

PhD Candidate Profile

Name:

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Research Group:

Electrochemical and Environmental Engineering

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Department/School:

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Supervisor:

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Funding body:

Spanish Agencia Estatal de Investigación and European Union through project PID2019-107271RB-I00 (AEI/FEDER, UE).

Area (field) of study:

New electro – absorption technologies for more sustainable environmental and energy applications.

Thesis Title:

Electrochemical removal of volatile organic compounds (VOCs) and odors in gaseous streams.

Abstract:

Volatile organic compounds (VOCs) and odorant substances (odours) are relevant gaseous pollutants mainly in industrial area, and their removal is one of the most important environmental issues nowadays causing an outstanding research interest. Electrochemically assisted technologies, that have been applied successfully in the last decades for the treatment of water, wastewater, and soils, have been found to be very promising for this target. Electro-scrubbing combined absorption and electro-oxidation and it has been found to be very promising environmental technology in gaseous treatment.

The main objective of the study is to evaluate the viability of VOCs and odours removal from gaseous streams using electro-scrubbing process through the analysis of influencing factors such as electrodes, inlet gas flow rate, absorber liquid formulation and current density. Also, one important part of study is to propose mechanistic models for the VOCs and odours degradation from the detection of intermediates and products.



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The experimental installation consists in an absorption system and a flow electrochemical cell integrated to form the electro-scrubber system. The inlet gas flow which contains pollutants is produced by bubble up air into its liquid phase, this stream has contact with the absorber liquid that contains the electrolyte of the cell. The time-course of the pollutants, reaction intermediates and products concentrations in both the liquid and gaseous streams is analysed by gas chromatography with mass spectroscopy (GC-MS) and high-performance liquid chromatography (HPLC).

Results pretend to show that electro-scrubbing can be a powerful technique for VOCs and odours removal due to this technology demonstrates that is functional to absorb and eliminate these pollutants through anodic oxidation mechanisms.

Collaborations:

N/A

Publications:

N/A

Presentations:

29th Topical Meeting of the International Society of Electrochemistry, 18 – 21 April 2021, Mikulov, Czech Republic.