General Description

The Sherlock® Identification System automatically identifies fatty acid methyl esters (FAMEs) by gas chromatography. MIDI has historically used this technology for fatty acid-based microbial identification. The Sherlock System has now been enhanced to identify the fatty acids from edible oils and marine oils.

For a complete automated edible oil acid analysis solution, the Sherlock software and methods are combined with an Agilent 6850 or 7890 GC and Agilent OpenLab Software.

Sherlock's pattern recognition algorithms, combined with the MIDI calibration mixture, standardize each instrument and batch of samples. This virtually eliminates the manual calibration adjustments associated with a GC. No chromatography knowledge or experience is required.

Methods

There are currently two Edible Oil methods:

Select FAME (SELECTF1):
Identifies 88 fatty acids and related compounds.
Optimal for coconut oil, dairy products, marine oil and palm oil

GC run time = 45 minutes

Edible Oils (EDOIL1):
Identifies 25 fatty acids and related compounds.
Optimal for other edible oils, including canola oil, olive oil, soybean oil and sunflower seed oil.

GC Run time = 15 minutes

Instrument Throughput

Following a short preparation procedure (typically done in batches), the sample vials are loaded into the instrument's autosampler. The automated system takes over and analyzes each sample.

- **Select FAME Method:**
  (SELECTF1)
  Processes approximately 10 samples in an eight hour shift on a 6850 or single channel 7890 GC.

- **Edible Oil method:**
  (EDOIL1)
  Processes approximately 32 samples in an eight hour shift on a 6850 or single channel 7890 GC.

Hardware

The Sherlock system is composed of a Windows® based computer loaded with the MIDI Sherlock and Agilent OpenLab software. The computer is interfaced to one of the following Agilent GCs:

Agilent 6850 Series II GC
- 57cm x 28cm x 49cm (L x W x H)
- Weight: 29kg
- Operating temp: 15ºC to 35ºC
- Operating humidity: 5% to 95%

Agilent 7890 Series GC – Single
- 51cm x 58cm x 49cm (L x W x H)
- Weight: 49kg
- Operating temp: 15ºC to 35ºC
- Operating humidity: 5% to 95%

MIDI Select FAME Column
- 50m x 0.25mm x 0.25µm
- 7" cage
- Preconditioned with a MIDI Certificate of Analysis

Low Cost per Sample

It costs less than $5.00 USD per sample for all consumables. This includes reagents, gases, calibration standards, glassware, and culture media.

Sample Preparation

Using inexpensive reagents, available from almost any chemical supply house, a technician averages less than 8 minutes per sample. Each sample is prepared for analysis using a liquid-liquid extraction in a single test tube.

- The preparation of FAMEs for the Sherlock System is based on AOCS Official Method Ce 2-66 (Alternate Method section).

- Accurately weigh a test portion (approximately 200mg) into a stopped –glass centrifuge vial.

- Add 4.0mL of hexane, followed by 0.1mL of 2M methanolic KOH.

- Cap the vial with a Teflon lined phenolic cap, shake or vortex for 30 seconds, centrifuge for 3-5 minutes at 3500 rpm, remove two drops of the upper layer and dilute with 4.0mL of hexane.

- The concentration of the FAMEs in hexane is approximately 0.5%. Inject 2µL for capillary column GC analysis using split injection.

FAME Extraction kits are also available for sale

Analysis Software

This software enables a user to explore relationships between sample data using:

- Dendrogram plots

- Neighbor-joining trees

- Principal component analysis (PCA) with 2-D plots and histograms.

The graphics can be exported to Microsoft Office® and other packages for further analysis and for research publications.

Data Export Software

This software enables a user to export sample data, fatty acid profiles, library match results and other information to Excel® spreadsheets and Access® databases. There are many applications for custom reports and calculations created using Excel, Access, and other data analysis tools:

- Trend analysis
- Custom reports
- Summary reports for sample sets
- Research and publications
- Data mining

Library Generation Software

This optional software enables a user to create custom libraries from any sample data set. Uses for *Library Generation* include:

- Quality control of raw and finished products

- Quickly recognize contaminants that reoccur in a facility or process

- Adulteration detection

- Research and publications

Tracker/Cluster Software

This *optional* software enables a user to compare a sample processed through the Sherlock System to a database of previous runs.

Tracker searches for matches between the current sample and all previous samples.

Cluster automatically finds groups (clusters) of highly related samples.

Uses for *Tracker/Cluster* include:

- Trend analysis
- Summary reports for sample sets
- Research and publications
- Data mining

Advanced Analysis Tools

This software enables a user to automatically perform complex calculations, including the following:

- Calculate any fatty acid combination (or ratio) with each sample report.

- Adjusting for the molarity of different fatty acid compounds.

- Categorizing results based on Omega position.

- Categorizing results based on fatty acid types (e. g. Saturated, MUFA, PUFA, Branched, and Trans.

- Calculate the Iodine Value and Saponification Value.

Markets Using Sherlock

- Edible Oil Manufacturing
- Edible Oil QC
- Food Science
- Marine Science
- Natural Products
- Pharmaceutical
- Soil Science

The information in this publication is subject to change without notice.

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