: CNPq - RHAIE-Innovation Program.

Keywords: photodegradation, semiconductor, photocatalyst, rhodamine, atrazine.

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