Maelle Derrien et al., Organic Chem Curr Res 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2161-0401.C1.013

Optimization of a supercritical fluid extraction of Lutein and Chlorophyll from spinach byproducts using response surface methodology

Maelle Derrien, Yacine Boumghar, André Gosselin, Yves Desjardins and Paul Angers
Université Laval, Canada

Green chemistry is a major challenge of the 21st century. Industrial vegetable by-products contain high levels of valuable phytochemicals that can be used as a rich source of biomolecules. The main objective of this project was to develop an extraction process technology of two highly valuables biomolecules, Lutein and Chlorophyll, using spinach by-products and respecting the main principles of green chemistry. This work focused on the development and optimization of ecological processes for extraction of these phytochemicals, using supercritical CO_2 technique and response surface methodology (Box Behnken). The extraction efficiency has been compared to the total extraction of Lutein and Chlorophyll obtained with hexane. The effect of pressure, temperature, duration and co-solvent has been tested on the extraction of Lutein and Chlorophyll. The results suggested that the extraction was mostly influenced by the extraction time, pressure and ratio of cosolvant (ethanol). There is a linear and negative quadratique effect of the pressure and the extraction time on the lutein and chlorophyll whereas the cosolvant exerted a linear positive effect on the recovery of both biomolecules. The temperature did not exert a significant interaction on these molecules during the extraction procedure. The optimum extraction parameters were given by a desirability function, and were 3,6h at 490 bars, with 10% of cosolvent and at 56°C. With these parameters a yield of 65% lutein and 45% of chlorophyll, without major drawbacks were obtained. The supercritical fluid extraction is therefore the available method for extracting lutein and chlorophyll with respecting to the green chemistry standard.

Biography

Maelle Derrien is currently a PhD student in Food Science at the University Laval in Québec, Canada. She has obtained a degree in Biology and Biochemistry from University of Rennes, France. She researches in the field of Green Chemistry, In order to valorize crops byproduct by an ecological extraction of their biomolecules content; she uses innovative green chemistry techniques optimized using statistical models.

maelle.derrien.1@ulaval.ca

Notes: