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Food and beverage resource guide for commercial food testing laboratories

ThermoFisher SCIENTIFIC

Fast, efficient analysis

From food safety analysis and nutritional testing, to chemical analysis for food quality and food integrity, our portfolio of application note compendiums demonstrates how our chromatography, trace elemental, and mass spectrometry systems consistently deliver data that is compliant with regulations.

Our separation and detection technologies, combined with experienced applications competence, and our best suited chemistries provide solutions for the analysis of residues and contaminants to metals and isotopes. We are unique in our commitment to provide fast, accurate testing for all applications performed in commercial food testing laboratories.

Key to the instrumentation acronyms

Learn more

Food Analytical Testing Learning Center

Food and Beverage Learning Center

Compendiums included in this directory

Next page

A key to the instrumentation acronyms

Acronym	Description
2D-HPLC	Two-Dimensional High Performance Liquid Chromatography
AA	Atomic Absorption Spectroscopy
EA-IRMS	Elemental Analysis with Isotope Ratio Mass Spectrometry Detection
GC-ECD	Gas Chromatography with Electron Capture Detection
GC-FID	Gas Chromatography with Flame Ionization Detection
GC-ICP-MS	Gas Chromatography with Inductively Coupled Plasma Mass Spectrometry Detection
GC-MS	Gas Chromatography with Single Quadrupole Mass Spectrometry Detection
GC-MS/MS	Gas Chromatography with Triple Quadrupole Mass Spectrometry Detection
GC-HRAM	Gas Chromatography with High Resolution Accurate Mass using Orbitrap Technology
GC-HRMS	Gas Chromatography High Resolution Mass Spectrometry using Magnetic Sector Technology
GC-IRMS	Gas Chromatography with Isotope Ratio Mass Spectrometry Detection
HPAE-PAD	High Performance Anion Exchange with Pulsed Amperometry Detection
HPLC-CAD	High Performance Liquid Chromatography with Charged Aerosol Detection
HPLC-DAD	High Performance Liquid Chromatography with Diode Array Detection
HPLC-ECD	High Performance Liquid Chromatography with Electrochemical Detection

Acronym	Description
HPLC-Fluorescence	High Performance Liquid Chromatography with Fluorescence Detection
HPLC-RI	High Performance Liquid Chromatography with Refractive Index Detection
HPLC-UV	High Performance Liquid Chromatography with Ultraviolet Detection
IC-ICP-MS	Ion Chromatography with Inductively Coupled Plasma Mass Spectrometry Detection
IC-MS	Ion Chromatography with Mass Spectrometry Detection
IC-PAD	Ion Chromatography with Pulsed Amperometry Detection
IC-Suppressed Conductivity	Ion Chromatography with Suppressed Conductivity Detection
IC-UV	Ion Chromatography with Ultraviolet Detection
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometry
IRMS	Isotope Ratio Mass Spectrometry
LC-IRMS	High Performance Liquid Chromatography with Isotope Ratio Mass Spectrometry Detection
LC-MS/MS	High Performance Liquid Chromatography with Triple Quadrupole Mass Spectrometry Detection
LC-QQQ	High Performance Liquid Chromatography with Triple Quadrupole Mass Spectrometry Detection
LC-HRAM	High Performance Liquid Chromatography with High Resolution Accurate Mass using Orbitrap Technology
UHPLC-UV	Ultra High Performance Liquid Chromatography with Ultra Violet Detection

Antifoaming agents, emulsifiers, and surfactants

View the full compendium

Overview

Antifoaming agents, emulsifiers, and surfactants are food additives that help maintain the appearance and texture of foods, but possess little nutritional value, per se. They are also important in food manufacturing and preparation.

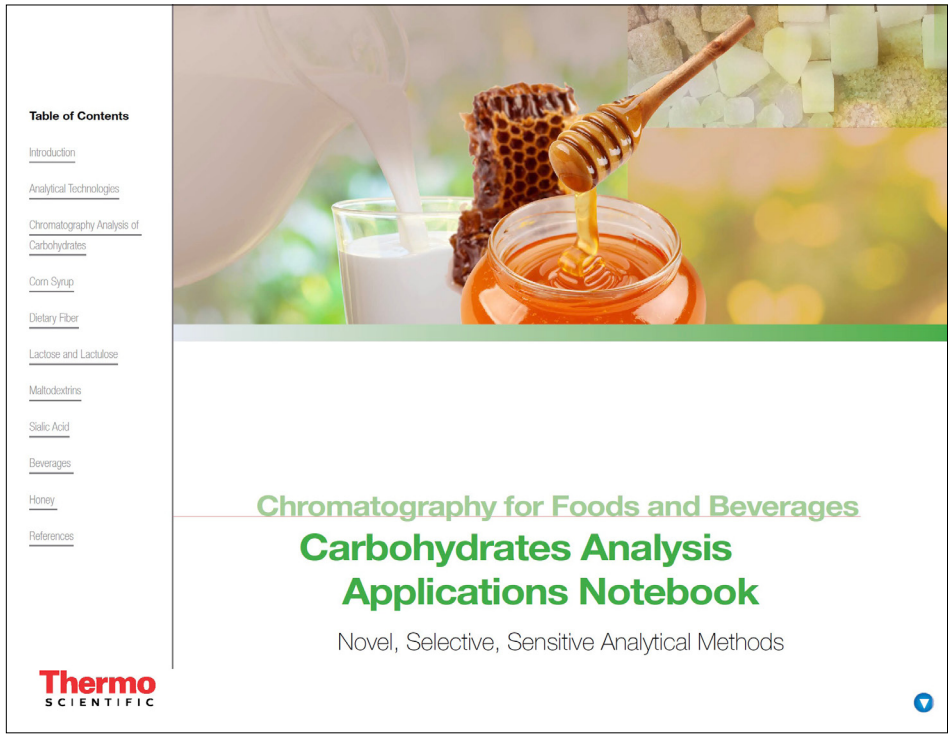
Included is an overview of instrumentation for the testing of antifoaming agents, emulsifiers, and surfactants and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Polyethylene glycol	HPLC-CAD
Silicone	
Egg lecithin	
Soy lecithin	
Hypromelose	
Polysorbate 80	
Gum arabic	
Sorbitan esters (Spans)	

Learn more: Food and Beverage Learning Center

Carbohydrate analysis



View the full compendium

Overview

The determination of the types and concentrations of carbohydrates in foods is integral for energy evaluation, nutritional labeling, quality control, and for identifying possible adulteration.

Included is an overview of instrumentation for the testing of carbohydrates and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Corn syrup	HPLC-CAD
Dietary fiber - inulins	HPAE-PAD
Dietary fiber - galactooligosaccharides	HPAE-PAD
Lactose in milk	HPLC-CAD
Lactose and lactulose in milk	HPAE-PAD
Maltodextrins	HPAE-PAD, HPLC-CAD
Sialic acid	HPAE-PAD, HPLC - Fluorescence
Beverages	HPLC-ECD, HPLC-CAD, HPAE-PAD, IC-MS
Honey	HPLC-CAD, HPLC-RI, HPAE-PAD

Learn more: Carbohydrate Testing Learning Center

Contaminants

View the full compendium

Overview

At any point in the global food supply chain, products could become contaminated or may become unfit for consumption. Contaminants may originate from agricultural sources, such as pesticides, animal growth hormones, or antibiotics; environmental sources, such as water and air pollutants; or from food production processes, via contamination or adulteration.

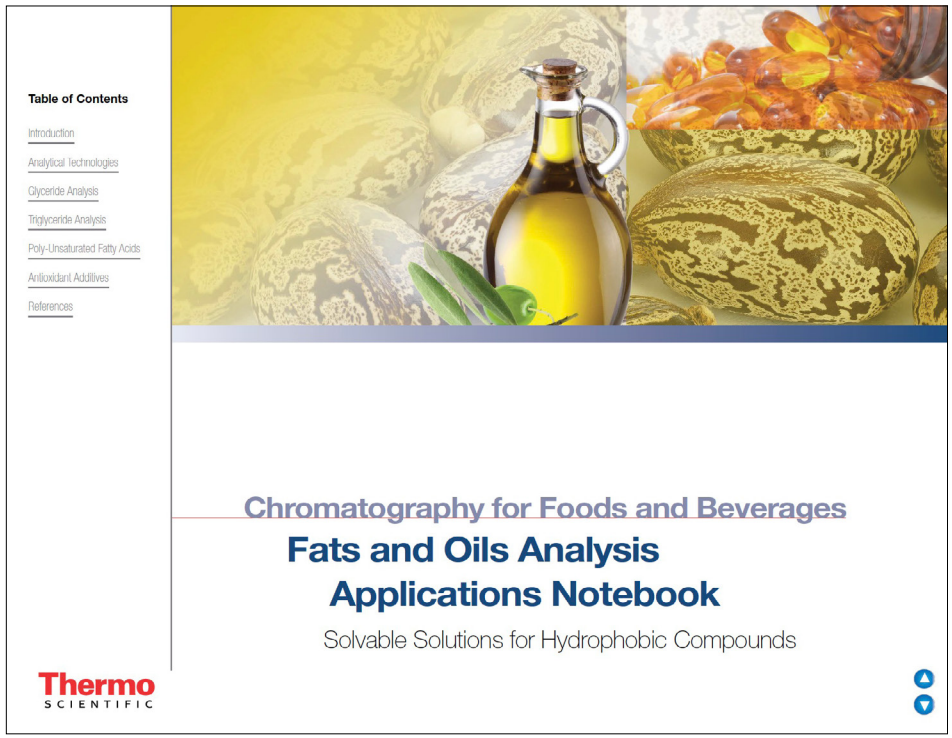
Included is an overview of Instrumentation for the testing contaminants and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Acrylamide	IC-UV and IC-MS
Aflatoxins	HPLC-Fluorescence
Antibiotics	HPLC-UV, HPLC-DAD, HPLC-CAD
Biogenic amines	IC-Suppressed Conductivity, IC-PAD, IC-UV, IC-MS
Bisphenol A	HPLC-UV, HPLC-DAD, HPLC-DAD
Cyanide	IC-PAD
Hydroxymethylfurfural	HPAE-PAD
Nitrate and nitrite	IC-UV, IC-Suppressed Conductivity
Oxyhalides and bromide	IC-UV, IC-Suppressed Conductivity
PAHs	HPLC-Fluorescence
Patulin	HPLC-DAD
Phthalates	HPLC-UV
Triazine herbicides	HPLC-MS
and many more….	

Learn more: Food Processing Contaminants Learning Center

Fats and edible oils



View the full compendium

Overview

We understand edible oils present analytical challenges due to their chemical complexity. Learn about our easy-to-use solutions to analyze oils for nutrition, contamination, and composition, as well as adulteration and authenticity.

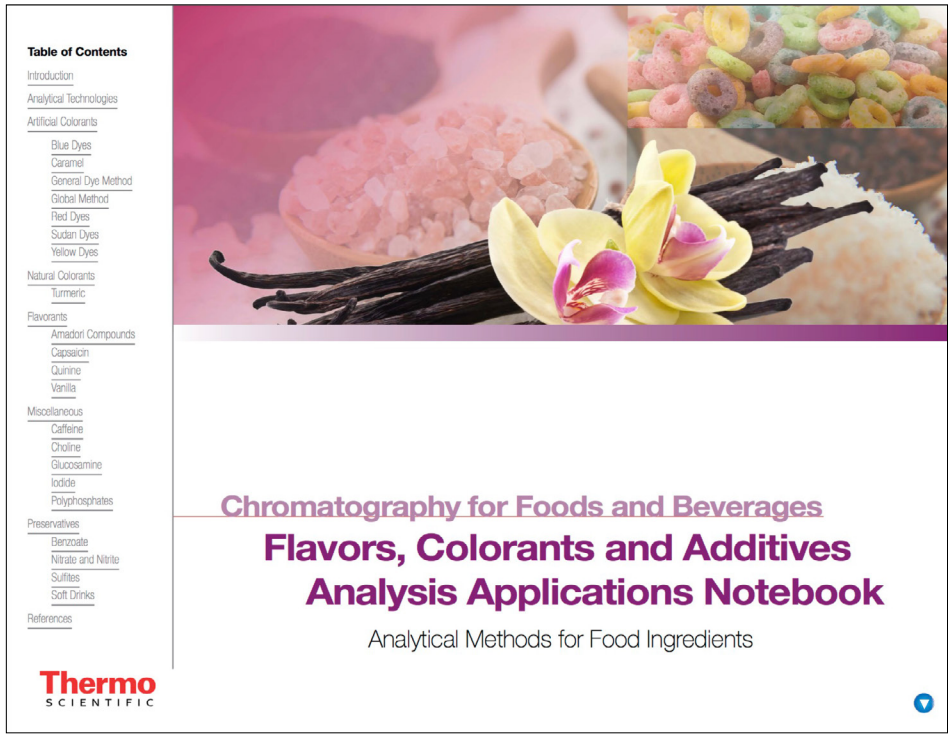
Included is an overview of instrumentation for the testing of fats and edible oils and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Glyceride	HPLC-CAD
Triglyceride	
Poly-unsaturated fatty acids	
Antioxidant additives	

Learn more: Edible Oil Testing Learning Center

Flavors, colorants, and additives



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Overview

The compositional quality and safety must be monitored to help track contamination, adulteration, product consistency, and to ensure regulatory compliance from raw ingredients (flavors, colorants, and additives) to the final product.

Included is an overview of instrumentation for the testing of flavors, colorants, and additives and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Artificial colorants and dyes	HPLC-UV, HPLC-MS
Sudan dyes	HPLC-UV, HPLC-MS
Benzoate	IC-Suppressed Conductivity
Flavorants	HPLC-UV, HPLC-MS, HPLC-ECD
Iodide	HPAE-PAD, HPLC-UV
Nitrate and nitrite	IC-UV
Caffeine	HPLC-UV
Sulfite	HPAE-PAD
Polyphosphates	IC-Suppressed Conductivity
Choline	IC-Suppressed Conductivity
Glucosamine	HPAE-PAD

Learn more: Food and Beverage Learning Center

Food contact materials

View the full compendium

Learn more: Food Packaging and Contact Materials Info

Overview

Food packaging and contact material compounds can migrate from the polymeric materials used in food and beverage packaging into the foods and beverages themselves. A packaging component should not release chemicals that can accumulate in the food or beverage product in quantities sufficient to present a risk for the consumers.

Discover our solutions and applications for the testing of these packaging chemicals in food and beverage samples.

Compendium contents

Analysis	Instrumentation type
Comparison of extraction techniques	Soxhlet and Accelerated Solvent Extraction
Residual solvents	Headspace Extraction and GC-FID
VOCs	GC-MS
Migration contaminants in paperboard	GC-MS/MS
Phthalate esters in soft drinks	GC-MS
Phthalates in liquor beverages	GC-MS
Benzophenone and 4-hydroxybenzophenone in breakfast cereal	GC-MS
Characterizing unknowns in food packaging	GC-HRAM
Bisphenols	HPLC-CAD
Phthalates in drinking water	UHPLC-UV
Plasticizer contaminants in beverages and milk	LC-QQQ
Phthalate screening	LC-HRAM
Identification of known and unknown substances	LC-HRAM
Nanoparticles	ICP-MS
Sn in canned fruit juice	AA

Food integrity (authenticity and adulteration)

View the full compendium

Learn more: Food Adulteration Learning Center

Overview

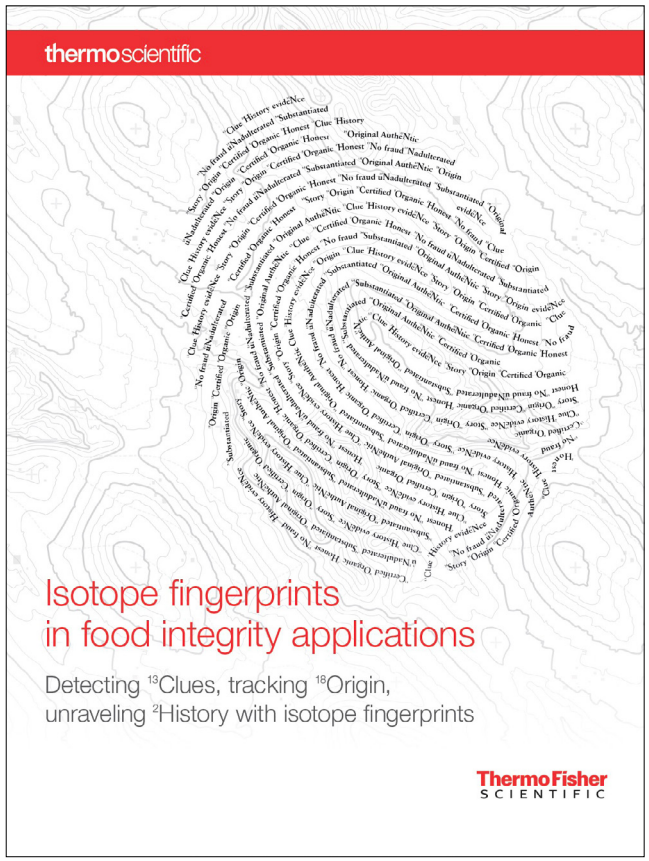
Determining the authenticity of a product is important for many reasons. Is the product pure; does it match the label claims? Thermo Fisher Scientific has applications that can help in the area of food authenticity to determine the purity of the food and beverage product. Our state-of-the-art products help laboratories check for the purity of wine, beer, edible oils, fruit juices, and many other products.

The Food Integrity Database directs you to a broad spectrum of journal abstracts that can be easily accessed online. Techniques described include gas chromatography-mass spectrometry, liquid chromatography-mass spectrometry, ion chromatography, isotope fingerprinting, molecular spectroscopy, and trace elemental analysis.

Compendium contents

Analysis	Instrumentation type
Dyes	HPLC-UV
Fish	LC-HRAM
Fruit	HPLC-DAD
Vegetables	EA-IRMS
Meat	EA-IRMS, LC-HRAM
Halal foods	LC-HRAM
Honey	HPAE-PAD, EA-IRMS, LC-IRMS
Edible oils	EA-IRMS
Spices	HPLC-DAD, 2D-HPLC, HPLC-ECD
Coffee	EA-IRMS
Sugar	EA-IRMS
Beverages	HPLC-ECD, HPAE-PAD, HPLC-UV, LC-QQQ, LC-HRAM, Orbitrap GC-MS, LC-IRMS, GC-IRMS
Menthol	GC-IRMS

Isotope fingerprints



View the full compendium

Overview

Food and beverage products have a fingerprint, a unique chemical signature that allows the product to be identified. To visualize this fingerprint, Isotope Ratio Mass Spectrometry (IRMS) can be used. IRMS can help identify the isotopic signatures that provide information about authenticity from geographic region, botanical processes, soil, or fertilization processes.

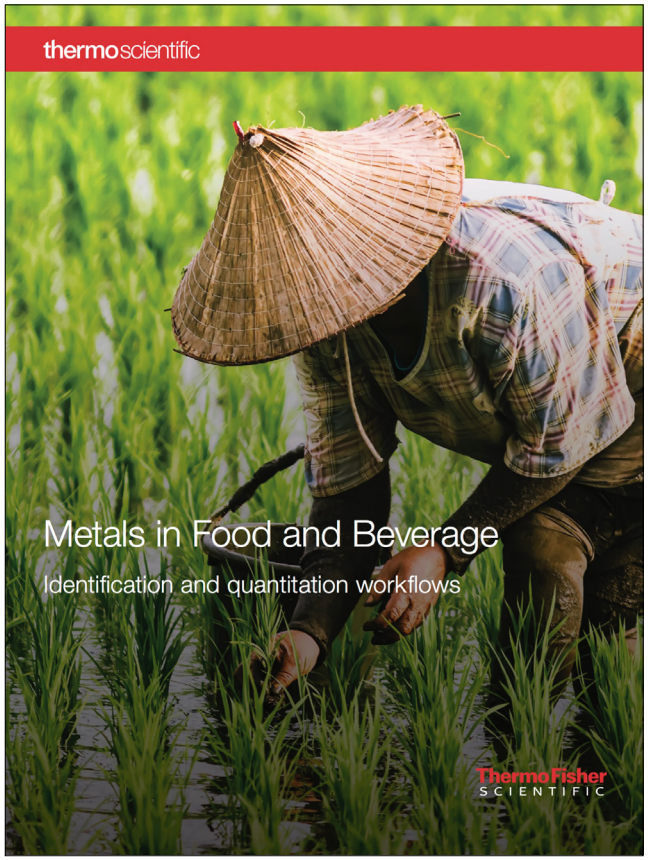
These processes can be traced using carbon, nitrogen, sulfur, oxygen, and hydrogen isotopes, with their variations indicating the origin and history of food and beverage products.

Compendium contents

Analysis	Instrumentation type
Wine adulteration	Gas Bench II-IRMS
Organic grown vegetables	EA-IRMS
Detecting purity and adulteration of tequila	GC-IRMS
Geographical origin of coffee	EA-IRMS
Sugar package label claims	EA-IRMS
Origin of meat	EA-IRMS
Honey adulteration	EA-IRMS
Compound specific isotope analysis of honey	LC-IRMS

Learn more: Isotope Fingerprinting Learning Center

Metals



View the full compendium

Learn more: Trace Elemental and Speciation Analysis Info

Overview

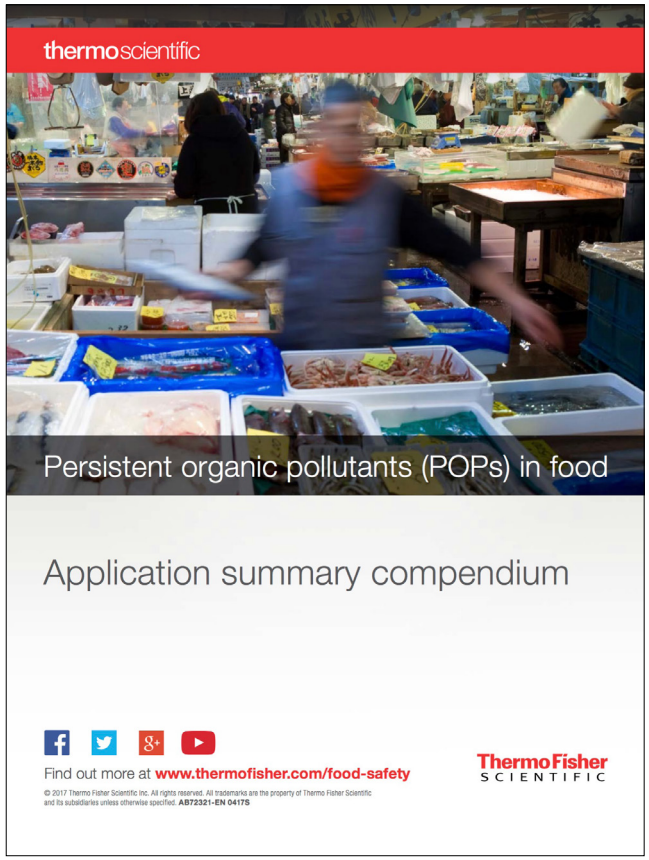
Trace elemental screening and speciation analysis of food is receiving global attention. Some elements are an essential part of a healthy diet, but others, such as lead, mercury, arsenic, and cadmium, offer no nutritional benefits to humans and are toxic.

This is driving industry-wide demand for fast, sensitive, reliable, and cost-effective testing methods for high-throughput trace elemental analysis of food. That is why we have created breakthrough technologies and applications to identify organic and inorganic elements at ppm to sub-ppt levels.

Compendium contents

Analysis	Instrumentation type
Major and trace elements in foodstuffs	ICP-OES, ICP-MS
Trace elements in various beverages	ICP-OES
Toxic elements in drinking and bottled water	ICP-OES
Mercury in fish	AA
Trace elements in rice	AA
Cadmium in chocolate	AA
Magnesium in meat	AA
Cadmium in crab meat	AA
Trace elements in honey	AA
Trace elements in traditional Chinese medicine	ICP-OES
Elemental analysis of canola oil	ICP-OES
Chromium speciation	IC-ICP-MS
Arsenic speciation	IC-ICP-MS
Bromine speciation	IC-ICP-MS
Nanoparticles in food	ICP-MS
Agricultural soil	ICP-OES

Persistent organic pollutants (POPs)



View the full compendium

Overview

Thermo Fisher Scientific has a strong commitment to supporting laboratories charged with the task of researching and monitoring environmental pollutants in food. This compendium demonstrates our high productivity, added value solutions for some of the most challenging environmental pollutant determinations.

Compendium contents

Analysis	Instrumentation type
Fish tissues	GC-MS/MS
Honey	GC-MS/MS
Dioxin-like PCBs	GC-MS/MS
Short-chained chlorinated paraffins	GC-HRAM
Polychlorinated dioxins/furans	Magnetic Sector GC-HRMS
Brominated flame retardants	GC-ICP-MS
Perfluorinated compounds	LC-MS/MS
Nitrofuran metabolites	LC-MS/MS
Unknown screening approach using HRAM	LC-HRAM

Learn more: Environmental Pollutants in Foods Info

Pesticides

View the full compendium

Learn more: Pesticide Residues Testing Learning Center

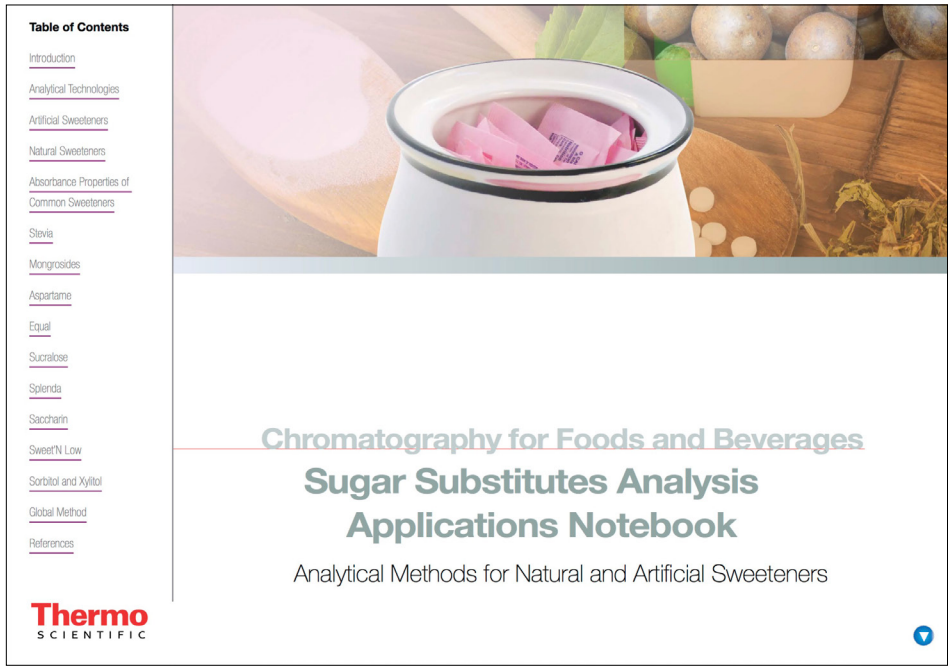
Overview

This pesticide residues analysis compendium features the most up-to-date application notes from Thermo Fisher Scientific and highlights the latest instrument and software innovations designed to increase productivity in a commercial food testing laboratory.

Compendium contents

Analysis	Instrumentation type
Pesticides in baby food	GC-MS/MS
Fipronil residues in egg	GC-MS/MS
Pesticide residues analysis in apple	GC-MS/MS
Pesticide residues in rice	GC-MS/MS, LC-MS/MS
Pesticide residues in chili powder	GC-MS/MS, LC-MS/MS
Pesticide residues in wheat	GC-MS/MS, LC-MS/MS
Pesticide residues in milk	GC-MS/MS
Automated micro-SPE clean-up method for pesticide residues in cereals	GC-MS/MS
Multi-residue pesticide screening in cereals	GC-HRAM
Pesticides and PCBs in food	GC-HRAM
Pesticide residues in high water content vegetable	LC-MS/MS
QuEChERS extracts using an automated online µSPE clean-up	LC-MS/MS
Fipronil and fipronil sulfone in eggs	LC-MS/MS
Dithianon in apple and apple juice	LC-MS/MS
Pesticide residues in fresh fruits	LC-MS/MS
Multi-class pesticides panel in wine	LC-MS/MS
A multiresidue method for pesticide profiling	LC-HRAM
Multi-residue analysis of polar anionic pesticides in food samples	IC-MS/MS
Cationic polar pesticides in homogenized fruit and vegetable	IC-HRAM

Sugar substitutes



View the full compendium

Overview

A sugar substitute is a food additive that duplicates the sweetness of sugar in taste, but with fewer calories. Some sugar substitutes are natural while others are synthetic. Those that are not natural are, in general, called artificial sweeteners.

Included is an overview of instrumentation for the testing of sugar substitutes and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Stevia	HPLC-UV, HPLC-CAD
Mongrosides	HPLC-UV, HPLC-CAD
Aspartame	HPLC-CAD
Equal	HPLC-CAD
Sucralose	HPAE-PAD
Splenda	HPLC-CAD
Saccharin	HPLC-CAD
Sweet'N Low	HPLC-CAD
Sorbitol	HPAE-PAD
Xylitol	HPAE-PAD
Global method	HPLC-CAD

Learn more: Nutritional & Food Label Testing Learning Center

Supplements

View the full compendium

Overview

The global supplement industry is growing each year with the introduction of new products. With this growth, come many more analytical challenges. For all supplements, the compositional quality and safety must be monitored to track contamination, adulteration, and product consistency.

Included is an overview of instrumentation for the testing of supplements and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Anthocyanins	UHPLC-UV, LC-MS
Black cohosh	HPLC-CAD
Echinacea	HPLC-UV
Ginko	HPLC-CAD
Ginseng	HPLC-CAD, HPLC-UV
Milk thistle	HPLC-CAD
Polyphenols	HPLC-UV, HPLC-ECD
Resveratrol	HPLC-UV
St John's wort	HPLC-UV, HPLC-ECD
Taxanes	HPLC-CAD, HPLC-UV
and many more….	

Learn more: Dietary Supplements Testing Learning Center

Learn more: Nutraceutical Analysis Learning Center

Vitamins and antioxidants

View the full compendium

Overview

Included is an overview of instrumentation for the testing of vitamins and antioxidants and a multitude of references from peer reviewed journals using our HPLC, ion chromatography, and sample preparation solutions.

Compendium contents

Analysis	Instrumentation type
Water-soluble vitamins	HPLC-DAD, HPLC-UV
Fat-soluble vitamins	HPLC-DAD, HPLC-UV
Vitamin mixtures	HPLC-DAD, HPLC-UV, HPLC-ECD
Antioxidants	HPLC-DAD, HPLC-UV, HPLC-ECD

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