



***Research Doctorate (Ph.D.) in Chemical Sciences
XXXV Ciclo – Academic Year 2019-2020***

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Project Information

1. Research project title

Vegetable Oil Epoxidation: from Batch to Continuous Process.

2. Key words

Epoxidation, vegetable oils, kinetics, scale-up, catalysis.

3. Research project abstract

Epoxidized vegetal oils (EO) are mainly used as plasticizers for polymers and as intermediates: epoxidized soybean oil is a good substitute for phthalates, debated by scientific community for their risks on human health. Therefore, the EO demand is increasing very much. Currently, the production of EO occurs by reacting the vegetable oil with a peroxyacid (-acetic or -formic), generated in-situ by the reaction of hydrogen peroxide with the carboxylic acid in the presence of a mineral acid as catalyst. Peroxyacid reacts with the double bonds of the oil giving an oxirane ring. The reaction is exothermic, and the temperature control, necessary to avoid runaway phenomena, can be implemented by dosing the oxidant solution in a fed-batch mode obtaining a yield of 80% and a double bond conversion of 98%. To satisfy the increase in the EO demand, it is imperative to shift the operation from fed-batch to continuous, improving both economical and safety issues of the industrial operation.