SCF 533

Selective Extraction of Fatty Acids and Carotenoids from Microalgae

Introduction

Spirulina maxima, a type of microalgae, is of great interest to the cosmetic, food, and pharmaceutical industries due to its chemical composition. The blue-green cyanobacterium is a source of carotenoids, which are rich in Vitamin A and act as powerful antioxidants. Conventional methods of extraction of carotenes from algae are often time consuming and use large volumes of organic solvent. These solvents often produce crude extracts that are difficult to fractionate.

SFE is an alternative technique using supercritical carbon dioxide to selectively extract carotenes and fatty acids quickly, while avoiding the co-extraction of triglycerides. SFE eliminates the use, exposure to, and disposal of hazardous solvents while providing superior extraction results in less time.

Equipment

- ✓ Applied Separations' *Spe-ed*™ SFE or Helix Supercritical Extraction System
- ✓ Analytical Balance

Materials

- ✓ *Spirulina maxima*
- ✓ Carbon dioxide –industrial grade with dip tube

Method

In order to prevent photodegradation always store dried algae at 20 °C under vacuum in plastic bags wrapped in aluminum foil. When ready for extraction, weigh out 8 g of dry *S. maxima* and grind to pass through a 16 mesh sieve. Place the ground sample in the extraction vessel, and compress the sample with a tamping rod. Next, seal the vessel and install it into the *Spe-ed* SFE. Place a predried and preweighed collection vial on the discharge tube, and extract the sample according to the specified extraction conditions.

Extraction Conditions

Extraction vessel:	10 mL
Sample:	8 g
Pressure:	150 BAR
Temperature:	50 ºC
Valve temperature:	100 ºC
CO_2 Flow Rate:	3 LPM gas
Collection:	60 mL pre-weighed vial
Dynamic time:	60 minutes
Depressurization time:	20 minutes

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Analysis

UV spectrophotometer and GC-MS.

Conclusion

The supercritical carbon dioxide extraction of carotenes offers a viable alternative process to solvent-based procedures. SFE provides extracts that are precise and easy to fractionate since conditions were selected to minimize triglyceride co-extraction. In addition, the use of hazardous solvents was eliminated.

References

Canela, A.; Rosa, P.; Marques, M.; and Meireles, M. "Supercritical Fluid Extraction of Fatty Acids and Carotenoids from the Microalgae *Spirulina maxima*." *Ind. Engl. Chem. Res*. 2002, 41, 3012-3018.