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## BIOFUELS AND BIOENERGY

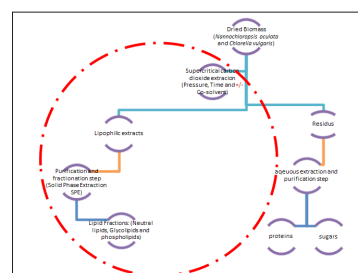
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Supercritical carbon dioxide extraction and fractionation of lipids for biofuel production from untreated microalgae *Nannochloropsis oculata* and *Chlorella vulgaris*

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Microalgae are lately known as committed futuristic and sustainable renewable energy source. This biomass has the potential to meet needs as a source of renewable energy in addition to other applications in food, feed and many other sectors. Alcorefinery inspired by researchers from the petroleum refinery concept opens up a considerable field for biotechnology and allows the production of a very wide range of products such as transportation fuels, alcohols, biogas, hydrogen and liquid hydrogen fuels. The supercritical fluid extraction (SFE) is an innovative extraction method of having the advantage of high selectivity, low extraction time and lower toxicity when compared with organic solvents extraction. In this study, Carbon dioxide as a green solvent was used; known for its characteristics: Low-cost, chemically stable, reliable, non-flammable, non-toxic and readily available, make it a desirable candidate working fluid. The evolution of the composition of the extracts, neutral lipids "NLs" (source of biofuel) and polar lipids (Glycolipids GLs and Phospholipids PPLs) was studied based on extraction conditions (absence of pretreatment, with or without co-solvent, pressure and time) and the microalgae species: *Chlorella vulgaris* and *Nannochloropsis oculata*. SFE (solid phase extraction) method was used as lipid purification step. 97% of NLs were extracted from *Chlorella vulgaris* using 10% ethanol as co-solvent. 45% of the LNs were extracted from *Nannochloropsis oculata* in absence of neither co-solvent nor destructive pretreatment under a pressure of 450 bar. Increasing the pressure above 450 bar did not increase the extraction yield, but the polarity of the media, with or without ethanol, can completely change the extraction yield of the three kinds of lipids (NLs, PPLs and GLs).



## Recent Publications

1. Jeevan Kumar S P, Garlapati V, Dash A, Scholz P, Banerjee R (2017) Sustainable green solvents and techniques for lipid extraction from microalgae: A review. *Algal Research*; 21: 138-147.
2. Mubarak M, Shaija A, Suchithra T V (2015) A review on the extraction of lipid from microalgae for biodiesel production. *Algal Research*; 7: 17-123.
3. Santana A, Jesus S, Larrayoz M A, Filho R M (2012) Supercritical Carbon Dioxide Extraction of Algal Lipids for the Biodiesel Production. *Procedia Engineering*; 42: 1755-1761.
4. Syafaini Japara A, Sobri Takriff M, Mohd Yasin N H (2017) Harvesting microalgal biomass and lipid extraction for potential biofuel production: A review. *Journal of Environmental Chemical Engineering*; 5: 555-563

## Biography

Sara Obeid is a currently a PhD candidate in University of Toulouse, France and Lebanese University, Lebanon. Her research is based on Alcorefinery concept, using a range of microalgae selected for their interests. Before commencing her PhD she studied Agricultural Engineering at the Faculty of Agricultural Sciences and Veterinary Medicine, Department of Food Technologies. She is a Co-Founder and Co-Owner of agricultural company since 2015 and supervising various activities related to agricultural production sites. She is also focusing on increasing the application and the potential of microalgae for agriculture applications.

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