GREEN SELECTIVE EXTRACTION OF VALUABLE COMPOUNDS FOR MICROALGAE BIOMASS REVALORIZATION

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1. Nannochloropsis gaditana

![SFE and PLE process flowchart]

**Kinetic studies using pressurized D-limonene: Selective extraction of Fucoxanthin**

- PLE 1-cycle 20 min
  - Selectivity: 3.54
  - Yield %: 3.86%
  - Fucox recovery: 51.16%
- PLE 6-cycles 70 min
  - Selectivity: 1.73
  - Yield %: 14.23%
  - Fucox. recovery: 44.41%
- ScCO₂ + Limonene 105 min
  - Selectivity: 1.18
  - Yield %: 27.54%
  - Fucox. Recovery: 92.71%

**Enrichment in Lipids and Fucoxanthin**

Extracted compounds per gram of biomass

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<thead>
<tr>
<th>Extract*</th>
<th>Yield %</th>
<th>Lipids %</th>
<th>Carot., mg/g*</th>
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<tr>
<td>P* (PLE, 50°C)</td>
<td>23.95</td>
<td>20.32 (79.07%)</td>
<td>7.73 (54.41%)</td>
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<td>P* (MAE, 30°C)</td>
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* P = Pressure

**Optimum extract of SFE-residue of N. gaditana using PLE was obtained with 100% ETOH at 170°C.**

**Design of Experiments (DOE) was useful for the determination of the extraction conditions.**

**Chromatographic methods were necessary for the chemical characterization of the extracts.**

**Optimum extracts contained carotenoids (mainly violaxanthin), chlorophylls and polar lipids.**

**Palmitoleic, Palmitic, Myristic and the PUFA Eicosapentanoic (EPA) acids were the predominant fatty acids in all PLE extracts.**

2. Phaeodactylum tricornutum

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**Two different green extraction processes (MAE and PLE) have been tested to study the optimum conditions leading to valuable extracts in terms of bioactivity and composition.**

**Similar results were obtained using either MAE or PLE regarding the composition of the extracts. But higher extraction yields using PLE.**

**Ethanol was the best solvent to obtain extracts with high antioxidant activity and rich in fucoxanthin.**

**The presence of different lipid classes containing EPA in the extracts reinforced the beneficial effects provided by the presence of fucoxanthin.**