

Evaluation of Photo-Fenton and Electro-Oxidative Processes for the Pre-Treatment of an Agro-Industrial Wastewater

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Agro-industries are spread all over the globe and along each processing chain, liquid and solid residues are generated. Usually, wastewater produced in this kind of industries has hazardous character, which can also exhibit toxicity, low biodegradability and strong colour [1-3], making it unproper for the application of conventional treatments. In this context, advanced oxidation processes (AOPs) are able to degrade recalcitrant compounds, making wastewater more suitable for the combination with lower-cost biological processes afterwards.

The aim of this investigation was to increase biodegradability of a real agro-industrial effluent through solar photo-Fenton, electro-Fenton (EF) and solar photo-electron-Fenton (SPEF) processes at pilot plant scale (Figure 1), in order to achieve the best pre-treatment for further application of a conventional biological treatment.

SPEF process was the fastest to attain biodegradability (20 minutes, 5 % of dissolved organic carbon (DOC) eliminated) with the lowest treatment cost (0.11 € m⁻³) while solar photo-Fenton, despite revealing almost complete mineralization, it was highly costly (0.22 € m⁻³) and it took a quite longer time to reach biodegradability (30 minutes and 10 % of DOC eliminated).

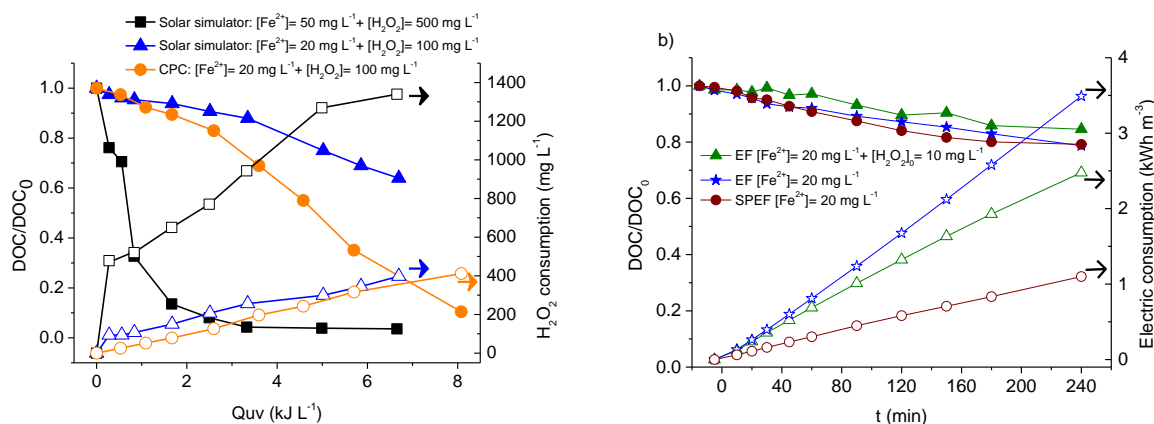


Figure 1. DOC evolution during the processes: a) solar photo-Fenton; b) EF and SPEF processes.

Acknowledgements:

The financial support was provided by the FCT-Portuguese Foundation for Science and Technology (PD/BD/128270/2017) and the financial support provided by SFERA (823802).

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