

# **STUDY OF CONTAMINATION PROCESSES BY ORGANIC COMPOUNDS USED IN AQUACULTURE. SOLAR RADIATION EFFECT AND ADVANCED OXIDATION TREATMENT**

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The Mediterranean coast has exceptionally good conditions for fish-farm development. Therefore, the growth of this already relevant activity is foreseen to increase considerably in the near future. As any other production activity, aquaculture generates different sorts of residues that may affect the quality of the coastal water as well as the marine ecosystems exposed to such residues. Some of these effects have already been detected. However, the legal framework is ambiguous and lacks information on the environmental impact caused by the direct or indirect use of organic compounds (persistent or emerging contaminants). This project will approach the organic compounds contamination problem in aquaculture from two prospects. Firstly, knowledge of these compounds performance and impact in marine environment: toxicity and transformation processes. Secondly, assessment of the treatments by Advanced Oxidation Processes. The project result will contribute to making this increasing production activity compatible with sustainability and preservation of the environment.

In this context, the antibiotics are very important in aquaculture industry to treat infectious diseases in fish. Flumequine (FLU) and Trimethoprim (TMP) are commonly used antibiotics in cases of pulmonary, urinary and gastrointestinal infections. FLU is a very hydrophilic compound and presents a strong affinity for soils, sediments and activated sludge. This behaviour contributes to the occurrence and persistence in the environment of FLU after conventional treatments. TMP belongs to a family of synthetic 2,4-diaminopyrimidines. TMP presence, at the  $\mu\text{g.L}^{-1}$  level, has been reported in WWTP influents and effluents.

Because of the environmental concern of both compounds and their inefficient elimination by conventional treatments, the technical feasibility, mechanisms and performance of degradation of FLU and TMP were studied with two Advanced Oxidation Processes (AOP): heterogeneous photocatalysis with  $\text{TiO}_2$  and photo-Fenton. Both AOP can be operated with natural solar UV light. Degradation experiments were performed in a pilot-plant ( $V=35\text{L}$ ) made up of Compound Parabolic Collectors (CPCs) designed for solar photocatalytic applications. Field conditions used allowed adequate comparison of both treatments. Different analytical techniques were applied to the evaluation of the degradation processes. Therefore, degradation kinetics and mineralization were followed by HPLC-UV and TOC, and identification of the main transformation products generated was reached by LC-TOF-MS.