PhD Candidate Profile

Name:
Solaima Belachqer El Attar

Research Group (if relevant):
BIO263 - Bioprocess Engineering and Water Technologies

Research Centre (if relevant):
Solar energy research center (CIESOL)

Department/School(s) (if relevant):
Chemical Engineering

College:
University of Almería, Spain

Supervisor(s):
Prof. José Antonio Sánchez Pérez; Paula Soriano Molina

Funding body:
N/A

Area (field) of study:
Wastewater reclamation by the solar photo-Fenton process

Thesis Title: Combination of oxidants for simultaneous bacterial inactivation and micropollutant removal in real WWTP effluents by the solar photo-Fenton process in continuous flow reactors for reuse in agricultural irrigation

Abstract: Wastewater reclamation is still limited and is implemented mainly in regions with severe water scarcity. The reuse of treated effluent from wastewater treatment plants (WWTPs) for agricultural irrigation can reduce pressure on freshwater sources. The new European Regulation on minimum requirements for the reuse of water (EU) 2020/741 is more restrictive than the Spanish regulation in force (RD 1620/2007). Besides the regulated parameters, the water reuse must consider microcontaminants. Consequently, there is an urgent need to develop new tertiary treatments, alternatives to conventional treatments (ozonation and chlorination) since avoiding the harmful subproducts formation and removing micropollutants is required, which is not possible with chlorination. In this regard, the solar photo-Fenton process is one of the most efficient advanced oxidation processes. Although operating at acidic pH is the optimal, currently research is focused on optimizing the process at neutral pH using iron complexes. In this regard, the continuous flow operation of the solar photo-Fenton process with Fe^{3+}-NTA is the most cost-effective strategy for microcontaminants removal. When the treatment is applied for both decontamination and disinfection of WWTP secondary effluents, disinfection is the limiting step. Hence, the need to investigate alternatives that allow reducing the treatment times associated with the disinfection step arises. Therefore, we decided to assess the combination of oxidants, hydrogen peroxide (H_2O_2) and sodium hypochlorite (NaOCl), for the simultaneous bacterial inactivation and micropollutant removal in WWTP secondary effluents using Fe^{3+}-NTA as iron source under solar radiation. Both oxidants react

with iron generating radicals capable of eliminating microorganisms and micropollutants. Afterwards, to study the effect of liquid depth and hydraulic residence time on the treatment capacity. Finally, to Identify and monitor the chlorine by-products.

Collaborations:

Publications:

Presentations:

- SolLab Doctoral Colloquium, October 7th- 8th, 2021. Almeria (Spain).
- X Simposio de investigación de Ciencias experimentales, November 15th, 2021. Almería (Spain).