



Food and beverage

Chromatography columns and consumables

# Food and beverage workflow solutions

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# Complete food and beverage workflow solutions

For food and beverage scientists pursuing higher quality analysis as well as higher throughput in their analysis, selecting the correct workflow can be imperative for success. With this brochure we aim to create a better understanding of how to compose a good workflow, from when the sample enters the lab,

until the sample is analyzed, allowing scientists to improve their throughput and provide imperative food safety data faster. The workflows in this brochure offer a sampling of available solutions from Thermo Fisher Scientific.

## Food quality, labelling, and fraud

- Thermo Scientific™ HyperSep™ SPE cartridges
- Thermo Scientific™ Accucore™ (U)HPLC columns
- Thermo Scientific™ TraceGOLD™ GC columns
- Gas chromatography (GC) parts and accessories
- Thermo Scientific™ SureSTART™ vials and caps

## Food packaging

- TraceGOLD GC columns
- GC parts and accessories
- SureSTART vials and caps

## Pesticides

- HyperSep SPE cartridges
- Thermo Scientific™ QuEChERS™ products
- Accucore (U)HPLC columns
- TraceGOLD GC columns
- GC parts and accessories
- SureSTART vials and caps





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# Triacylglycerol profiling workflow

## Multivariate UHPLC-CAD analysis of olive oil

This workflow shows a quick and easy analysis of olive oil that decreases cost per sample for purity determination. The workflow is designed to replace both fatty acid and sterol analyses, which in turn saves time in determining sample purity. There is no sample preparation needed other than dilution before analysis by ultra high-performance liquid chromatography charged aerosol detection (UHPLC-CAD). Furthermore, the analysis uses fewer chemicals and solvents than both fatty acid and sterol analyses, providing an environmentally friendly alternative to traditional approaches. Additionally, the method can be easily implemented in-house, thus eliminating the need to send samples out for testing.

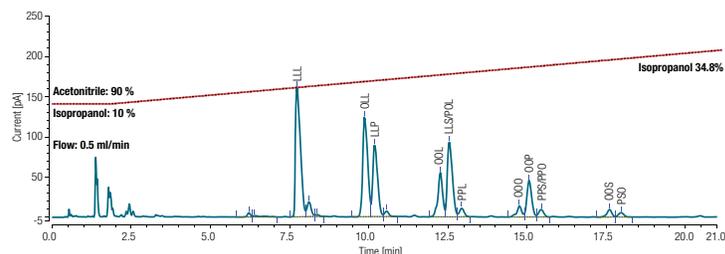


Figure 1. Representative chromatogram showing the TAGs LLL, OLL, LLP, OOL, LLS/POL, PPL, OOO, OOP, PPS/PPO, OOS, and PSO in a grapeseed oil



Vanquish Flex UHPLC system with CAD



Accucore C18 column



Uniguard direct-connection guard cartridge holder



SureSTART vial and cap

### Workflow solution

Thermo Scientific instruments	Cat. no.
Thermo Scientific™ Vanquish™ Flex UHPLC system	—
Charged Aerosol Detector (CAD)	—
Thermo Scientific columns and guard columns	Cat. no.
Thermo Scientific™ Accucore™ C18 LC column	11317471
Accucore C18 guard cartridge	11647701
Thermo Scientific™ Uniguard™ direct-connection guard cartridge holder	10602864
Thermo Scientific vials and caps	Cat. no.
Thermo Scientific™ SureSTART™ 2 mL GOLD-Grade glass screw, crimp vial	17374073
Thermo Scientific™ SureSTART™ 9 mm screw cap	17334063
This workflow includes the newest recommended products	

# Water- and fat-soluble vitamins workflow

## Simultaneous methods for testing fat- and water-soluble vitamins

Vitamins are essential nutrients found in various natural food sources and food supplements. Vitamins can be classified as water-soluble vitamins (WSV) or fat-soluble vitamins (FSV), based on their hydrophobicity. Reversed-phase high-performance liquid chromatography is widely used to determine vitamins in food, supplements, and beverages. Because of the dramatically different hydrophobicity of WSV and FSV, simultaneous liquid chromatography analysis with the same method is difficult. This workflow describes the simultaneous quantitative analysis of fat-soluble and water-soluble vitamins in drinks and food supplement tablets using the Thermo Scientific™ Vanquish™ Duo system for Dual LC and the Thermo Scientific™ Accucore™ Polar Premium columns.

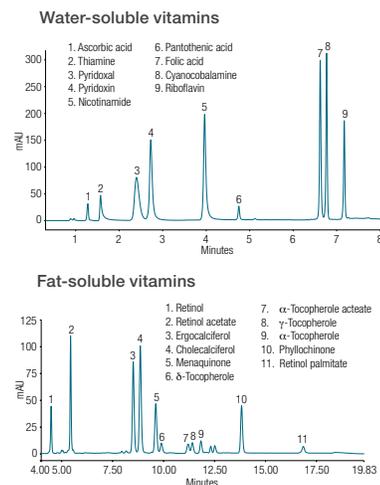


Figure 2. Separation of water- and fat-soluble



Vanquish Duo UHPLC system for Dual LC



Accucore Polar Premium column



Uniguard direct-connection guard cartridge holder



SureSTART vial and cap

### Workflow solution

Thermo Scientific instruments	Cat. no.
Vanquish Duo UHPLC system	—
Diode Array Detectors (DAD)	—
Thermo Scientific columns and guard columns	Cat. no.
Accucore Polar Premium LC column (150 mm)	13465649
Accucore Polar Premium LC column (250 mm)	13438739
Accucore Polar Premium guard cartridge	13405659
Uniguard direct-connection guard cartridge holder	10602864
Thermo Scientific vials and caps	Cat. no.
Thermo Scientific™ SureSTART™ 2 mL glass screw vial	17344083
SureSTART 9 mm screw cap	17344043
This workflow includes the newest recommended products	

# FAME workflow

## High resolution separation of cis/trans conformations of fatty acids

Gas chromatography is the preferred analytical method for the determination of fatty acid methyl esters (FAMES). The fatty acid content of food was analyzed after derivatization to their methyl ester products. This conversion involved either an acid or base esterification process. In this application, separation of a mixture of 37 FAMES in a reference standard was achieved Thermo Scientific™ TRACE™ TR-FAME GC column (100 m × 0.25 mm × 0.2 μm). The reference standard contained a wide range of carbon chain lengths (C4–C24), with concentrations between 2–6% wt/wt. The high polarity phase GC column is optimized for separating complex mixtures of cis- and trans-fatty acids.

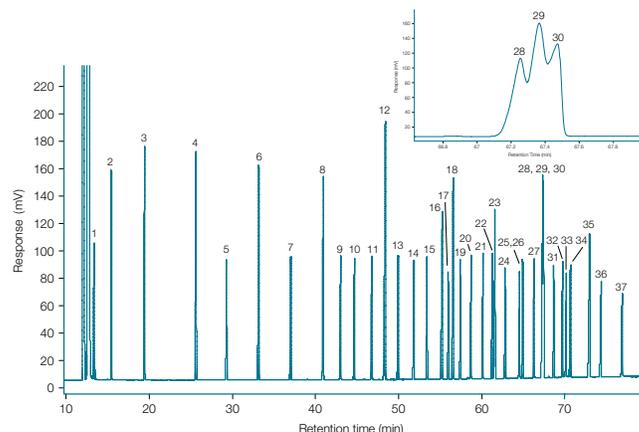


Figure 3. Chromatogram of 37 components FAME mixture (reference standard) separated on a TR-FAME GC column



AI/AS 1610 Liquid autosampler



TRACE 1600 series gas chromatograph with FID detector



TRACE TR-FAME GC column



Super Clean gas cartridge filter



SureSTART vial and cap

### Workflow solution

Thermo Scientific instruments	Cat. no.
Thermo Scientific™ AI/AS 1610 Liquid autosampler	—
Thermo Scientific™ TRACE™ 1600 series gas chromatograph with FID detector	—
Thermo Scientific column	Cat. no.
TRACE TR-FAME GC column	16031412
Thermo Scientific GC accessories	Cat. no.
Thermo Scientific™ GC liner sealing ring	15398384
Thermo Scientific™ LinerGOLD™ GC liner	15438000
Thermo Scientific™ septa	12683166
Thermo Scientific™ fixed-needle, gas-tight syringe	10781534
Thermo Scientific™ GC SMART syringe	17627055
Thermo Scientific™ GC injection port base seal	10219174
Thermo Scientific™ Super Clean™ gas cartridge filter	10213423
Thermo Scientific™ Super Clean™ gas cartridge filter with baseplate	10344093
Thermo Scientific™ ferrule	
Thermo Scientific vials and caps	Cat. no.
Thermo Scientific™ SureSTART™ 0.3 mL screw vial	17314073
SureSTART 9 mm screw cap	17334063
This workflow includes the newest recommended products	

# Food contact materials/ packaging workflow

## Automated analysis for VOC in food packaging by GC-MS

The use of packaging materials for food is regulated all over the world. The European Union (EU) published the first regulation concerning packaging materials in 2003 in EU Framework Regulation EC 1935/2004. A number of other regulations followed which focuses on plastic materials and articles intended to come into contact with food. This workflow consists of solid phase microextraction (SPME) coupled to gas chromatography triple quadrupole mass spectrometry (GC-MS/MS), enabling detection of volatile and semi-volatile sample components. The reported in-house validated method enables determination and quantification of 12 possible migrants from paperboard packaging. This fully automated SPME method can increase laboratory throughput.

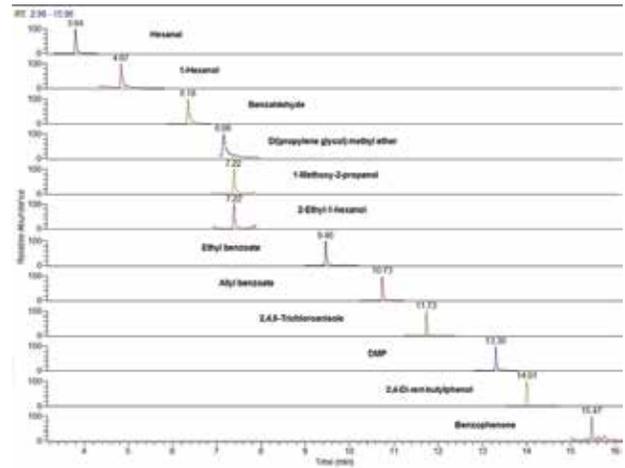


Figure 4. Chromatogram of spiked paperboard with 12 packaging migrants (c = 0.024–30 mg/kg)



TriPlus RSH  
SMART  
autosampler



TRACE 1600 series  
gas chromatograph  
with TSQ 9610



TraceGOLD  
TG-5SiIMS GC  
column



Super Clean gas  
cartridge filter



SureSTART  
vial and cap

### Workflow solution

Thermo Scientific instruments	Cat. no.
Thermo Scientific™ TriPlus™ RSH SMART autosampler	—
Thermo Scientific™ TRACE™ 1600 series gas chromatograph with Thermo Scientific™ TSQ™ 9610	—
Thermo Scientific columns	Cat. no.
Thermo Scientific™ TraceGOLD™ TG-5SiIMS GC column	10177894
Thermo Scientific GC accessories	Cat. no.
Thermo Scientific™ SMART SPME arrow	17707454
GC liner sealing ring	15398384
Septa	15340431
GC injection port base seal	10219174
Super Clean gas cartridge filter	10019682
Ferrule	10120513
Nut	15125256
Thermo Scientific™ MS interface line nut	15392155
Thermo Scientific vials and caps	Cat. no.
Thermo Scientific™ SureSTART™ 10 mL glass crimp headspace vial	17373783
Thermo Scientific™ SureSTART™ 20 mm crimp cap	17333923
This workflow includes the newest recommended products	

# Pesticides in food workflow

## Increased robustness of pesticide analysis in potatoes

Potato (*Solanum tuberosum*) is a major root crop that contributes to food security in developing countries. Often, potato cultivation involves unregulated applications of pesticides, thereby leading to non-compliance issues related to trade and potential health hazards to consumers. With available technologies like GC-MS/MS, it is possible to detect and quantify the presence of pesticides in potato with unit mass resolution as per the SANTE/12682/2019 quantitation and identification criteria. The use of the QuEChERS method for extraction, followed by the instrumental analysis, increases the overall throughput and significantly increases the confidence in the results.

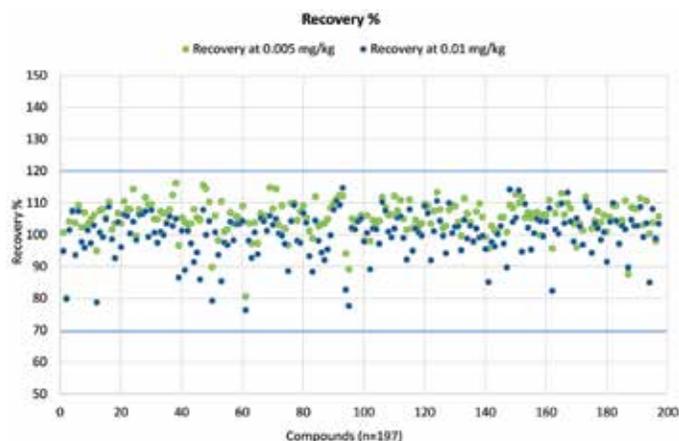


Figure 5. % Recovery of 197 target compounds in potato at 0.005 and 0.01 mg/kg



### Workflow solution

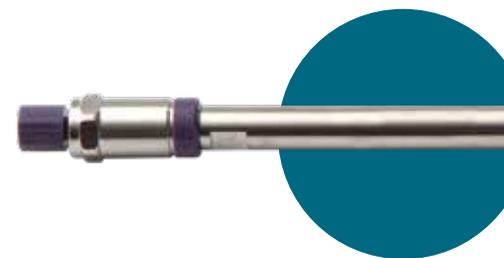
Thermo Scientific instruments	Cat. no.
Thermo Scientific™ Orbitrap™ Exploris™ GC mass spectrometer	—
TriPlus RSH SMART autosampler	—
Thermo Scientific column	Cat. no.
Thermo Scientific™ TraceGOLD™ TG-5SiIMS GC column	10177894
Thermo Scientific GC accessories	Cat. no.
GC liner sealing ring	15398384
LinerGOLD GC liner	15417990
Septa	12683166
SMART syringe	17627055
GC injection port base seal	10548605
Super Clean gas cartridge filter	10019682
Thermo Scientific™ high temperature nut and ferrule kit	16834316
Nut	15125256
Line nut	15392155
Thermo Scientific sample preparation	Cat. no.
Thermo Scientific™ QuEChERS extraction kit	17369822
Thermo Scientific™ QuEChERS clean-up kit	17399852
Thermo Scientific vials and caps	Cat. no.
Thermo Scientific™ SureSTART™ 1.5 mL glass screw vial	17384083
SureSTART 9 mm screw cap	17334043
This workflow includes the newest recommended products	

## Accucore C18 columns

Achieve fast, high-resolution separations at low backpressures using Accucore C18 LC columns. Rugged 2.6  $\mu\text{m}$  solid-core particles ensure high efficiencies and enable compatibility with both HPLC and UHPLC platforms. The high bonded phase coverage provides optimal retention of a broad range of nonpolar analytes across multiple applications. Robust bonding technology and automated packing procedures ensure excellent reproducibility and long column lifetimes.

## Accucore Polar Premium columns

Achieve fast, high-resolution separations of polar and nonpolar analytes using Accucore Polar Premium LC columns. Rugged 2.6  $\mu\text{m}$  solid-core particles enable fast, high-efficiency separations at low backpressures. The robust amide-embedded C18 stationary phase provides unique selectivity complementary to conventional C18 columns, is stable from pH 1.5–10, and is fully compatible with highly aqueous mobile phases. Robust bonding technology and automated packing procedures ensure excellent reproducibility and long column lifetimes.



## Uniguard direct-connection guard cartridge holders

Eliminate the requirement for extra fittings using Uniguard direct-connection guard cartridge holders. They are reusable, stainless-steel guard cartridge holders that attach directly to the analytical column inlet.



### Accucore LC columns

Format	Length (metric)	Particle size	Cat. no.
Accucore C18 column	100 mm	2.6 $\mu\text{m}$	11347471
Accucore C18 guard cartridge (4/pk)	10 mm	2.6 $\mu\text{m}$	11667701
Accucore Polar Premium LC column	150 mm	2.6 $\mu\text{m}$	13465649
Accucore Polar Premium LC column	250 mm	2.6 $\mu\text{m}$	13438739
Accucore Polar Premium guard cartridge (4/pk)	10 mm	2.6 $\mu\text{m}$	13405659
Uniguard direct-connection guard cartridge holder			10602864



# GC columns

## GC accessories



### TRACE TR-FAME GC columns

Choose TRACE TR-FAME GC columns for separation of cis/trans isomers and fatty acid methyl esters (FAMES) with various degrees of unsaturation. The TRACE TR-FAME column is a cyanopropylphenyl-based phase specifically designed for the separation of FAMES. It is also suitable for any application that requires a high-polarity column for use with MS detection.



### TraceGOLD TG-5SiIMS GC columns

Thermo Scientific TraceGOLD TG-5SiIMS GC columns incorporate phenyl groups in the polymer backbone for improved thermal stability, reduced bleed and reduced susceptibility to oxidation.

### Super Clean gas cartridge filters

Ensure high-purity (99.9999% or 6.0 grade) output gas for optimal GC performance using Super Clean gas cartridge filters. The baseplates can be configured to individual user needs, and there is no contamination during cartridge change. Easy-to-use and cost-effective, Super Clean gas cartridge filters enable fast, tool-free replacement.



### Ferrules and nuts

Use ferrules and nuts to ensure optimal performance. They are available in two different materials of various dimension to accommodate a range of instruments and applications.



#### GC columns

Description	Length (metric)	Diameter	Cat. no.
TRACE TR-FAME GC column	100 m	0.25 mm	16031412
TraceGOLD TG-5SiIMS GC column	30 m	0.25 mm	10177894

#### GC accessories

Description	Unit size	Cat. no.
Ferrule (15% graphite/85% vespel)	10	10120513
Nut	1	15392155
Retaining nut	5	15125256
GC liner sealing ring	1	15398384
Septa	50	12683166
GC injection port base seal	2	10219174



## SMART SPME arrow and SPME fibers

Automate solvent-free solid phase micro extraction (SPME) sample preparation by performing sample extraction and enrichment in a single step using SPME arrow and SPME fiber products. These products are used with the TriPlus RSH autosampler prior to gas chromatography (GC) or gas chromatography mass spectrometry (GC-MS) analysis.



## Fixed-needle, gas-tight syringes

Get durability, clarity and accuracy in gas chromatography sample introduction for confidence in analytical results, time-after-time. The fixed-needle, gas-tight syringes offer an affixed needle and a plunger that creates a tight seal with the barrel.



## GC SMART syringes

Use the unique technology of GC SMART syringes as a traceable usage-based approach to gas chromatography syringe management, resulting in increased reliability, instrument up-time, confidence in the results, and full traceability.



## LinerGOLD GC liners

Use the gold standard in GC liner performance and consistency. LinerGOLD GC liners provide enhanced inertness, leading to increased accuracy, sensitivity, and precision in your gas chromatography analysis.



### GC accessories

Type	Unit size	Cat. no.
SMART SPME arrow and SPME fiber	3	17727454
Fixed-needle, gas-tight syringe	1	10781534
GC SMART syringe	1	17627055
LinerGOLD splitless liner	5	15447990



# Sample preparation

## QuEChERS method extraction kits

Use QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) extraction kits to prepare complex sample matrices such as fruits and vegetables for LC-MS or GC-MS analysis of pesticide residues, veterinary drug residues, and toxins using the EN 15662 method. Our QuEChERS kits contain pre-packaged, ready-weighed salts, sorbents, and buffers designed to streamline your workflow, provide excellent recoveries for a wide variety of analytes, minimize the potential for error, save time and money, and deliver high-quality, reproducible results.



## QuEChERS method clean-up kits

Use QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) extraction kits and clean up kits to prepare complex sample matrices such as fruits and vegetables for LC-MS or GC-MS analysis of pesticide residues, veterinary drug residues, and toxins using the EN 15662 method. Our QuEChERS kits contain pre-packaged, ready-weighed salts, sorbents, and buffers designed to streamline your workflow, provide excellent recoveries for a wide variety of analytes, minimize the potential for error, save time and money, and deliver high-quality, reproducible results.



### QuEChERS products

Type	Unit size	Cat. no.
QuEChERS EN 15662 method extraction kit for 10 g sample	50	17369822
QuEChERS EN 15662 method clean-up kit	100	17399852



# Vials and caps

Triacylglycerol  
workflow

Vitamins  
workflow

FAME  
workflow

FCM  
workflow

Pesticide  
workflow

## 0.3 mL glass screw vials

Choose SureSTART 0.3 mL glass screw top microvials, performance level 3, when you need to maximize the injection volume for <2 mL samples.



## 2 mL glass screw vials

Choose SureSTART 2 mL glass screw top vials, performance level 3, for high performance applications, when sensitivity is a must.



## 2 mL GOLD-Grade glass screw and crimp top vials

Choose SureSTART 2 mL GOLD-Grade clear glass screw and crimp top vials, performance level 3, when analyzing analytes such as polar compounds that strongly adsorb on the glass surface or are sensitive to sample pH changes.



## 10 mL glass crimp top headspace vials

Use SureSTART 10 mL glass crimp top headspace vials in your high-throughput volatile gas analyses. Performance level 2 vials ensure high quality data with an uninterrupted workflow in high-throughput applications using GC and single or triple quadrupole MS systems.



## 9 mm screw caps

Use SureSTART 9 mm screw caps with screw vials that have a 9 mm opening.



## 20 mm crimp caps

Use SureSTART 20 mm crimp caps with crimp vials that have a 20 mm opening, including our SureSTART 20 mL glass crimp top headspace vials (level 3).



### SureSTART vials

Material	Total volume	Usable volume	Dimensions	Cat. no.
Amber glass	0.3 mL	0.25 mL	9 x 32 mm	17314073
Amber glass	2 mL	1.5 mL	9 x 32 mm	17344083
Clear glass	2 mL	1.5 mL	9 x 32 mm	17374073
Clear glass	10 mL	8 mL	20 x 46 mm	17373783

### SureSTART caps

Septum	Closure material	Cat. no.
Red PTFE/white silicone/red PTFE	Blue polypropylene	17334063
Blue silicone/clear PTFE; soft	Blue polypropylene	17344043
Blue silicone/clear PTFE; soft	Red aluminum/magnetic tinplate	17333923

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- **Educational resources** available online with training courses and webinars for your applications

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**BR001228-FEMEA-EM-1222**