

PhD Candidate Profile

Name:

Melisa Portilla Sangabriel

Research Group:

N/A

Research Centre:

Institute of Engineering

**Department/School(s):**

Department of Environmental Engineering

College:

Universidad Nacional Autónoma de México

Supervisor(s):

Dra. Rosa María Ramírez Zamora

Funding body:

CONACYT

Area (field) of study:

Degradation of drugs by advanced oxidation process

Thesis Title:

Degradation of drugs associated with the treatment of COVID-19 and its main metabolites presents in WWTPs secondary effluents using a photo-assisted Fe/NaClO system

Abstract:

The continuous increase in the concentration of pharmaceuticals used to treat the COVID-19 and its metabolites represents a risk to health and the environment because the treatment trains installed in the Wastewater Treatment Plants (WWTP), they are not designed to withstand those significant peaks in the amounts to be

PhD Candidate Profile

treated of these pollutants. Additionally, in Mexico only one third part of wastewater is treated and the rest are discharged without treatment. This problem can be aggravated by the increase in the number of COVID-19 patients, until an effective vaccine is available to the vast majority of the population.

Previously, a similar system (metallurgical slag-NaOCl and simulated solar radiation) has been evaluated at the laboratory level, aimed at the degradation of the pesticide thiabendazole, whose results point to using NaOCl as an oxidant instead of H₂O₂, a higher degradation rate is achieved, with which the treatment capacity of the process operated at the pilot level could be increased. However, there are several niches of opportunity to make improvements to the PAO in order to increase the technical-economic feasibility of the PAO, and, therefore, that it can be transferred.

A technological improvement proposed for this system, which has not been reported, is the functionalization with citric acid of the Fe present in the metallurgical slags, to increase the speed of the catalytic decomposition reaction of NaOCl into radicals HO• and Cl•, which are those mainly responsible for the degradation of pollutants. Due to this situation, this project proposes to evaluate at a pilot level the degradation of drugs used for the treatment of COVID-19, present in WWTP effluents, applying a new system or Advanced Oxidation Process (PAO), technically and economically viable. This system is composed of functionalized metallurgical slags from the copper industry (with a high content of Fe functionalized with citric acid to form the Fe-citrate complex), NaOCl, photo-assisted or with solar irradiation.

Collaborations:

N/A

Publications:

Portilla-Sangabriel, M., Arzate, S., Macías-Vargas, J. A., & Ramírez-Zamora, R. M. (2020). Assessment of the Use of NaClO as an Alternative to H₂O₂ in the Oxidant-Titanium Ore-Simulated Solar Light System for Thiabendazole Degradation. *Topics in Catalysis*, 1-13. DOI: <https://doi.org/10.1007/s11244-020-01388-8>

Presentations:

6th Latin-American Congress of Photocatalysis, Photoelectrochemistry and Photobiology (September-2019) Oral presentation with poster "Assessment of the use of NaClO as an alternative to H₂O₂ in the oxidant-titanium ore- simulated solar light system for thiabendazole degradation".

7° Congreso Internacional de la Asociación Mesoamericana de Ecotoxicología y Química Ambiental. (August-2016). Oral Presentation "Efecto de las PCI de teléfonos celulares en girasol y mostaza".