# SCF 513

# Fat Extraction from Cocoa Powders Using Supercritical Fluids

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## Introduction

Gravimetric fat determinations in the chocolate industry are normally performed using a soxhlet apparatus with petroleum ether. In addition, specialized equipment and methods have been developed to determine fat content in a perchloroethylene extract using a magnetically driven hydrometer.

Supercritical carbon dioxide extraction of fats from chocolate products eliminates solvent cost, exposure to hazardous solvents, and additional solvent disposal costs.

Sample preparation and processing time was reduced significantly using SC-$CO_2$ as a replacement for standard soxhlet or Foss-Let techniques.

## Equipment

- ✓ Applied Separations' *Spe-ed* SFE Supercritical Extraction System

## Materials

- ✓ *Spe-ed* Matrix (Cat. #7950)
- ✓ *Spe-ed* Wool (Cat. #7953)
- ✓ Carbon dioxide – Instrument grade

## Method

Weigh 3g of ground chocolate sample onto 5g of *Spe-ed* Matrix. Mix chocolate and *Spe-ed* Matrix thoroughly and pour sample into an extraction vessel. Place a preweighed collection vial onto the *Spe-ed* SFE discharge tube and extract at specified conditions. Remove preweighed collection vial with fat extract and weigh.

## Extraction Conditions

| | |
|---|---|
| Extraction vessel: | 24mL |
| Pressure: | 9000 psi |
| Temperature: | 80ºC |
| Valve temperature: | 100ºC |
| $CO_2$ Flow Rate: | 3L/min |
| Static time: | 5 minutes |
| Dynamic time: | 15 minutes |
| Extractor vessel Configuration: | 4 simultaneous extractions |

## Results

| Sample | % Fat SFE (N=4) | SD | CV% | %Fat Foss-lett (N=1) |
|---|---|---|---|---|
| Cocoa Powders | 21.88 | 0.25 | 1.14% | 22.90 |

## Conclusion

Cocoa powders were extracted without hazardous solvents and the results compared closely with a standard extraction technique. In addition, the precision for the SFE extracts was excellent, the procedure was simple, and significant time was saved.

## References

AOAC Method 936.15

Applied Separations

930 Hamilton Street · Allentown, PA 18101
610-770-0900 · 610-740-5520 (fax)
www.appliedseparations.com