Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Chromatography for Foods and Beverages

Sugar Substitutes Analysis Applications Notebook

Analytical Methods for Natural and Artificial Sweeteners

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Chapter 2: Sugar Substitutes

Introduction

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.

Six intensely sweet sugar substitutes are approved for use in the United States: acesulfame potassium, aspartame, neotame, saccharin, stevia, and sucralose.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

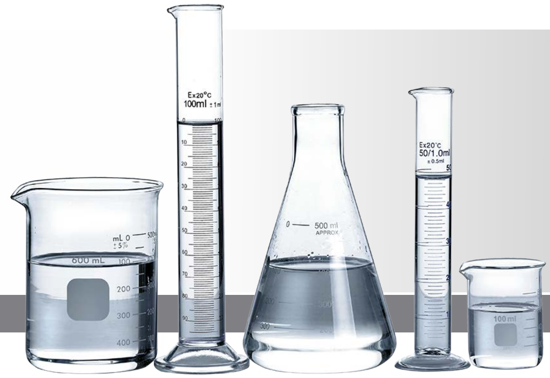
Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

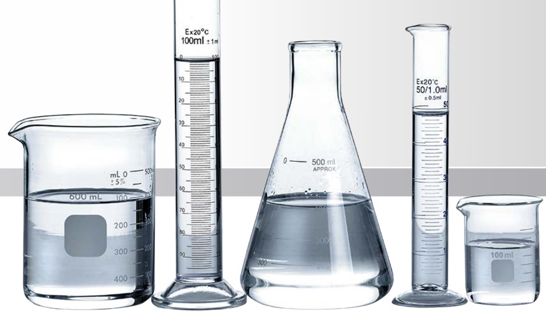
References



Food Compendium: Analytical Technologies

High-Performance Liquid Chromatography

Thermo Scientific™ Dionex™ UltiMate™ 3000 UHPLC+ systems offer excellent chromatographic performance, operational simplicity and unrivaled flexibility. Choose from a wide range of standard and unique specialty detectors to extend your laboratory's analytical capabilities.



UltiMate 3000 UHPLC^{+} Systems

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Best-in-class HPLC systems for all your chromatography needs

UltiMate 3000 UHPLC^{+} Systems provide excellent chromatographic performance while maintaining easy, reliable operation. The basic and standard analytical systems offer ultra HPLC (UHPLC) compatibility across all modules, ensuring maximum performance for all users and all laboratories.

Covering flow rates from 20 nL/min to 10 mL/min with an industry-leading range of pumping, sampling, and detection modules, UltiMate 3000 UHPLC^{+} Systems provide solutions from nano to semipreparative, from conventional LC to UHPLC.

Superior chromatographic performance

- UHPLC design philosophy throughout nano, standard analytical, and rapid separation liquid chromotography (RSLC)
- 620 bar (9,000 psi) and 100 Hz data rate set a new benchmark for basic and standard analytical systems
- RSLC systems go up to 1000 bar and data rates up to 200 Hz
- ×2 Dual System for increased productivity solutions in routine analysis
- Fully UHPLC compatible advanced chromatographic techniques
- Thermo Scientific™ Dionex™ Viper™ and nanoViper™ fingertight fittings—the first truly universal, fingertight fitting system even at UHPLC pressures

Thermo
SCIENTIFIC

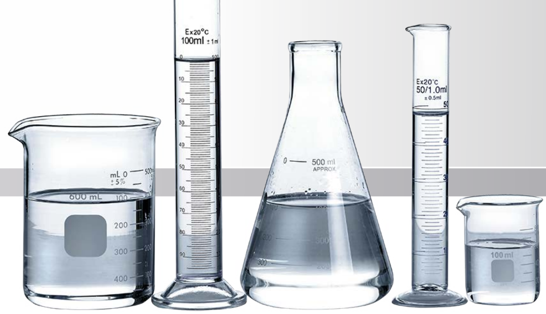


Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

UltiMate 3000 UHPLC+ Systems

We are uniquely focused on making UHPLC technology available to all users, all laboratories, and for all analytes.

Rapid Separation LC Systems

The extended flowpressure footprint of the RSLC system provides the performance for ultrafast high-resolution and conventional LC applications.

Standard LC Systems

Choose from a wide variety of standard LC systems for demanding LC applications at nano, capillary, micro, analytical, and semipreparative flow rates.

RSLCnano Systems

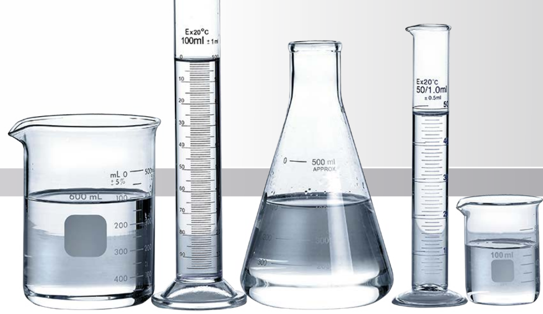
The Rapid Separation nano LC System (RSLCnano) provides the power for high resolution and fast chromatography in nano, capillary, and micro LC.

Basic LC Systems

UltiMate 3000 Basic LC Systems are UHPLC compatible and provide reliable, high performance solutions to fit your bench space and your budget.

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Standard HPLC Detectors

UltiMate 3000 Variable Wavelength Detectors

The Thermo Scientific Dionex UltiMate 3000 VWD-3000 is a variable wavelength detector (VWD) series for industry leading UV-Vis detection. The forward optics design and wide range of available flow cells ensure optimal performance over a flow rate range of five orders of magnitude. Automated qualification, performance optimization, and instrument wellness monitoring deliver maximum uptime, simplify work-flow, and give you full confidence in your analytical results. The detector is available in a standard 100 Hz (VWD-3100) and a 200 Hz Rapid Separation version (VWD-3400RS) for the most challenging UHPLC applications.

High-Performance UV-Vis Detection

- The VWD-3400RS variant provides data collection rates of up to 200 Hz for optimal support of today's and tomorrow's UHPLC separations
- The VWD-3100 standard detector operates at up to 100 Hz data rate for optimum support of 62 MPa (9000 psi) UltiMate 3000 Standard systems
- Superior detection of trace analytes with low noise (< –2.0 µAU) and drift (< 100 µAU/h)
- The detector's large linearity range of up to 2.5 AU is ideal for applications with widely varying analyte concentrations
- Up to four absorption channels (VWD-3400RS) and spectral scans support effective method development
- Active temperature control of optics and electronics for data acquisition independent of ambient conditions
- Front panel access for quick and easy lamps and flow cells changes
- Automated qualification monitoring for full regulatory compliance
- Large front panel display for monitoring the detector status even from a distance
- Maximize uptime using predictive performance–based on monitoring the life cycle of detector lamps
- The detector can be upgraded with the Thermo Scientific Dionex pH/Conductivity Monitor (PCM-3000) for accurate and precise pH- and conductivity monitoring
- Unique 45 nL ultra-low dispersion UV monitor for dispersion-free UV detection in LC/MS

UltiMate 3000 VWD-3400 Variable Wavelength Detector.

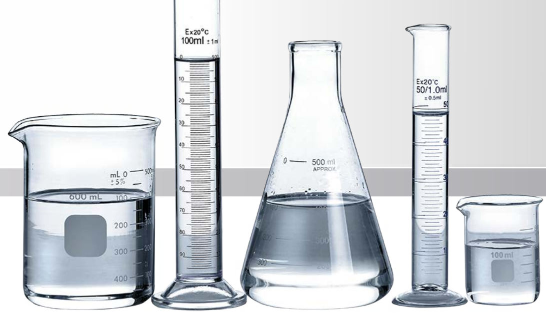


Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Standard HPLC Detectors

UltiMate 3000 Diode Array and Multiple-Wavelength Detectors

The Thermo Scientific Dionex UltiMate DAD 3000 detector is a high-resolution, 1024-element diode array detector (DAD) available in Rapid Separation (200 Hz) and Standard (100 Hz) versions. It operates with the Thermo Scientific™ Dionex™ Chromeleon™ Chromatography Data System (CDS) software to provide a variety of spectra views, including 3-D plotting and automated chromatogram handling. The high resolution and low-noise performance of the DAD-3000 family makes it ideal for the most sensitive and accurate library searches and peak purity analyses.

The detector is also available as a multiple wavelength detector (MWD) in Standard (100 Hz) and Rapid Separation (200 Hz) versions.

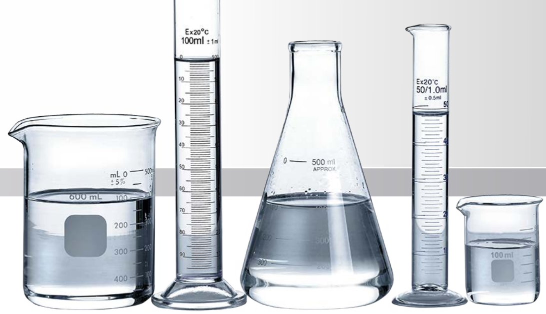
- Data collection at up to 200 Hz using a maximum of eight single-wavelength data channels and one 3-D field (3-D only with DAD-3000 (RS)) for best support of ultrafast separations
- Standard versions operate at up to 100 Hz data collection rate for optimum support of 62 MPa (9000 psi) UltiMate 3000 Standard systems
- Accurate compound confirmation with a 1024-element, high resolution photodiode array
- Flexibility in both UV and Vis applications with 190–800 nm wavelength range
- Low-noise over the full spectral range using deuterium and tungsten lamps
- Fast and accurate wavelength verification using a built-in holmium oxide filter
- The detector can be upgraded with the UltiMate PCM 3000 for accurate monitoring pH gradients
- Excellent reliability and reproducibility with low baseline drift (typically < 500 µAU/h)
- Simplified routine maintenance with front access to pre-aligned cells and lamps
- ID chips on flow cells and lamps for identification and life-span monitoring
- Chromeleon CDS software for full control and flexible data handling
- Front-panel display for easy monitoring of detector status to maximize uptime
- Flow cells for semi-micro, semi-analytical, analytical, and semi-preparative applications
- Flow cells available in stainless steel and biocompatible versions

UltiMate 3000 DAD-3000 Diode Array Detector

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Standard HPLC Detectors

RefractoMax 521 Refractive Index Detector

The Thermo Scientific RefractoMax 521 Refractive Index Detector from ERC Inc. This detector, in combination with the UltiMate 3000 system, is the right choice for the isocratic analysis of sugars, polymers, and fatty acids. It features fast baseline stabilization and excellent reproducibility, combined with high sensitivity. The RefractoMax 521 is fully controlled by the Chromeleon CDS, and can also operate in stand-alone mode.

- The detector is highly sensitive and applicable universally. It provides very stable baselines with a drift of 0.2 µRIU/h and a noise specification of 2.5 nRIU or less
- The optical bench, thermostatically regulated from 30 °C to 55 °C, and the superior signal-to-noise ratio ensure highly precise measurement results
- The extended flow rate range from 1 mL/min up to 10 mL/min and the operating range of 1.00 to 1.75 RIU enable the use of this detector for a wide range of applications
- Applications include the analysis of all compounds with low UV-Vis activity, such as alcohols, mono- and polysaccharides, esters, fatty acids, or polymers
- An Auto Set-up function automates purging, equilibration, autozero, and the control baseline stability and noise
- Operation with Chromeleon CDS makes the detector easy to use and ensures maximum productivity in instrument control, data processing, and reporting of results

RefractoMax 521 Refractive Index Detector

Thermo
SCIENTIFIC

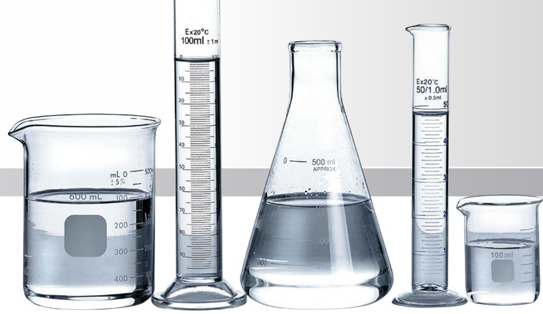


Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Specialty HPLC Detectors

Corona Veo Charged Aerosol Detector

Charged Aerosol Detection provides near universal detection independent of chemical structure for non- or semi-volatile analytes with HPLC and UHPLC. A Thermo Scientific™ Dionex™ Corona™ Veo™ Charged Aerosol detector is ideally suited as a primary detector for any laboratory, while providing complementary data to UV or MS methods. No other LC detector available today can match the performance of a Corona Veo detector.

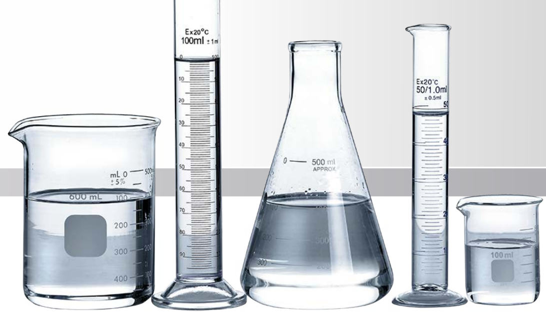
- High sensitivity – single-digit nanogram on column
- Consistent response – independent of chemical structure
- Wide dynamic range – to four orders of magnitude or greater
- Simple to use – easy to integrate with any HPLC/UHPLC system

The Corona Veo detector gives the simplicity, reproducibility and performance required for a full range of applications from basic research to manufacturing QC/QA. With charged aerosol detection you get predictable responses to measure analytes in direct proportion to their relative amounts for quantitation without actual standards.

This detector offers the flexibility to use reversed-phase gradients, as well as normal phase and HILIC modes of separation on any LC system. And, in many cases eliminates the need for derivatization or sample pre-treatment to provide real dilute-and-shoot simplicity.

Corona Veo Charged Aerosol Detector

Thermo SCIENTIFIC



Specialty HPLC Detectors

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Ultimate 3000 Electrochemical Detector

Electrochemical detection delivers high sensitivity for neurotransmitter analysis, simplicity and robustness for pharmaceutical or clinical diagnostics, and the selectivity for the characterization of complex samples such as natural products, biological tissues and fluids. For today's researcher, there is a continuing need for detecting vanishingly small quantities of analyte and often in complex samples. Because electrochemical detection measures only compounds that can undergo oxidation or reduction it is both highly sensitive and very selective.

The Thermo Scientific Dionex UltiMate 3000 Electrochemical Detector, designed by the pioneers of coulometric electrochemical detection, delivers state-of-the-art sensor technologies complete with an entire range of high performance and ultra-high performance LC systems optimized for electrochemical detection. The UltiMate 3000 ECD-3000RS takes electrochemical detection to the next level with UHPLC compatibility, total system integration, and selection of detection mode, all with unprecedented operational simplicity.

Features include:

- Detection Modes – choose from DC and PAD for optimum analyte response
- Choice of sensors – both coulometric and amperometric sensors to meet the demands of any application
- UHPLC compatibility – ultralow peak dispersion and high data acquisition rates for conventional or fast, high resolution chromatography
- Modularity – easily expandable to multiple independent sensors for unrivaled flexibility
- Autoranging – simultaneously measure both low and high levels of analytes without losing data
- SmartChip™ technology – easy operation with automatic sensor recognition, event logging and electrode protection

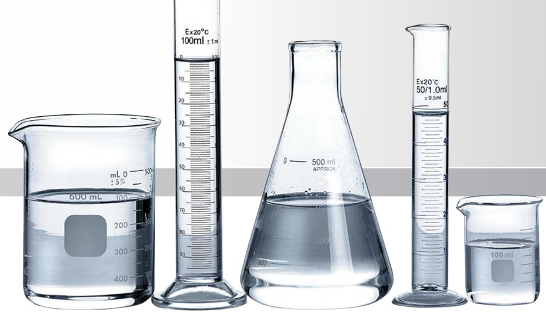
UltiMate 3000 Electrochemical Detector

Learn more at www.thermoscientific.com/ECDetection

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Specialty HPLC Detectors

CoulArray Multi-electrode Array Detector

The Thermo Scientific™ Dionex™ CoulArray™ Multi-electrode Array detector is the only practical multi-channel electrochemical detection system that allows you to measure multiple analytes simultaneously, including those that are chromatographically unresolved. The CoulArray detector delivers the widest dynamic range of any available electrochemical detector with unmatched selectivity for detection of trace components in complex matrixes, even when used with aggressive gradients.

- Measures analytes from femtomole to micromole levels
- Greatly simplify sample preparation and eliminate interferences
- Simultaneously analyze multiple analytes in very complex samples
- Easily produce qualitative information for compound identification

Multiple system configurations offer 4, 8, 12, or 16 channels that can be upgraded anytime. The unique data acquisition and processing software uses automatic signal ranging and a unique patented baseline correction algorithms to provide identification and quantitation of single or multiple analytes and powerful 3D data for quick sample fingerprint confirmation with integration to pattern recognition platforms.

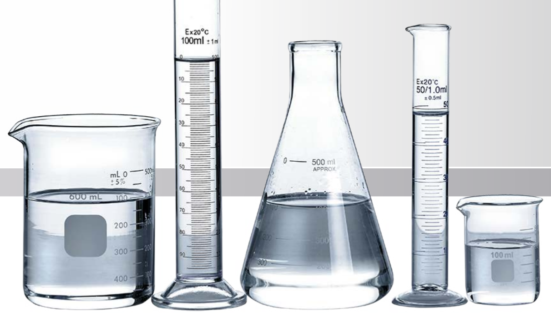
With the power of coulometric array technology, the CoulArray detector can give you the qualitative data of a optical PDA with 1,000 fold greater sensitivity to profile the characteristic qualities of products, determine integrity, identify adulteration and even evaluate competitors' products.

CoulArray Multi-electrode Array Detector

Learn more at www.thermoscientific.com/coularray

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Specialty HPLC Detectors

Ultimate 3000 Fluorescence Detector

The Thermo Scientific Dionex UltiMate 3000 FLD-3000 is a high-sensitivity fluorescence detector series for UltiMate 3000 HPLC systems. It is available in Rapid Separation (RS) and Standard (SD) versions. The optics of the FLD-3000 series provide maximum stray-light suppression for best detection sensitivity. Operated with the Chromeleon CDS software, the detector provides automated qualification, various tools for method development, and instrument wellness monitoring for ease of use, maximum uptime, and the highest degree of regulatory compliance.

- Data collection at up to 200 Hz for optimal support of even the fastest UHPLC separations (FLD-3400RS)
- Standard detectors operate at up to 100 Hz data rate for optimum support of 62 MPa (9,000 psi) UltiMate 3000 standard systems
- Lowest limits of detection with a Raman signal-to-noise ratio (S/N): > 550 ASTM (> 2100 using dark signal as noise reference)
- Unsurpassed reproducibility with active flow cell temperature control for stable fluorophore activity independent of changes in ambient temperature
- Long-life xenon flash lamp for highest sensitivity and long-term operation without the need for frequent lamp changing
- Optional second photomultiplier (PMT) for unique Dual-PMT operation, offering an extended wavelength range up to 900 nm without sacrificing sensitivity in the standard wavelength range
- Two-dimensional (2D) or three dimensional (3D) excitation, emission, or synchro scans to provide the highest degree of flexibility for method development or routine sample characterization
- Innovative Variable Emission Filter for real-time compound-related sensitivity optimization (FLD-3400RS only)
- Large front-panel display for easy monitoring of the detector status
- Two flow-cell sizes for easy optimization to application requirements: the 8 µL flow cell is ideal for trace analysis, and the 2 µL flow cell offers best peak resolution with narrow-bore HPLC and UHPLC columns

Ultimate 3000 Fluorescence Detector

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

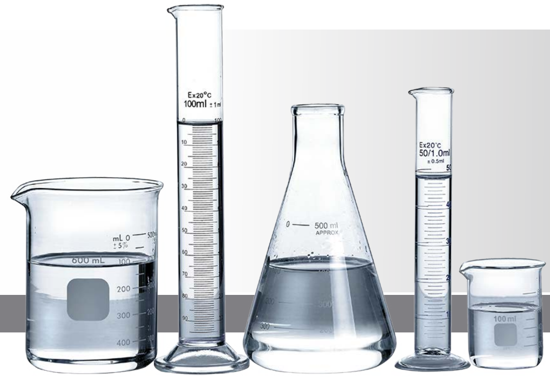
Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Thermo SCIENTIFIC



Food Compendium: Analytical Technologies

Ion Chromatography

Thermo Scientific Dionex IC systems have led the analytical instrument industry for over 30 years with solutions that represent state-of-the art technological advancements and patented technologies.

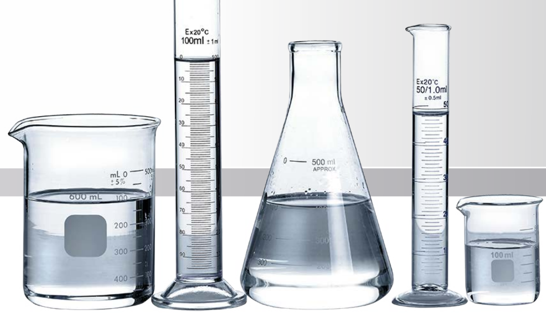


Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

IC and RFIC Systems

Innovative Ion Chromatography Solutions

Our High-Pressure™ Ion Chromatography (HPIC™) systems include the Thermo Scientific Dionex ICS-5000+ HPIC system, which is optimized for flexibility, modularity, and ease-of-use, combining the highest chromatographic resolution with convenience. In addition, the Thermo Scientific Dionex ICS-4000 Capillary HPIC system is the world's first commercially available dedicated capillary high-pressure Reagent-Free™ (RFIC™) IC system. The Dionex ICS-4000 system is always ready for the next analysis, delivering high-pressure IC on demand.

Reagent-Free IC systems eliminate daily tasks of eluent and regenerant preparation in turn saving time, preventing errors, and increasing convenience. RFIC-EG systems use electrolytic technologies to generate eluent on demand from deionized water, and to suppress the eluent back to pure water to deliver unmatched sensitivity. RFIC-ER systems are designed to use carbonate, carbonate/ bicarbonate, or MSA eluents for isocratic separations.

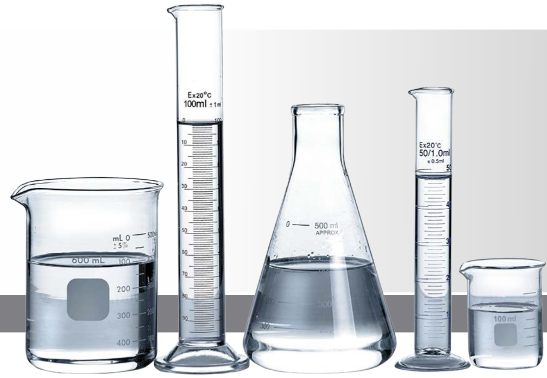
At the heart of our ion chromatography portfolio is a unique set of column chemistries that provide high selectivities and efficiencies with excellent peak shape and resolution. Thermo Scientific™ Dionex™ IonPac™ chromatography columns address a variety of chromatographic separation modes including ion exchange, ion exclusion, reversed-phase ion pairing, and ion suppression. Our column chemistries are designed to solve specific applications, and we offer a variety of selectivities and capacities for simple and complex samples. Additionally, our Dionex IonPac column line is available in standard bore, microbore and capillary formats for the ultimate application flexibility.

Thermo Scientific Dionex IC instrument family

Thermo SCIENTIFIC

Table of Contents

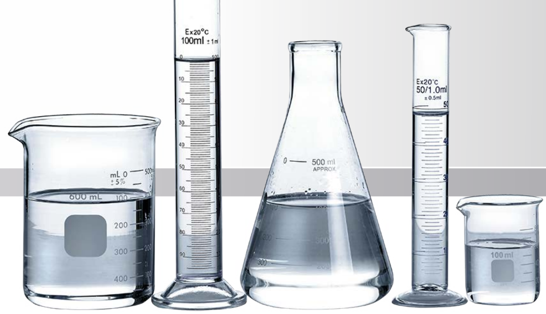
Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Food Compendium: Analytical Technologies

Mass Spectrometry

Thermo Fisher Scientific provides advanced integrated IC/MS and LC/MS solutions with superior ease-of-use and modest price and space requirements. UltiMate 3000 System Wellness technology and automatic MS calibration allow continuous operation with minimal maintenance. The Dionex ion chromatography family automatically removes mobile phase ions for effort-free transition to MS detection.



Mass Spectrometry Instruments

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Single-Point Control and Automation

Thermo Fisher Scientific provides advanced integrated IC/MS and LC/MS solutions with superior ease-of-use and modest price and space requirements. UltiMate 3000 System Wellness technology and automatic MS calibration allow continuous operation with minimal maintenance. The Dionex ion chromatography family automatically remove mobile phase ions for effort-free transition to MS detection.

- Thermo Scientific™ MSQ Plus™ mass spectrometer, the smallest and most sensitive single quadrupole on the market for LC and IC
- Self-cleaning ion source for low maintenance operation
- Chromeleon CDS software for single-point method setup, instrument control, and data management compatible with existing IC and LC methods
- The complete system includes the MSQ Plus mass spectrometer, PC data system, electrospray ionization (ESI) and atmospheric pressure chemical ionization (APCI) probe inlets, and vaccum system

Now, you no longer need two software packages to operate your LC/MS system. Chromeleon CDS software provides single-software method setup and instrument control; powerful UV, conductivity, and MS data analysis; and fully integrated reporting.

MSQ Plus Mass Spectrometer

Thermo
SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

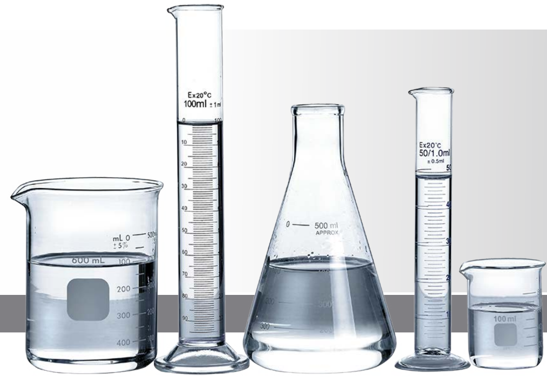
Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References



Food Compendium: Analytical Technologies

Chromatography Data Systems

Tackle chromatography management challenges with the world's most complete chromatography software. Whether your needs are simple or complex or your scope is a single instrument, a global enterprise, or anything in between – the combination of Chromeleon CDS' scalable architecture and unparalleled ease-of use, makes your job easy and enjoyable with one Chromatography Data System for the entire lab.

Thermo SCIENTIFIC

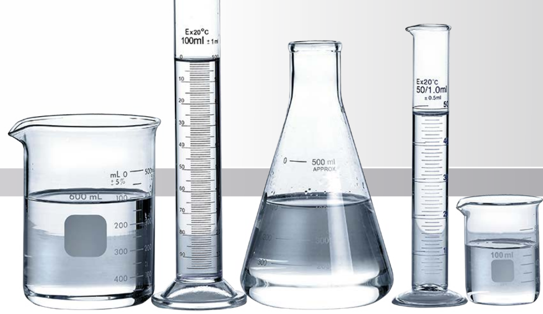


Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Chromeleon CDS Software

The Fastest Way from Samples to Results

The 7.2 release of Chromeleon Chromatography Data System software is the first CDS that combines separation (GC/IC/LC) and Mass Spectrometry (MS) in an enterprise (client/server) environment. By extending Chromeleon 7.2 CDS beyond chromatography into MS, lab technicians can now streamline their chromatography and MS quantitation workflows with a single software package. MS support in Chromeleon 7.2 CDS is focused on routine and quantitative workflows, which provides access to rich quantitative data processing and automation capabilities — ultimately boosting your overall lab productivity and increasing the quality of your analytical results.

- Enjoy a modern, intuitive user interface designed around the principle of operational simplicity
- Streamline laboratory processes and eliminate errors with eWorkflows™, which enable anyone to perform a complete analysis perfectly with just a few clicks
- Access your instruments, data, and eWorkflows instantly in the Chromeleon Console
- Locate and collate results quickly and easily using powerful built-in database query features
- Interpret multiple chromatograms at a glance using MiniPlots
- Find everything you need to view, analyze, and report data in the Chromatography Studio
- Accelerate analyses and learn more from your data through dynamic, interactive displays
- Deliver customized reports using the built-in Excel compatible speadsheet

Learn more at www.thermoscientific.com/Chromeleon

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Process Analytical Systems

Thermo Scientific Dionex process analytical systems provide timely results by moving chromatography-based measurements on-line.

Process Analytical Systems and Software

Table of Contents

- Introduction
- Analytical Technologies
- Artificial Sweeteners
- Natural Sweeteners
- Absorbance Properties of Common Sweeteners
- Stevia
- Mongrosides
- Aspartame
- Equal
- Sucralose
- Splenda
- Saccharin
- Sweet'N Low
- Sorbitol and Xylitol
- Global Method
- References

Improved Process Monitoring with On-line Chromatography IC and LC Systems

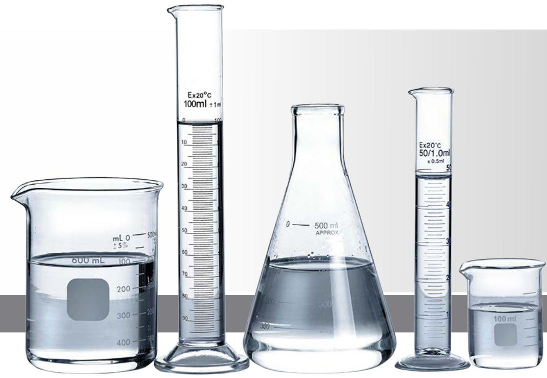
Information from the Thermo Scientific Dionex Integral process analyzer can help reduce process variability, improve efficiency, and reduce downtime. These systems provide comprehensive, precise, accurate information faster than is possible with laboratory-based results. From the lab to the factory floor, your plant's performance will benefit from the information provided by on-line LC.

- Characterize your samples completely with multicomponent analysis
- Reduce sample collection time and resources with automated multipoint sampling
- Improve your process control with more timely results
- See more analytes with unique detection capabilities
- The Thermo Scientific Integral Migration Path approach lets you choose the systems that best meets your needs

Integral process analytzer

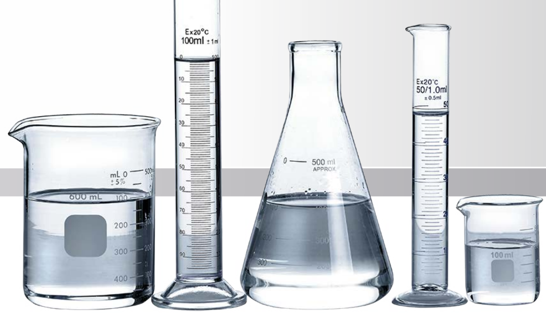
Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References



Automated Sample Preparation

Solvent extractions that normally require labor-intensive steps are automated or performed in minutes, with reduced solvent consumption and reduced sample handling using the Thermo Scientific™ Dionex™ ASE™ Accelerated Solvent Extractor system or Thermo Scientific™ Dionex™ AutoTrace™ 280 Solid-Phase Extraction instrument.



Accelerated Solvent Extractor System

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Complete Extractions in Less Time Using Less Solvent

Thermo Scientific Dionex ASE systems extract of solid and semisolid samples using common solvents at elevated temperature and pressure. The Dionex ASE 150 and 350 systems feature pH-hardened pathways with Dionium™ components to support extraction of acidic or alkaline matrices, and combine pretreatment, solvent extraction, and cleanup into one step. Dionium is zirconium that has undergone a proprietary hardening process that makes it inert to chemical attack by acids and bases at elevated temperatures.

Dionex ASE systems are dramatically faster than Soxhlet, sonication, and other extraction methods, and require significantly less solvent and labor. Accelerated solvent extraction methods are accepted and established in the environmental, pharmaceutical, foods, polymers and consumer product industries. Accelerated solvent extraction methods are accepted and used by government agencies worldwide.

Dionex ASE 150/350 and Dionex AutoTrace 280 SPE instruments

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Chapter 2: Sugar Substitutes

Types of Sugar Substitutes

The majority of sugar substitutes approved for food use by the FDA are artificial. However, a growing number of natural sugar substitutes are now commercially available. Stevia components and mogrosides are obtained from plants. Although sorbitol and xylitol are found in berries, fruits, vegetables, and mushrooms, their extraction is not feasible so these are produced industrially by the catalytical hydrogenation of appropriate sugar starting materials.

Structures of Sugar Substitutes

Artificial Sweeteners

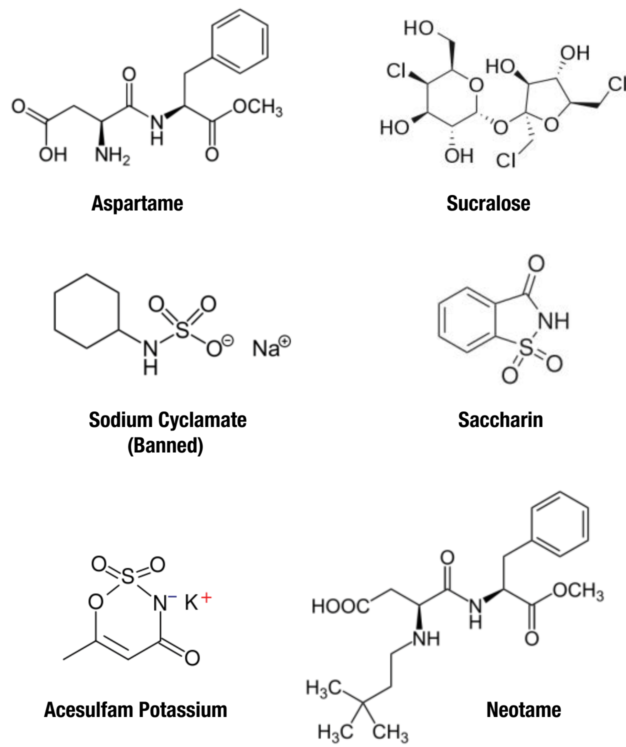


Figure 2-1. Chemical structures of various artificial sweeteners.

Natural Sweeteners

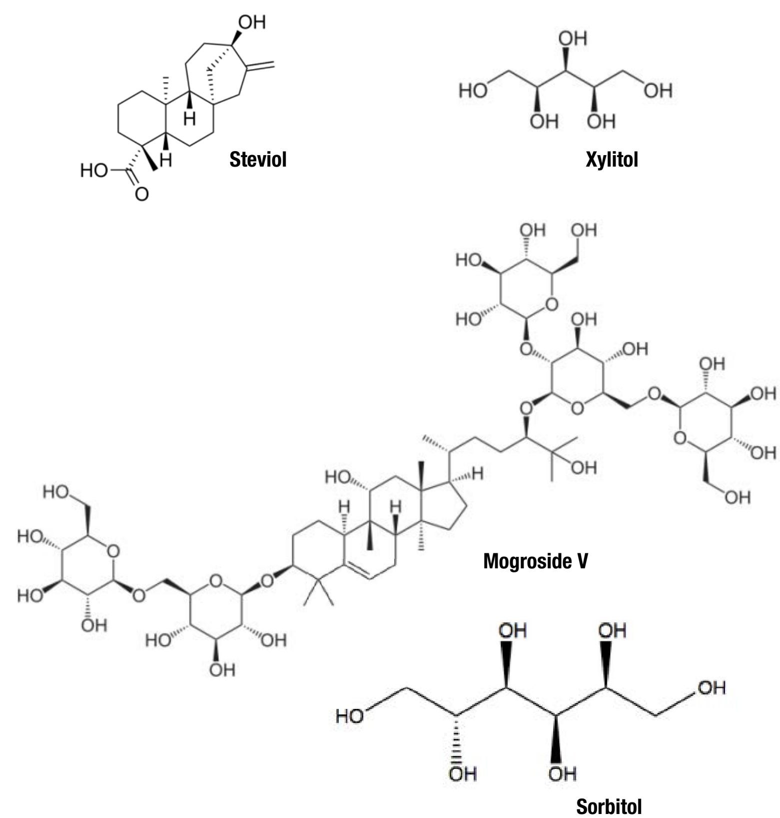


Figure 2-2. Chemical structures of various natural sweeteners.

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Structures of Sugar Substitutes

Absorbance Properties of Common Sweeteners

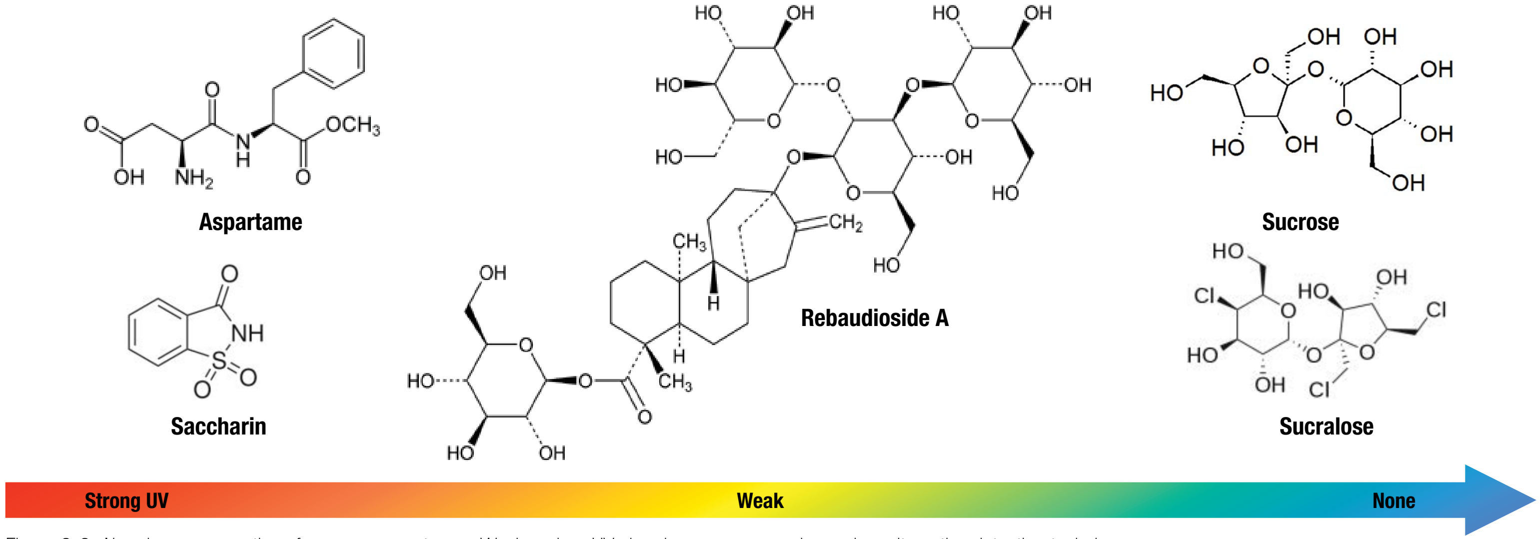


Figure 2-3. Absorbance properties of common sweeteners. Weak and no UV absorbance compounds need an alternative detection technique.

Did You Know?

Lead acetate (sometimes called *sugar of lead*) is an artificial sugar substitute made from lead that was widely used by ancient Romans. Lead acetate was abandoned as a food additive throughout most of the world after the high toxicity of lead compounds became apparent.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Stevia

Stevia

In December 2008, the U.S. FDA recognized rebaudioside A purified from *Stevia rebaudiana (Bertoni)* as “Generally Recognized as Safe” (GRAS) for use as a sugar substitute in foods. Since this recognition, stevia products have become popular as table-top and beverage sweeteners.

Stevia

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Although the stevia plant and extracts from stevia leaves have long been used as sweeteners in Asia and Latin America, the terpene glycosides have different flavor profiles with both sweet and unpleasant bitter flavors. Two steviol glycosides, stevioside and rebaudioside A, are largely responsible for the desired sweet flavor of the leaves, with rebaudioside A preferred for sweeteners.

Steviol glycoside determination is challenging for multiple reasons. The structures of the steviol glycosides are quite similar, differing in small changes in glycosylation. For example, rebaudioside B, an impurity that can be formed during processing of the leaves, differs in structure from rebaudioside A primarily by the presence or absence of a glucose residue at the R1 position on the terpene. These structural similarities make chromatographic separation difficult. In addition to the separation challenges, sensitive detection of these compounds also can be difficult. They do not absorb strongly in the UV, and typical detection wavelengths for steviol glycosides, such as 210 nm, are nonspecific.

Application Note 293 describes an HPLC-charged aerosol detection method capable of measuring all relevant analytes in Stevia.

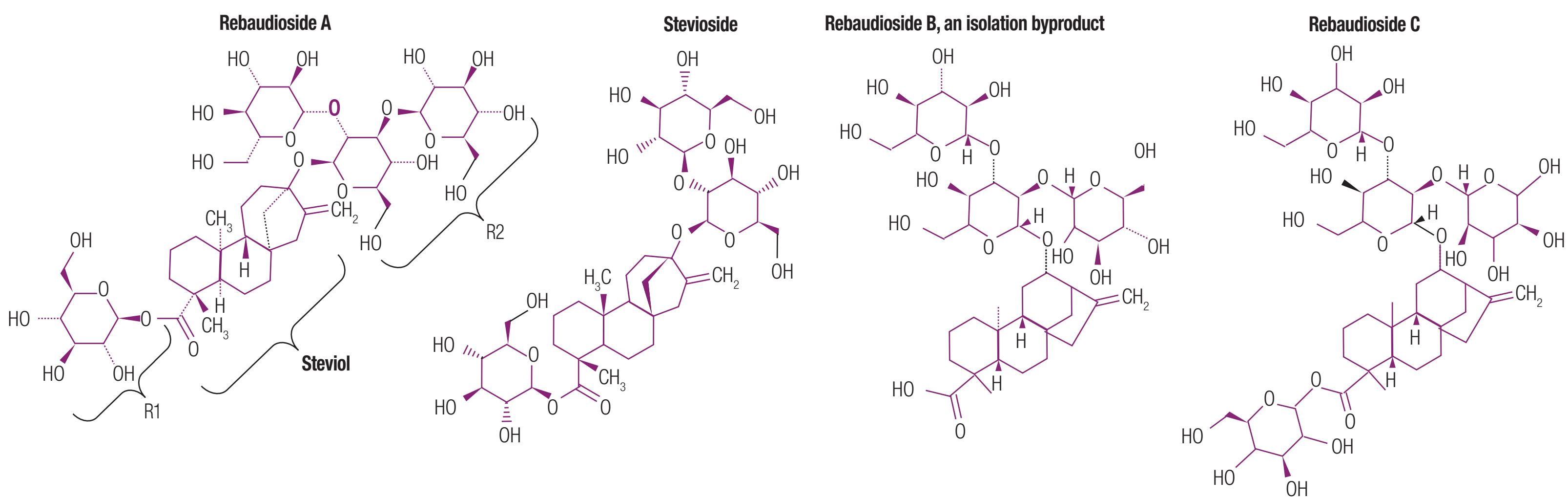


Figure 2-4. Chemical structures of the steviol glycosides stevioside and rebaudioside A, rebaudioside B, and rebaudioside C.

Download Application Note 293: Steviol Glycoside Determination by HPLC with Charged Aerosol and UV Detections Using the Acclaim Trinity P1 Column

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Stevia

Column:	Acclaim Trinity P1, 2.1 × 100 mm and guard
Flow Rate:	0.3 mL/min
Temperature:	20 °C
Injection Volume:	5 µL
Mobile Phase:	81/19 acetonitrile/10 mM ammonium formate, pH = 3.00
Detection:	A) UV detection, 210 nm B) Charged aerosol detection, nebulizer temp. 10 °C
Sample:	Brand A extracted sweetener

Peaks (A):	1. Stevioside	0.032 mg/mL
	2. Rebaudioside C	—
	3. Rebaudioside A	0.035
Peaks (B):	1. Stevioside	0.032
	2. Inulin	—
	3. Rebaudioside C	—
	4. Rebaudioside A	0.038
	5. Stevioboiside	0.002
	6. Unknown	—

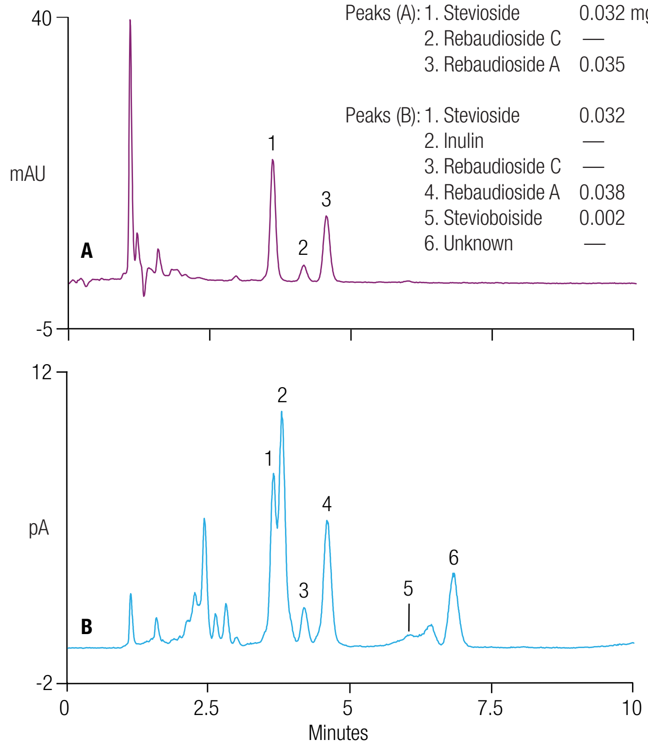


Figure 2-6. Separation of Brand A sweetener on the Acclaim Trinity P1 column and detected by A) UV and B) charged aerosol detections.

Column:	Acclaim Trinity P1, 3 µm analytical, 2.1 × 100 mm and guard
Mobile Phase:	81/19 acetonitrile/10 mM ammonium formate, pH = 3.00
Flow Rate:	0.3 mL/min
Temperature:	20 °C
Injection Volume:	5 µL
Detection:	Charged aerosol detection, nebulizer temp. 10 °C
Sample:	A) Brand A extracted sweetener B) Steviol glycoside standards

Peaks (A):	1. Stevioside	0.028 mg/mL
	2. Inulin	—
	3. Rebaudioside C	—
	4. Rebaudioside A	0.038
	5. Steviolbioside	0.002
	6. Unknown	—
	7. Sodium	—
Peaks (B):	1. Dulcoside A	0.040 mg/mL
	2. Stevioside	0.040
	3. Rebaudioside C	—
	4. Rebaudioside A	0.040
	5. Steviolbioside	0.040
	6. Rebaudioside B	0.040
	7. Mogroside V	0.040
	8. Sodium	—

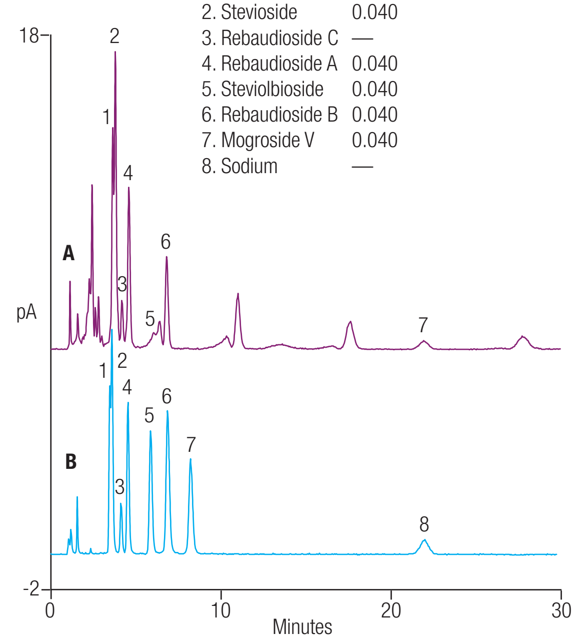


Figure 2-7. Separation of a A) stevia sweetener Brand A in comparison to B) standards on the Acclaim Trinity P1 column detected by charged aerosol detection.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Stevia

Column:	Acclaim Trinity P1, 3 µm analytical, 2.1 × 100 mm and guard	Peaks (A):	1. Rebaudioside A	0.044 mg/mL
		(Inset):	2. Rebaudioside B	<LOD
Flow Rate:	0.3 mL/min	Peaks (B):	1. Erythritol	—
Temperature:	20 °C		2. Rebaudioside A	0.044
Injection Volume:	5 µL		3. Rebaudioside B	0.003
Mobile Phase:	81/19 acetonitrile/ 10 mM ammonium formate, pH = 3.00	(Inset):	3. Rebaudioside B	0.003
Detection:	A) UV detection, 210 nm B) Charged aerosol detection			
Sample:	Brand B extracted sweetener			

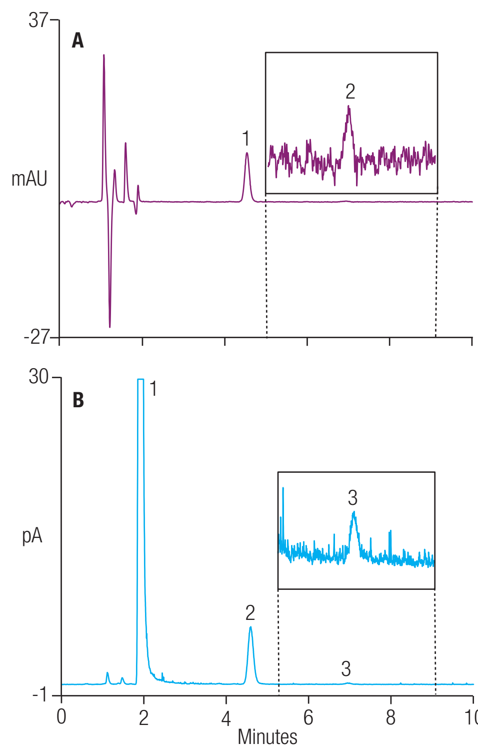


Figure 2-8. Rebaudioside A determination in Brand B, commercial sweetener, by A) UV and B) charged aerosol detection.

Alternate HPLC-Charged Aerosol Detection Approach

Column:	C18, 4.6 × 250 mm, 5 µm
Flow:	1.0 mL/min
Column Temp.:	50 °C
Injection Volume:	10 µL
Mobile Phase:	A. Deionized Water (DI), acetonitrile, trifluoroacetic acid (TFA) (95:5:0.1) B. DI:acetonitrile (5:95)
Gradient:	0–90% B in 30 min; hold for 5 min and return to starting conditions
Sample Prep.:	Commercially available stevia extract powder was dissolved in deionized water (0.9 mg/mL)

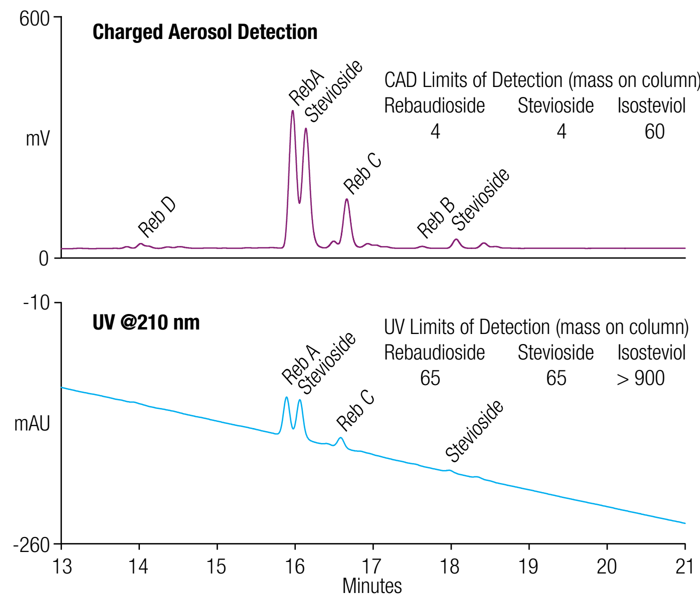


Figure 2-9. Alternate HPLC-charged aerosol detection method for Stevia anlysis.

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Stevia

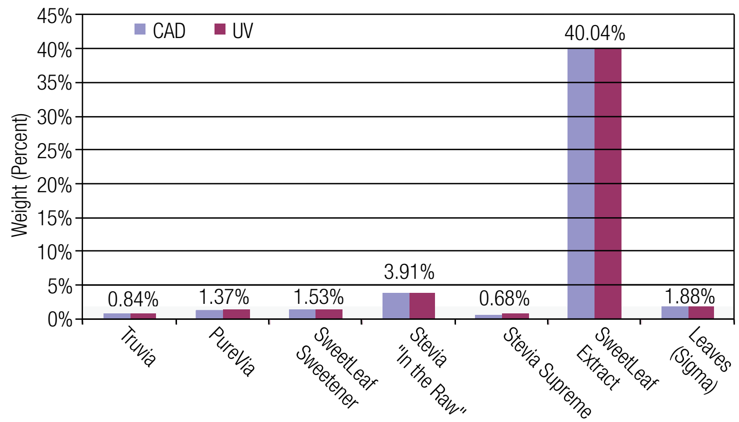


Figure 2-10. Percentage of Reb A in stevia-containing products.

Comparison of HPLC and RSLC for the Analysis of a Stevia Extract

HPLC (A)

Column:	C18, 4.6 × 250 mm, 5 µm
Flow Rate:	1.0 mL/min
Column Temp.:	50 °C
Injection Volume:	10 µL
Mobile Phase:	A. Deionized Water (DI), acetonitrile, trifluoroacetic acid (TFA) (95:5:0.1) B. DI:acetonitrile (5:95)
Gradient:	5–90% B in 30 min; hold for 5 min and return to starting conditions

UHPLC (B)

Column:	Acclaim RSLC Polar Advantage II 2.1 × 250 mm, 2.2 µm
Flow Rate:	0.7 mL/min
Column Temp.:	40 °C
Injection Volume:	5 µL
Mobile Phase:	A. Deionized Water (DI) + 0.1% formic acid B. Acetonitrile + 0.1% formic acid
Gradient:	5% to 60% B in 9 min; hold 1 min and return to 5% B

Sample Prep.:
Commercially available stevia extract powder was dissolved in deionized water (0.9 mg/mL)

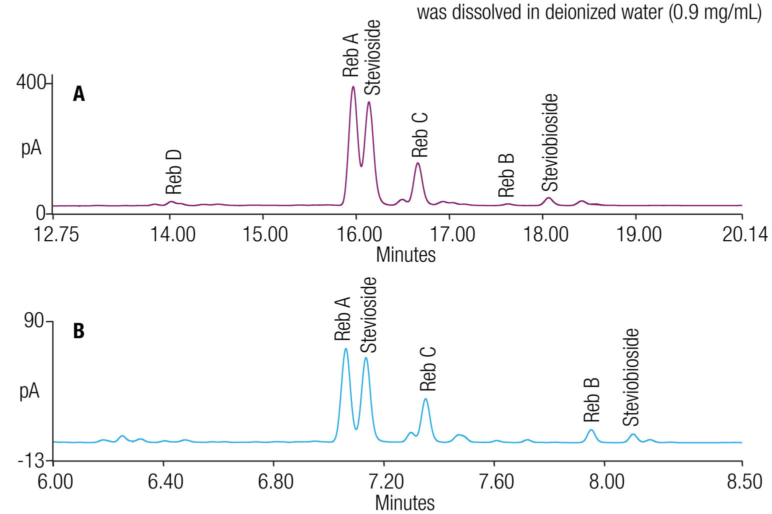


Figure 2-11. Using UHPLC conditions not only halves the time to perform analysis but improves resolution and also saves on mobile phase costs.

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Stevia

Stevia Degradation

Column:	Acclaim RSLC Polar Advantage II, 2.1 × 250 mm, 2.2 µm
Flow:	0.7 mL/min
Column Temp.:	40 °C
Injection Volume:	5 µL
Mobile Phase:	A. Deionized Water (DI) + 0.1% formic acid B. Acetonitrile + 0.1% formic acid
Gradient:	5% to 60% B in 9 min; hold 1 min and return to 5% B

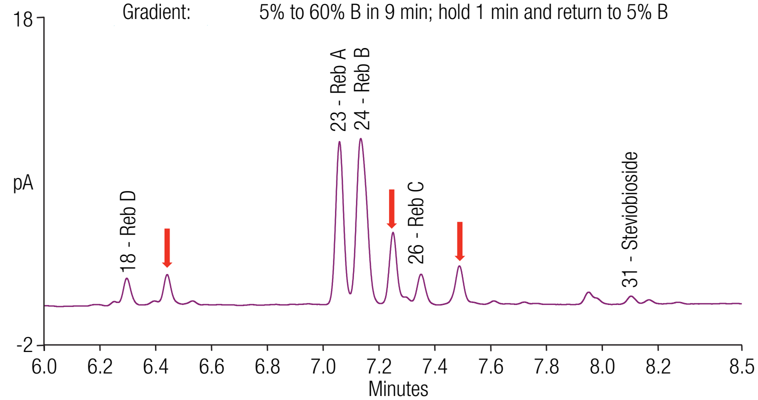


Figure 2-12. The UHPLC charged aerosol detection method could readily distinguish degradation products formed in a stevia-containing beverage left unopened at room temperature for over a year.

Trivia Question

Q: Do you know who discovered the first artificial sweetener?

A: Constantine Fahlberg, a German scientist, discovered Saccharin–the first artificial sweetener–in 1879, completely on accident! He was doing research entirely unrelated to sweeteners and was instead conducting research on coal tar derivative products.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Mongrosides

Mogrosides

Luo han kuo fruit (*Siraitia grosvenori* Swingle) has long been used in traditional Asian medicine. Recently cucurbitane-type and other triterpene glycosides have been isolated from the fruit and investigated for numerous potential health benefits such as antioxidant activity, anticancer effects, and antihyperglycemic effects. Many of these compounds are intensely sweet and therefore have also been investigated as sugar substitutes and flavor enhancers. Extracts of luo han kuo fruit used as sweeteners were acknowledged as "Generally Recognized as Safe" (GRAS) based on a GRAS submission to the U.S. FDA in January of 2010.

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Mogrosides

Typical reversed-phase high-performance liquid chromatography methods to determine these glycosides are challenging due to the lack of a strong, specific chromophore in the compound. Other detection methods, such as charged aerosol detection, can be used to improve triterpene glycoside quantification.

In Application Update 184: Mongroside V determination by HPLC with Charged Aerosol and UV Detections, mogroside V is determined in a luo han kuo beverage by both charged aerosol and UV detections. The volatile mobile phase makes charged aerosol detection possible, which adds further flexibility to the method for detection of such glycosides.

Column:	Acclaim Trinity P1, 3 µm Analytical, 2.1 × 100 mm and guard
Flow:	0.3 mL/min
Temperature:	20 °C
Injection Volume:	5 µL
Mobile Phase:	81/19 acetonitrile/10 mM ammonium formate, pH 3.00
Detection:	Charged aerosol detection, nebulizer temp. 10 °C
Sample:	Steviol glycoside and mogroside V standards
Peaks:	1. Dulcoside A 0.190 mg/mL
	2. Stevioside 0.190
	3. Rebaudioside C —
	4. Rebaudioside A 0.190
	5. Steviolbioside 0.190
	6. Rebaudioside B 0.190
	7. Mogroside V 0.190

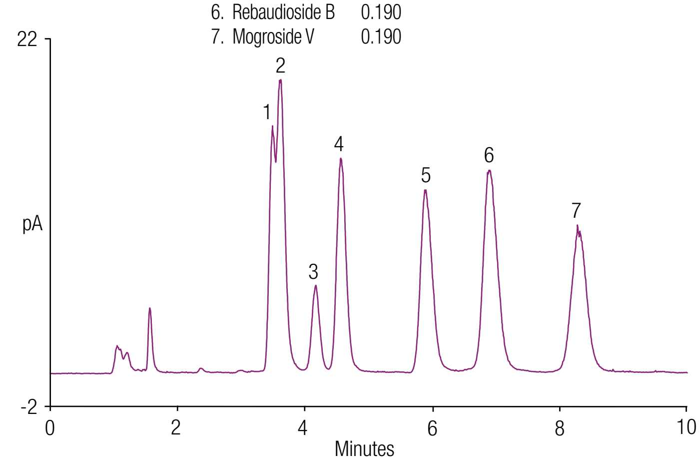


Figure 2-13. Detection of mogroside standards by charged aerosol detection.

Download Application Update 184: Mogroside V Determination by HPLC with Charged Aerosol and UV Detections

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Mogrosides

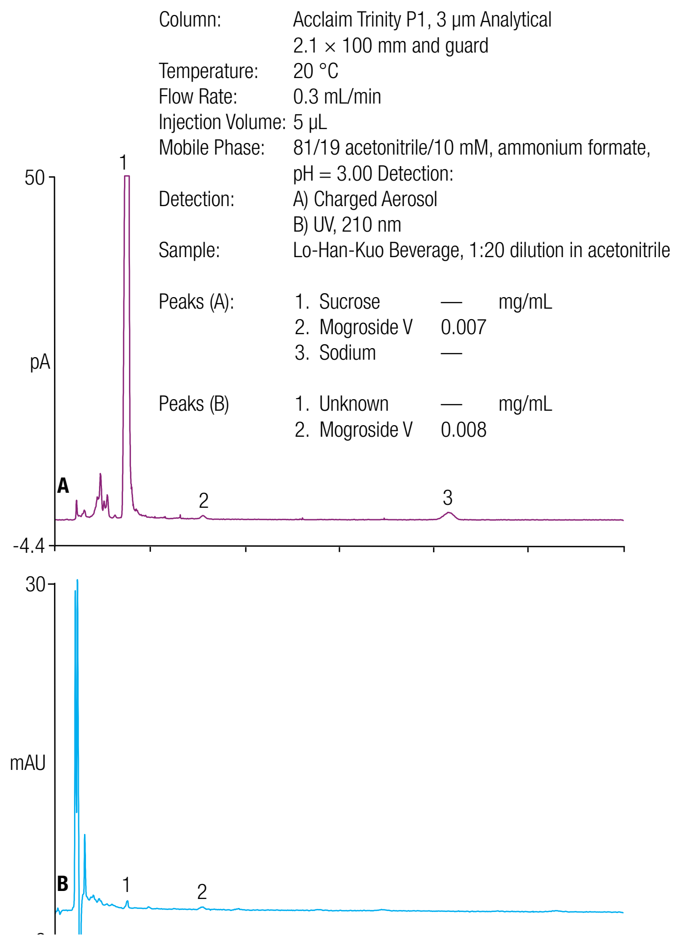


Figure 2-14. Superior performance of charged aerosol detection over UV detection for the detection of key analytes.

Did You Know?

The pure mogroside mix extracted from the luo han guo fruit is approximately 300 times sweeter than sugar!

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Chapter 2: Sugar Substitutes

Various artificial sugar substitutes.

Sweetener Brand Ingredients

- Equal®: Aspartame, dextrose, and maltodextrin
- Splenda®: Sucralose, dextrose, and maltodextrin
- Sweet'n Low®: Saccharin, dextrose, and cream of tartar

Thermo SCIENTIFIC

Aspartame

Table of Contents

- Introduction
- Analytical Technologies
- Artificial Sweeteners
- Natural Sweeteners
- Absorbance Properties of Common Sweeteners
- Stevia
- Mongrosides
- Aspartame
- Equal
- Sucralose
- Splenda
- Saccharin
- Sweet'N Low
- Sorbitol and Xylitol
- Global Method
- References

Aspartame was discovered by James M. Schlatter in 1965. Schlatter was a chemist working for G.D. Searle & Company. He had synthesized aspartame as an intermediate step in the process of making a tetrapeptide of the hormone gastrin, which was to be used in assessing the effectiveness of an anti-ulcer drug candidate. He accidentally discovered aspartame's sweet taste when he licked his finger, which had become contaminated with the compound.

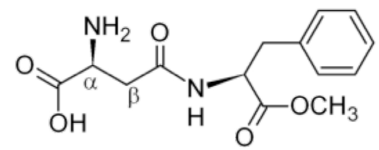


Figure 2-15. Aspartame, the methyl ester of the dipeptide of the natural amino acids L-aspartic acid and L-phenylalanine, is an artificial sweetener, that is approximately 200 times sweeter than sucrose, or table sugar.

Did You Know?

A study in the journal *Physiology and Behavior* found that habitual diet soda sippers have more widespread activity in the reward processing regions of the brain when they consume other sweet foods and drinks than those who don't regularly opt for these beverages. That means they're more likely to overindulge in treats, which can pose a threat to maintaining a healthy weight.

Thermo SCIENTIFIC

Table of Contents

- Introduction
- Analytical Technologies
- Artificial Sweeteners
- Natural Sweeteners
- Absorbance Properties of Common Sweeteners
- Stevia
- Mongrosides
- Aspartame
- Equal
- Sucralose
- Splenda
- Saccharin
- Sweet'N Low
- Sorbitol and Xylitol
- Global Method
- References

Equal and Impurity Method

Equal contains multiple components, including the active ingredient, aspartame, along with the fillers dextrose and maltodextrin.

In this example, all components were separated using reversed phase chromatography and detected by the Corona charged aerosol detector. During method development a trace impurity/contaminant was found. Although several potential degradants (e.g. phenylalanine, aspartic acid) were analyzed, none corresponded to the impurity.

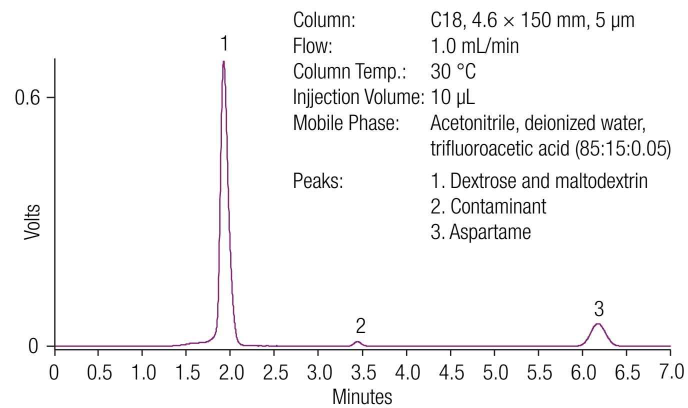


Figure 2-16. Chromatogram of Equal® sweeteners.

Did You Know?

Equal was the first aspartame-based sweetener to be sold to the public in the United States. Up until its debut in the early 1980's the only other sweetener products contained only saccharin

Download Poster Note: Sensitive Analysis of Commonly Used Artificial and Natural Sweeteners Including Stevia and Their Impurities and Degradation Products

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Sucralose

Sucralose (trichlorogalactosucrose or 1,6-dichloro- 1,6-dideoxy-β-D-fructofuranosyl-4-deoxy-α-D-galacto- pyranoside) is a non-nutritive sweetener used to manufacture diabetic and dietetic foods and beverages. Detection of sucralose and other carbohydrates is challenging because they lack a strong chromophore and, therefore, cannot be detected at low concentrations with UV detection. Furthermore, sucralose would typically be present in foods containing compounds with strong UV chromophores. Refractive index detection can be used, but the sensitivity is poor. Charged aerosol detection is a viable approach to determination of sucralose (see above).

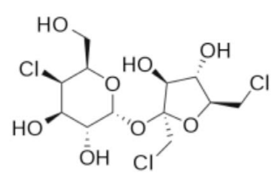


Figure 2-19. Chemical structure of sucralose.

Application Update 151 discusses the use of an alternate technique, High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD), to determine sucralose in reduced-carbohydrate colas. HPAE-PAD has been used to determine sucralose in other sugar-free beverages, after dilution, and foods. Reduced-carbohydrate cola samples have high concentrations of fructose and sucrose relative to sucralose, making these samples challenging for chromatographic analysis.

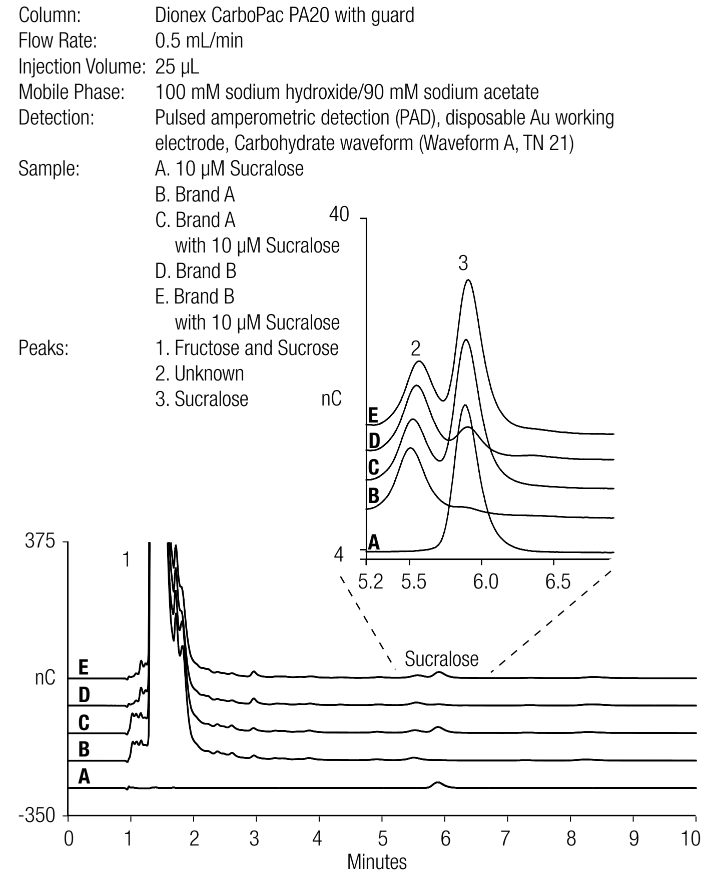


Figure 2-17. HPAE-PAD analysis of sucralose in a 100-fold dilution of the reduced-carbohydrate colas.

Download Application Update 151: Determination of Sucralose in Reduced-Carbohydrate Colas using HPAE-PAD

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Sucralose

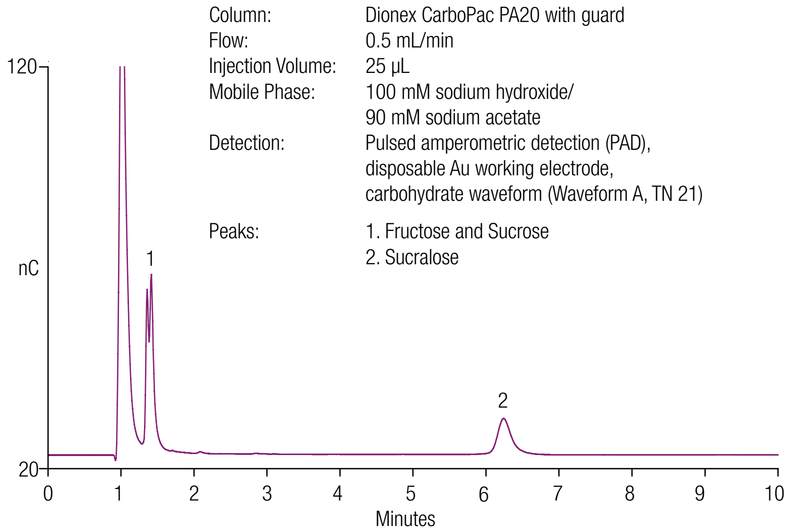


Figure 2-18. Determination of sucralose in a 50-fold dilution of Brand C peach citrus low-carbohydrate beverage.

Did You Know?

Sucralose is twice as sweet as saccharin, three times a sweet as aspartame and over 300 hundred times sweeter than table sugar!

Download Application Note 159: Determination of Sucralose Using HPAE-PAD

Table of Contents

- Introduction
- Analytical Technologies
- Artificial Sweeteners
- Natural Sweeteners
- Absorbance Properties of Common Sweeteners
- Stevia
- Mongrosides
- Aspartame
- Equal
- Sucralose
- Splenda
- Saccharin
- Sweet'N Low
- Sorbitol and Xylitol
- Global Method
- References

Splenda and Sweet'N Low

Splenda

HPLC-Charged Aerosol Detection Parameters:

Column:	Amino, 4.6 × 250 mm, 5 µm
Flow Rate:	1.0 mL/min
Column Temp.:	30 °C
Injection Volume:	10 µL
Mobile Phase:	A. Acetonitrile B. Deionized water
Gradient:	30% to 70% B in 40 minutes

Peaks:
1. Sucralose
2. Dextrose
3. Maltose
4. Maltotriose
5. Maltotetraose
6. Maltopentaose
7. Maltohexaose
8. Maltoheptaose
9. Maltooctaose
10. Maltononase
11. Maltodecaose

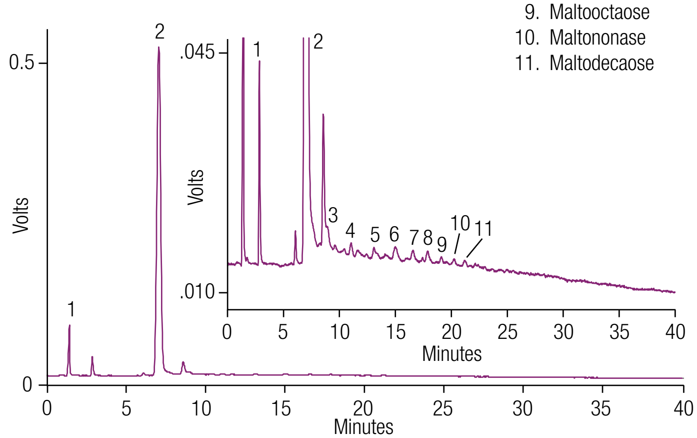


Figure 2-20. Analysis of Splenda. 10 µg on column. Inset presented at 10x sensitivity.

Sweet'N Low

HPLC-Charged Aerosol Detection Parameters:

Column:	C18, 4.6 mm × 150 mm, 5 µm
Flow Rate:	1.0mL/min
Column Temp.:	Ambient
Injection Volume:	10 µL
Mobile Phase:	0.1% TFA in 20% MeOH(aq)
Sample:	Sweet and Low sachet dissolved in water at 1mg/mL

Inset at 10x sensitivity

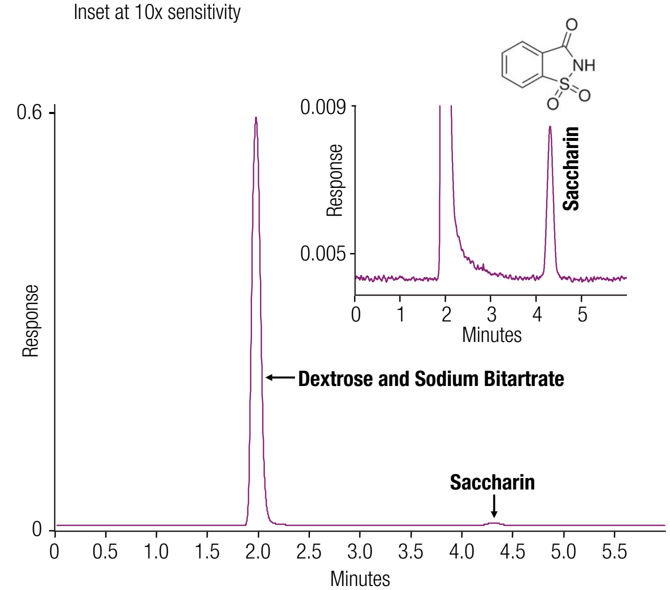


Figure 2-22. Analysis of Sweet'N Low. Saccharin, benzoic sulfilimine, is an artificial sweetener. It is much sweeter than sucrose, but has a bitter or metallic aftertaste, especially at high concentrations

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

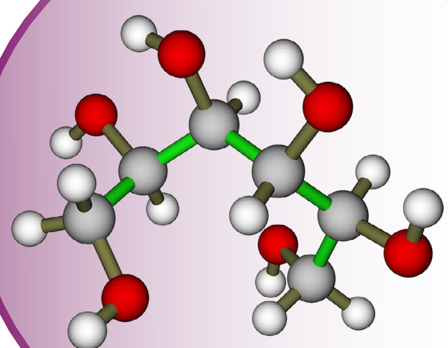
Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Chapter 2: Sugar Substitutes



Chemical structure of sorbitol

Sugar Alcohols

Sugar alcohols, such as sorbitol and mannitol, are used in confectionary products because they impart a sweet taste without the calories associated with sugars.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Sugar Alcohols

Sorbitol (60% as sweet as sucrose) and mannitol are sugar alcohols commonly used as replacements for sucrose in dietetic candy. However, their use in foods is regulated because they exhibit laxative and diuretic properties.

Application Note 87 explores the use by pulsed amperometric detection for the measurement of sugar alcohols.

Column:	Dionex CarboPac MA1, 4 × 250 mm
Expected Operating Pressure:	5.5–7.6 MPa (800–1100 psi)
Flow Rate:	0.4 mL/min
Injection Volume:	10 µL
Mobile Phase:	A. Deionized water, 52% B. 1.0 M Sodium hydroxide, 48%
Detection:	Pulsed amperometery, gold working electrode

ED40 Settings:

Time (min)	E (volts)	Integration (s)
400	+0.05	0.2–0.4
200	+0.75	
400	–0.15	

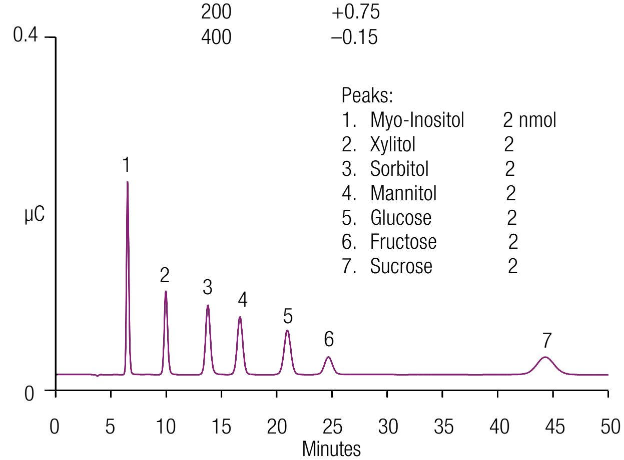


Figure 2-23. Sugar alcohols with high pKa values elute first.

Column:	Dionex CarboPac MA1, 4 × 250 mm
Expected Operating Pressure:	5.5–7.6 MPa (800–1100 psi)
Flow Rate:	0.4 mL/min
Injection Volume:	10 µL
Mobile Phase:	A. Deionized water, 50% B. 1.0 M Sodium hydroxide, 50%
Detection:	Pulsed amperometery, gold working electrode

ED40 Settings:

Time (min)	E (volts)	Integration (s)
400	+0.05	0.2–0.4
200	+0.75	
400	–0.15	

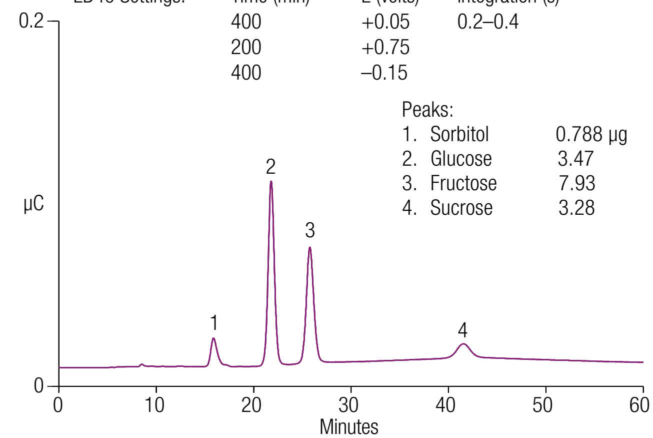


Figure 2-24. Diluted apple juice containing sorbitol.

Thermo SCIENTIFIC

Download Application Note 87: Determination of Sugar Alcohols in Confections and Fruit Juices by HPAE-PAD

Sugar Alcohols

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Column:	Dionex CarboPac MA1, 4 × 250 mm		
Expected Operating Pressure:	5.5–7.6 MPa (800–1100 psi)		
Flow Rate:	0.4 mL/min		
Injection Volume:	10 µL		
Mobile Phase:	A. Deionized water, 50%		
	B. 1.0 M Sodium hydroxide, 50%		
Detection:	Pulsed amperometery, gold working electrode		
ED40 Settings:	Time (min)	E (volts)	Integration (s)
	400	+0.05	0.2–0.4
	200	+0.75	
	400	–0.15	

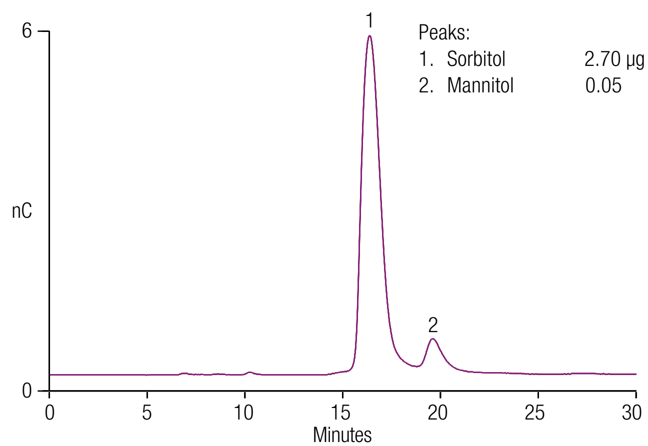


Figure 2-25. "Sugarless" hard candy containing sorbitol and mannitol.

Column:	Dionex CarboPac MA1, 4 × 250 mm		
Expected Operating Pressure:	5.5–7.6 MPa (800–1100 psi)		
Flow Rate:	0.4 mL/min		
Injection Volume:	10 µL		
Mobile Phase:	A. Deionized water, 50%		
	B. 1.0 M Sodium hydroxide, 50%		
Detection:	Pulsed amperometery, gold working electrode		
ED40 Settings:	Time (min)	E (volts)	Integration (s)
	400	+0.05	0.2–0.4
	200	+0.75	
	400	–0.15	

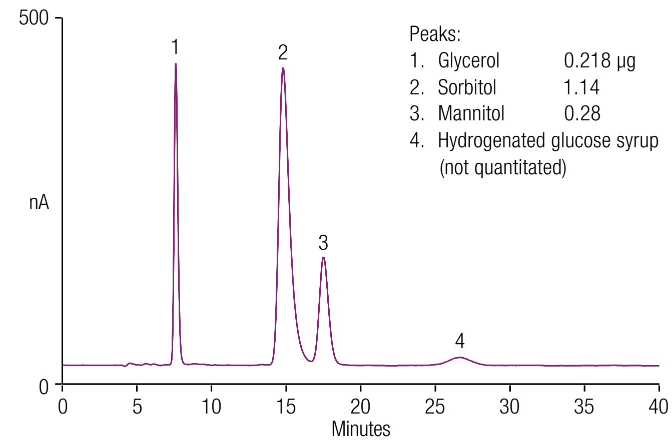


Figure 2-26. Chewing gum extract containing glycerol, sorbitol, and mannitol.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

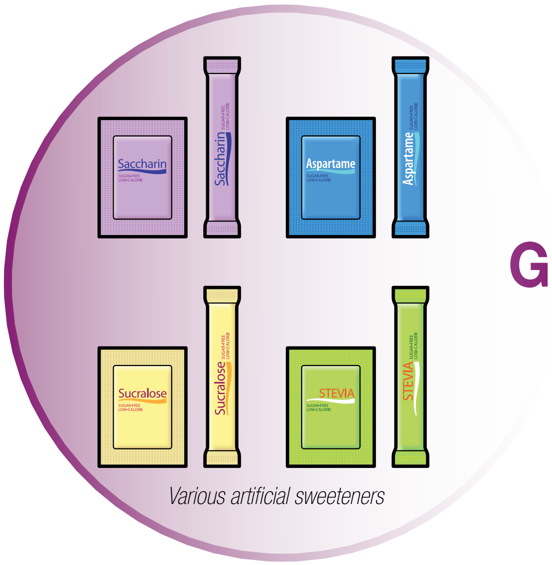
Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References



Various artificial sweeteners

Global Artificial Sweetener Method

Many recently commercialized sweeteners tend to have increased potency, reducing the amount of active ingredient added to beverages and other food products and often providing cost savings to the manufacturer.

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Global Artificial Sweetener Method

Using sugar substitutes of increased potency has also contributed to a need for sensitive analytical methods to quantify the active product and to detect low levels of breakdown products and impurities, which are required for quality and safety issues. Because compounds typically do not possess a chromophore, traditional HPLC-UV approaches are inappropriate.

The Poster Note "Sensitive Analysis of Commonly Used Artificial and Natural Sweeteners Including Stevia and Their Impurities and Degradation Products" describes a global gradient HPLC method with charged aerosol detection for the simultaneous measurement of several artificial sweeteners. This method is sensitive (low ng levels), with good reproducibility and accuracy.

Did You Know?

Sugar substitutes are often cheaper to use than sugar due to their longer shelf-life and higher sweetening intensity, meaning a smaller amount can be used to achieve an equivalent level of sweetness.

Column :	C18, 5 µm, 4.6 mm x 250 mm
Flow:	1.00 mL/min
Temperature:	30 °C
Injection Volume:	50 µL
Mobile Phase:	A: Deionized Water B: Acetonitrile and 0.1% Trifluoroacetic Acid
Gradient:	Isocratic: 2–40% B over 25 min; 40–60% from 25–30 min
Samples	1.2 to 20 µg on column

Peaks: 1. Acesulfame K
2. Cyclamate
3. Saccharin
4. Sucralose
5. Aspartame
6. Neotame
7. Alitame
8. NHDC
9. Dulcin

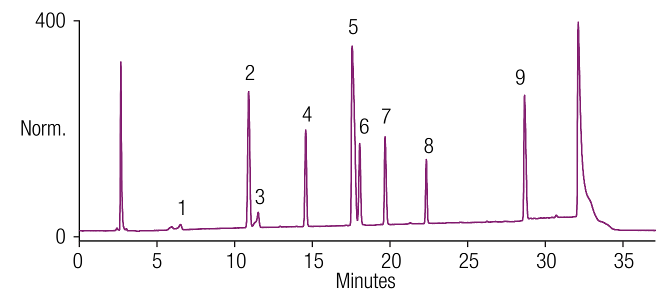


Figure 2-27. Chromatogram of artificial sweeteners.

Download Poster Note: Sensitive Analysis of Commonly Used Artificial and Natural Sweeteners Including Stevia and Their Impurities and Degradation Products

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

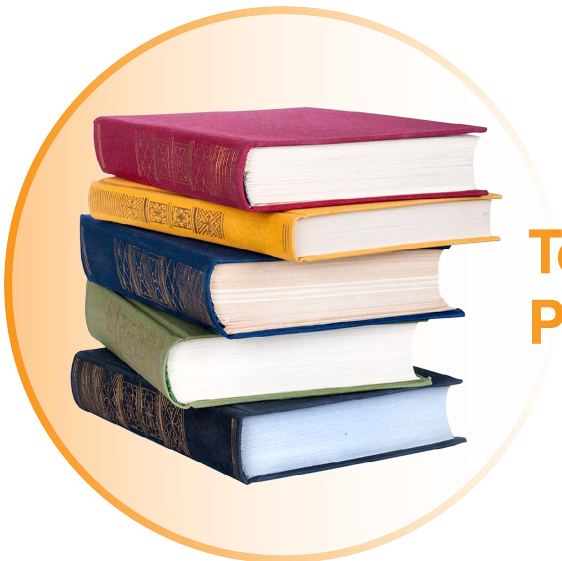
Sweet'N Low

Sorbitol and Xylitol

Global Method

References

References



Technical Collateral and Peer Reviewed Journals

Here you'll find a multitude of references using our HPLC, ion chromatography and sample preparation solutions.

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

References

HPLC and UHPLC References

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Carbohydrates

Title	Authors	Publication	Publication Date
Carbohydrate and oligosaccharide analysis with a universal HPLC detector.	Asa, D.	*American Laboratory 38,* 16.	2006
Determination of levoglucosan in atmospheric aerosols using high performance liquid chromatography with aerosol charge detection.	Dixon, R. W.; Baltzell, G.	*J. Chromatogr., A. 1109 (2),* 214–221	2006 Mar 24
Composition of structural carbohydrates in biomass: Precision of a liquid chromatography method using a neutral detergent extraction and a charged aerosol detector.	Godin, B.; Agneessens, R.; Gerin, P. A.; Delcarte, J.	*Talanta 85 (4),* 2014–2026	2011 Sep 30
Selectivity issues in targeted metabolomics: Separation of phosphorylated carbohydrate isomers by mixed-mode hydrophilic interaction/weak anion exchange chromatography.	Hinterwirth, H.; Lämmerhofer, M.; Preinerstorfer, B.; Gargano, A.; Reischl, R.; Bicker, W.; Trapp, O.; Brecker, L.; Lindner, W.	*J. Sep. Sci. 33 (21),* 3273–3282	2010 Nov
Investigation of polar organic solvents compatible with Corona charged aerosol detection and their use for the determination of sugars by hydrophilic interaction liquid chromatography.	Hutchinson, J. P.; Remenyi, T.; Nesterenko, P.; Farrell, W.; Groeber, E.; Szucs, R.; Dicinoski, G.; Haddad, P. R.	*Anal. Chim. Acta. 750,* 199–206	2012 Oct 31
Characterization of an endoglucanase belonging to a new subfamily of glycoside hydrolase family 45 of the basidiomycete Phanerochaete chrysosporium.	Igarashi, K.; Ishida, T.; Hori, C.; Samejima, M.	*Appl. Environ. Microbiol. 74 (18),* 5628–5634	2008 Sep
Direct detection method of oligosaccharides by high-performance liquid chromatography with charged aerosol detection.	Inagaki, S.; Min, J. Z.; Toyo'oka, T.	*Biomed. Chromatogr. 21 (4),* 338–342	2007 Apr
Differential selectivity of the Escherichia coli cell membrane shifts the equilibrium for the enzyme-catalyzed isomerization of galactose to tagatose.	Kim, J. H.; Lim, B. C.; Yeom, S. J.; Kim, Y. S.; Kim, H. J.; Lee, J. K.; Lee, S. H.; Kim, S. W.; Oh, D. K.	*Appl. Environ. Microbiol. 74 (8),* 2307–2313	2008 Apr
Elution strategies for reversed-phase high-performance liquid chromatography analysis of sucrose alkanoate regioisomers with charged aerosol detection.	Lie, A.; Pedersen, L. H.	*J. Chromatogr., A. 1311,* 127–133	2013 Oct 11
Design of experiments and multivariate analysis for evaluation of reversed-phase high-performance liquid chromatography with charged aerosol detection of sucrose caprate regioisomers	Lie, A.; Wimmer, R.; Pedersen, L. H.	*J. Chromatogr., A. 1281,* 67–72	2013 Mar 15
Solvent effects on the retention of oligosaccharides in porous graphitic carbon liquid chromatography	Melmer, M.; Stangler, T.; Premstaller, A.; Lindner, W.	*J. Chromatogr., A 1217 (39)* 6092–6096	2010 Sep 24
Practical preparation of lacto-N-biose I, a candidate for the bifidus factor in human milk	Nishimoto, M.; Kitaoka, M.	*Biosci., Biotechnol., Biochem. 71 (8),* 2101–2104	2007 Aug

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Carbohydrates

Title	Authors	Publication	Publication Date
Cellotriose and cellotetraose as inducers of the genes encoding cellobiohydrolases in the basidiomycete Phanerochaete chrysosporium	Suzuki, H.; Igarashi, K.; Samejima, M.	*Appl. Environ. Microbiol. 76 (18)*, 6164–6170	2010 Sep
1,2-alpha-l-Fucosynthase: A glycosynthase derived from an inverting alpha-glycosidase with an unusual reaction mechanism	Wada, J.; Honda, Y.; Nagae, M.; Kato, R.; Wakatsuki, S.; Katayama, T.; Taniguchi, H.; Kumagai, H.; Kitaoka, M.; Yamamoto, K.	*FEBS Lett. 582 (27)*, 3739–3743	2008 Nov 12
Efficient separation of oxidized cello-oligosaccharides generated by cellulose degrading lytic polysaccharide monooxygenases	Westereng, B.; Agger, J. W.; Horn, S. J.; Vaaje-Kolstad, G.; Aachmann, F. L.; Stenstrøm, Y. H.; Eijsink, V. G.	*J. Chromatogr., A. 1271 (1)*, 144–152	2013 Jan 4
Distribution of in vitro fermentation ability of lacto-*N*-Biose I, a major building block of human milk oligosaccharides, in bifidobacterial strains	Xiao, J. Z.; Takahashi, S.; Nishimoto, M.; Odamaki, T.; Yaeshima, T.; Iwatsuki, K.; Kitaoka, M.	*Appl. Environ. Microbiol. 76 (1)*, 54–59	2010 Jan

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Characterization of phenolic compounds in strawberry (Fragaria x ananassa) fruits by different HPLC detectors and contribution of individual compounds to total antioxidant capacity	Aaby, K.; Ekeberg, D.; Skrede, G.	*J. Agric. Food Chem. 55 (11),* 4395–4406	2007 May 30
Analysis of flavonoids and other phenolic compounds using high-performance liquid chromatography with coulometric array detection: relationship to antioxidant activity	Aaby, K.; Hvattum, E.; Skrede, G.	*J. Agric. Food Chem. 52 (15),* 4595–4603	2004 Jul 28
Aqueous extract of Astragali Radix induces human natriuresis through enhancement of renal response to atrial natriuretic peptide	Ai, P.; Yong, G.; Dingkun, G.; Qiuyu, Z.; Kaiyuan, Z.; Shanyan, L.	*J. Ethnopharmacol. 116 (13),* 413–421	2008 Mar 28
Antioxidant, α-amylase inhibitory and oxidative DNA damage protective property of *Boerhaavia diffusa* (Linn.) root	Akhter, F.; Hashim, A.; Khan, M. S.; Ahmad, S.; Iqbal, D.; Srivastava, A. K.; Siddiqui, M. H.	*S. Afr. J. Bot. 88,* 265–272	2013 Sep
Antioxidant activity and metabolite profile of quercetin in vitamin-E-depleted rats.	Ameho, C. K.; Chen, C. Y. O.; Smith, D.; Sánchez-Moreno, C.; Milbury, P. E.; Blumberg, J. B.	*J. Nutr. Biochem. 19 (7),* p.467–474	2008 Jul
Evaluation of tolerable levels of dietary quercetin for exerting its antioxidative effect in high cholesterol-fed rats	Azuma, K.; Ippoushi, K.; Terao, J.	*Food Chem. Toxicol. 48 (4),* 1117–1122	2010 Apr
Recent methodology in ginseng analysis	Baek, S.; Bae, O.; Park, J.	*J. Ginseng Res. 36 (2),* 119–134	2012 Apr
Sensitive determination of saponins in radix et rhizoma notoginseng by charged aerosol detector coupled with HPLC	Bai, C.; Han, S.; Chai, X.; Jiang, Y.; Li, P.; Tu, P.	*J. Liq. Chromatogr. Relat. Technol. 32 (2),* 242–260	2010 Aug 27
Comprehensive analysis of polyphenols in 55 extra virgin olive oils by HPLC-ECD and their correlation with antioxidant activities	Bayram, B.; Esatbeyoglu, T.; Schulze, N.; Ozcelik, B.; Frank, J.; Rimbach, G.	*Plant Foods Hum. Nutr. (N. Y., NY, U.S.) 67 (4),* 326–336	2012 Dec
Hydrogen sulfide mediates the vasoactivity of garlic	Benavides, G. A.; Squadrito, G. L.; Mills, R. W.; Patel, H. D.; Isbell, T. S.; Patel, R. P.; Darley-Usmar, V. M.; Doeller, J. E.; Kraus, D. W.	*Proc.Natl. Acad. Sci. U.S.A. 104 (46),* 17977–17982	2007 Nov
Analysis of selected stilbenes in Polygonum cuspidatum by HPLC coupled with CoulArray detection	Benová, B.; Adam, M.; Onderková, K.; Královský, J.; Krajícek, M.	*J. Sep. Sci. 31 (13),* 2404–2409	2008 Jul
Rapid and complete extraction of phenols from olive oil and determination by means of a coulometric electrode array system	Brenes, M.; García, A.; García, P.; Garrido, A.	*J. Agric. Food Chem. 48 (11),* 5178–5183	2000 Nov
The real nature of the indole alkaloids in *Cortinarius infractus:* Evaluation of artifact formation through solvent extraction method development	Brondz, I.; Ekeberg, D.; Høiland, K.; Bell, D.; Annino, A.	*J. Chromatogr., A 1148 (1),* 1–7	2007 Apr 27

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Chemotaxonomic differentiation between Cortinarius infractus and Cortinarius subtortus by supercritical fluid chromatography connected to a multi-detection system	Brondz, I.; Høiland, K.	*Trends Chromatogr. 4*, 79–87	2008
Carotenoid bioavailability is higher from salads ingested with full-fat than with fat-reduced salad dressings as measured with electrochemical detection	Brown, M. J.; Ferruzzi, M. G.; Nguyen, M. L.; Cooper, D. A.; Eldridge, A. L.; Schwartz, S. J.; White, W. S.	*Am. J. Clin. Nutr.* 80 (2), 396–403	2004 Aug
Naringenin from cooked tomato paste is bioavailable in men	Bugianesi, R.; Catasta, G.; Spigno, P.; D'Uva, A.; Maiani, G.	*J. Nutr.* 132 (11), 3349–3352	2002 Nov
"Dilute-and-shoot" triple parallel mass spectrometry method for analysis of vitamin D and triacylglycerols in dietary supplements	Byrdwell, W. C.	*Anal. Bioanal. Chem. 401 (10)*, 3317–3334	2011 Dec
Human skeletal muscle ascorbate is highly responsive to changes in vitamin C intake and plasma concentrations	Carr, A. C.; Bozonet, S. M.; Pullar, J. M.; Simcock, J. W.; Vissers, M. C.	Am. J. Clin. Nutr. 97 (4), 800–807	2013 Apr
Utilization of RP-HPLC fingerprinting analysis for the identification of diterpene glycosides from *Stevia rebaudiana*	Chaturvedula, V.; Prakash, I.	*Int. J. Res. Phytochem. Pharmacol. 1 (2)*, 88–92	2011 Jun 9
Acid and alkaline hydrolysis studies of stevioside and rebaudioside A	Chaturvedula, V.; Prakash, I.	*J. Appl. Pharm. Sci. 1 (8)*, 104–108	2011 Oct
Spectral analysis and chemical studies of the sweet constituent, rebaudioside A	Chaturvedula, V.; Prakash, I.	*Eur. J. Med. Plants 2 (1)*, 57–65	2012 Feb
Flavonoids from almond skins are bioavailable and act synergistically with vitamins C and E to enhance hamster and human LDL resistance to oxidation	Chen, C.; Milbury, P. E.; Lapsley, K.; Blumberg, J. B.	*J. Nutr. 135 (6)*, 1366–1373	2005 Jun 1
Photostability of rebaudioside A and stevioside in beverages	Clos, J. F.; Dubois, G. E.; Prakash, I.	*J. Agric. Food Chem. 56 (18)*, 8507–8513	2008 Sep 24
CoulArray electrochemical evaluation of tocopherol and tocotrienol isomers in barley, oat and spelt grains	Colombo, M. L.; Marangon, K.; Bugatti, C.	*Nat. Prod. Commun. 4 (2)*, 251–254	2009 Feb
Composition and stability of phytochemicals in five varieties of black soybeans (Glycine max)	Correa, C. R.; Li, L.; Aldini, G.; Carini, M.; Oliver Chen, C. Y.; Chun, H.; Cho, S.; Park, K.; Russell, R. M.; Blumberg, J. B.; Yeum, K.	*Food Chem. 123 (4)*, 1176–1184	2010 Dec 15
Effect of UV-B light and different cutting styles on antioxidant enhancement of commercial fresh-cut carrot products	Du, W.; Avena-Bustillos, R. J.; Breksa, A. P., III.; McHugh, T. H.	*Food Chem. 134 (4)*, 1862–1869	2012 Oct 15

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Phenols, lignans and antioxidant properties of legume and sweet chestnut flours	Durazzo, A.; Turfani, V.; Azzini, E.; Maiani, G.; Carcea, M.	*Food Chem. 140 (4),* 666–671	2013 Oct 15
alpha-Lipoic acid in dietary supplements: development and comparison of HPLC-CEAD and HPLC-ESI-MS methods	Durrani, A. I.; Schwartz, H.; Schmid, W.; Sontag, G.	*J. Pharm. Biomed. Anal. 45 (4),* 694–699	2007 Nov 30
Comparison between evaporative light scattering detection and charged aerosol detection for the analysis of saikosaponins	Eom, H. Y.; Park, S. Y.; Kim, M. K.; Suh, J. H.; Yeom, H.; Min, J. W.; Kim, U.; Lee, J.; Youm, J. R.; Han, S. B.	*J. Chromatogr., A. 1217 (26),* 4347–4354	2010 Jun 25
Assessment of microcystin purity using charged aerosol detection	Edwards, C.; Lawton, L. A.	*J. Chromatogr., A. 1217 (32),* 5233–5238	2010 Aug 6
Analysis of lycopene geometrical isomers in biological microsamples by liquid chromatography with coulometric array detection	Ferruzzi, M. G.; Nguyen, M. L.; Sander, L. C.; Rock, C. L.; Schwartz, S. J.	*J. Chromatogr., B: Biomed. Sci. Appl. 760 (2),* 289–299	2001 Sep 5
Charged aerosol detection to characterize components of dispersed-phase formulations	Fox, C. B.; Sivananthan, S. J.; Mikasa, T. J.; Lin, S.; Parker, S. C.	*Adv. Colloid Interface Sci. 199–200,* 59–65	2013 Nov
HPLC with charged aerosol detection for the measurement of natural products	Fukushima, K.; Kanedai, Y.; Hirose, K.; Matsumoto, T.; Hashiguchi, K.; Senda, M.; et al.	*Chromatography 27 (Suppl. 1),* 83–86	2006
Determination of heterocyclic aromatic amines in beef extract, cooked meat and rat urine by liquid chromatography with coulometric electrode array detection	Gerbl, U.; Cichna, M.; Zsivkovits, M.; Knasmüller, S.; Sontag, G.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 802 (1),* 107–113	2004 Mar 25
Determination of macrolide antibiotics in porcine and bovine urine by high-performance liquid chromatography coupled to coulometric detection	González de la Huebra, M. J.; Vincent, U.; Bordin, G.; Rodríguez, A. R.	*Anal. Bioanal. Chem. 382 (2),* 433–439	2005 May
Development and validation of HPLC-DAD-CAD-MS3 method for qualitative and quantitative standardization of polyphenols in *Agrimoniae eupatoriae herba* (Ph. Eur)	Granica, S.; Krupa, K.; Kłębowska, A.; Kiss, A. K.	*J. Pharm. Biomed. Anal. 86,* 112–122	2013 Dec
Total reducing capacity of fresh sweet peppers and five different Italian pepper recipes	Greco, L.; Riccio, R.; Bergero, S.; Del Re, A. A. M.; Trevisan, M.	*Food Chem. 103 (4),* 1127–1133	2007 Jan
Urinary 3-(3,5-dihydroxyphenyl)-1-propanoic acid, an alkylresorcinol metabolite, is a potential biomarker of whole-grain intake in a U.S. population	Guyman, L. A.; Adlercreutz, H.; Koskela, A.; Li, L.; Beresford, S. A.; Lampe, J. W.	*J. Nutr. 138 (10),* 1957–1962	2008 Oct
Multidimensional LC x LC analysis of phenolic and flavone natural antioxidants with UV-electrochemical coulometric and MS detection	Hájek, T.; Skeríková, V.; Cesla, P.; Vynuchalová, K.; Jandera, P.	*J. Sep. Sci. 31 (19),* 3309–3328	2008 Oct
Determination of the urinary aglycone metabolites of vitamin K by HPLC with redox-mode electrochemical detection	Harrington, D. J.; Soper, R.; Edwards, C.; Savidge, G. F.; Hodges, S. J.; Shearer, M. J.	*J. Lipid Res. 46 (5),* 1053–1060	2005 May

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Bioavailability and antioxidant effect of epigallocatechin gallate administered in purified form versus as green tea extract in healthy individuals	Henning, S. M.; Niu, Y.; Liu, Y.; Lee, N. H.; Hara, Y.; Thames, G. D.; Minutti, R. R.; Carpenter, C. L.; Wang, H.; Heber, D.	*J. Nutr. Biochem. 16 (10),* 610–616	2005 Oct
Procyanidin dimer B_2 [epicatechin-(4beta-8)-epicatechin] in human plasma after the consumption of a flavanol-rich cocoa	Holt, R. R.; Lazarus, S. A.; Sullards, M. C.; Zhu, Q. Y.; Schramm, D. D.; Hammerstone, J. F.; Fraga, C. G.; Schmitz, H. H.; Keen, C. L.	*Am. J. Clin. Nutr. 76 (4),* 798–804	2002 Oct
Effects of natural (RRR α-tocopherol acetate) or synthetic (all-rac α-tocopherol acetate) vitamin E supplementation on reproductive efficiency in beef cows	Horn, M.; Gunn, P.; Van Emon, M.; Lemenager, R.; Burgess, J.; Pyatt, N. A.; Lake, S. L.	*J. Anim. Sci. (Savoy, IL, U.S.) 88 (9),* 3121–3127	2010 Sep
RP-HPLC analysis of phenolic compounds and flavonoids in beverages and plant extracts using a CoulArray detector	Jandera, P.; Skeifíková, V.; Rehová, L.; Hájek, T.; Baldriánová, L.; Skopová, G.; Kellner, V.; Horna, A.	*J. Sep. Sci. 28 (9–10),* 1005–1022	2005 Jun
A new application of charged aerosol detection in liquid chromatography for the simultaneous determination of polar and less polar ginsenosides in ginseng products	Jia, S.; Li, J.; Yunusova, N.; Park, J. H.; Kwon, S. W.; Lee, J.	*Phytochem. Anal. 24 (4),* 374–380	2013 Jul–Aug
A combination of aspirin and γ-tocopherol is superior to that of aspirin and α-tocopherol in anti-inflammatory action and attenuation of aspirin-induced adverse effects	Jiang, Q.; Moreland, M.; Ames, B. N.; Yin, X.	*J. Nutr. Biochem. 20 (11),* 894–900	2009 Nov
HPLC analysis of rosmarinic acid in feed enriched with aerial parts of *Prunella vulgaris* and its metabolites in pig plasma using dual-channel coulometric detection	Jirovský, D.; Kosina, P.; Myslínová, M.; Stýskala, J.; Ulrichová, J.; Simánek V.	*J. Agric. Food Chem. 55 (19),* 7631–7637	2007 Sep 19
Molar absorptivities and reducing capacity of pyranoanthocyanins and other anthocyanins	Jordheim, M.; Aaby, K.; Fossen, T.; Skrede, G.; Andersen, Ø. M.	*J. Agric. Food Chem. 55 (26),* 10591–10598	2007 Dec 26
Sensitive electrochemical detection method for alpha-acids, beta-acids and xanthohumol in hops (*Humulus lupulus L.*)	Kac, J.; Vovk, T.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 850 (1–2),* 531–537	2007 May 1
Determination of phenolic compounds and hydroxymethylfurfural in meads using high performance liquid chromatography with coulometric-array and UV detection	Kahoun, D.; Rezková, S.; Veskrnová, K.; Královský, J.; Holcapek, M.	*J. Chromatogr., A 1202 (1),* 19–33	2008 Aug 15
Analysis of terpene lactones in a Ginkgo leaf extract by high-performance liquid chromatography using charged aerosol detection	Kakigi, Y.; Mochizuki, N.; Icho, T.; Hakamatsuka, T.; Goda, Y.	*Biosci., Biotechnol., Biochem. 74 (3),* 590–594	2010
Linear aglycones are the substrates for glycosyltransferase DesVII in methymycin biosynthesis: analysis and implications	Kao, C.; Borisova, S.; Kim, H.; Liu, H.	*J. Am. Chem. Soc. 128 (17),* 5606–5607	2006 May 3

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Antioxidant-rich food intakes and their association with blood total antioxidant status and vitamin C and E levels in community-dwelling seniors from the Quebec longitudinal study NuAge	Khalil, A.; Gaudreau, P.; Cherki, M.; Wagner, R.; Tessier, D. M.; Fulop, T.; Shatenstein, B.	*Exp. Gerontol. 46 (6),* 475–481	2011 Jun
Certification of a pure reference material for the ginsenoside Rg1	Kim, D.; Chang, J.; Sohn, H.; Cho, B.; Ko, S.; Nho, K.; Jang, D.; Lee, S.	*Accredit. Qual. Assur. 15 (2),* 81–87	2009 Sep
Optimization of pressurized liquid extraction for spicatoside A in *Liriope platyphylla*	Kim, S. H.; Kim, H. K.; Yang, E. S.; Lee, K. Y.; Kim, S. D.; Kim, Y. C.; Sung, S. H.	*Sep. Purif. Technol. 71 (2),* 168–172	2010
Production of surfactin and iturin by *Bacillus licheniformis* N1 responsible for plant disease control activity	Kong, H. G.; Kim, J. C.; Choi, G. J.; Lee, K. Y.; Kim, H. J.; Hwang, E. C.; Moon, B. J.; Lee, S. W.	*Plant Pathol. J. 26 (2),* 170–177	2010
Transepithelial transport of microbial metabolites of quercetin in intestinal Caco-2 cell monolayers	Konishi, Y.	*J. Agric. Food Chem. 53 (3),* 601–607	2005 Feb 9
Absorption and bioavailability of artepillin C in rats after oral administration	Konishi, Y.; Hitomi, Y.; Yoshida, M.; Yoshioka, E.	*J. Agric. Food Chem. 53 (26),* 9928–9933	2005 Dec 28
Pharmacokinetic study of caffeic and rosmarinic acids in rats after oral administration	Konishi, Y.; Hitomi, Y.; Yoshida, M.; Yoshioka, E.	*J. Agric. Food Chem. 53 (12),* 4740–4746	2005 Jun 15
Intestinal absorption of *p*-coumaric and gallic acids in rats after oral administration	Konishi, Y.; Hitomi, Y.; Yoshioka, E.	*J. Agric. Food Chem. 52 (9),* 2527–2532	2004 May 5
Microbial metabolites of ingested caffeic acid are absorbed by the monocarboxylic acid transporter (MCT) in intestinal Caco-2 cell monolayers	Konishi, Y.; Kobayashi, S.	*J. Agric. Food Chem. 52 (21),* 6418–6424	2004 Oct 20
Transepithelial transport of rosmarinic acid in intestinal Caco-2 cell monolayers	Konishi, Y.; Kobayashi, S.	*Biosci., Biotechnol., Biochem. 69 (3),* 583–591	2005 Mar
Effects of various doses of selenite on stinging nettle (*Urtica dioica L.*)	Krystofova, O.; Adam, V.; Babula, P.; Zehnalek, J.; Beklova, M.; Havel, L.; Kizek, R.	*Int. J. Environ. Res. Public Health 7 (10),* 3804–3815	2010 Oct
Biofortified cassava increases β-carotene and vitamin A concentrations in the TAG-rich plasma layer of American women	La Frano, M. R.; Woodhouse, L. R.; Burnett, D. J.; Burri, B. J.	*Br. J. Nutr. 110 (2),* 310–320	2013 Jul 28
Chlorogenic acid is absorbed in its intact form in the stomach of rats	Lafay, S.; Gil-Izquierdo, A.; Manach, C.; Morand, C.; Besson, C.; Scalbert, A.	*J. Nutr. 136 (5),* 1192–1197	2006 May
Determination of 4-ethylcatechol in wine by high-performance liquid chromatography-coulometric electrochemical array detection	Larcher, R.; Nicolini, G.; Bertoldi, D.; Nardin, T.	*Anal. Chim. Acta 609 (2),* 235–240	2008 Feb 25
Determination of volatile phenols in wine using high-performance liquid chromatography with a coulometric array detector	Larcher, R.; Nicolini, G.; Puecher, C.; Bertoldi, D.; Moser, S.; Favaro, G.	*Anal. Chim. Acta 582 (1),* 55–60	2007 Jan 16

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Acute, quercetin-induced reductions in blood pressure in hypertensive individuals are not secondary to lower plasma angiotensin-converting enzyme activity or endothelin-1: nitric oxide	Larson, A.; Witman, M. A. H.; Guo, Y.; Ives, S.; Richardson, R. S.; Bruno, R. S.; Jalili, T.; Symons, J. D.	*Nutr. Res. (N. Y., NY, U.S.) 32 (8)*, 557–564	2012 Aug
High-performance liquid chromatography method for the determination of folic acid in fortified food products	Lebiedzińska, A.; Dąbrowska, M.; Szefer, P.; Marszałł M.	*Toxicol. Mech. Methods 18 (6)*, 463–467	2008 Jul
Reversed-phase high-performance liquid chromatography method with coulometric electrochemical and ultraviolet detection for the quantification of vitamins B(1) (thiamine), B(6) (pyridoxamine, pyridoxal and pyridoxine) and B(12) in animal and plant foods	Lebiedzińska, A.; Marszałł, M. L.; Kuta, J.; Szefer, P.	*J. Chromatogr., A 1173 (1–2)*, 71–80	2007 Nov 30
An improved method for the determination of green and black tea polyphenols in biomatrices by high-performance liquid chromatography with coulometric array detection	Lee, M. J.; Prabhu, S.; Meng, X.; Li, C.; Yang, C. S.	*Anal. Biochem. 279 (2)*, 164–169	2000 Mar 15
Characterisation, extraction efficiency, stability and antioxidant activity of phytonutrients in *Angelica keiskei*	Li, L.; Aldini, G.; Carini, M.; Chen, C. Y. O.; Chun, H.; Cho, S.; Park, K.; Correa, C. R.; Russell, R. M.; Blumberg, J. B.; Yeum, K.	*Food Chem.* 115 (1), 227–232	2009 Jul
Vitamin A equivalence of the β-carotene in β-carotene-biofortified maize porridge consumed by women	Li, S.; Nugroho, A.; Rocheford, T.; White, W. S.	*Am. J. Clin. Nutr. 92 (5)*, 1105–1112	2010 Nov
Phase IIa chemoprevention trial of green tea polyphenols in high-risk individuals of liver cancer: modulation of urinary excretion of green tea polyphenols and 8-hydroxydeoxyguanosine	Luo, H.; Tang, L.; Tang, M.; Billam, M.; Huang, T.; Yu, J.; Wei, Z.; Liang, Y.; Wang, K.; Zhang, Z. Q.; Zhang, L.; Wang, J. S.	*Carcinogenesis 27 (2)*, 262–268	2006 Feb
Determination of four water-soluble compounds in *Salvia miltiorrhiza Bunge* by high-performance liquid chromatography with a coulometric electrode array system	Ma, L.; Zhang, X.; Guo, H.; Gan, Y.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 833* (2), 260–263	2006 Apr 3
Effect of green tea powder (*Camellia sinensis L.* cv. Benifuuki) particle size on O-methylated EGCG absorption in rats, The Kakegawa Study	Maeda-Yamamoto, M.; Ema, K.; Tokuda, Y.; Monobe, M.; Tachibana, H.; Sameshima, Y.; Kuriyama, S.	*Cytotechnology 63 (2)*, 171–179	2011 Mar
Supplementation of a γ-tocopherol-rich mixture of tocopherols in healthy men protects against vascular endothelial dysfunction induced by postprandial hyperglycemia	Mah, E.; Noh, S. K.; Ballard, K. D.; Park, H. J.; Volek, J. S.; Bruno, R. S.	*J. Nutr. Biochem. 24 (1)*, 196–203	2013 Jan

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Mediterranean diet reduces endothelial damage and improves the regenerative capacity of endothelium	Marin, C.; Ramirez, R.; Delgado-Lista, J.; Yubero-Serrano, E. M.; Perez-Martinez, P.; Carracedo, J.; Garcia-Rios, A.; Rodriguez. F.; Gutierrez-Mariscal, F. M.; Gomez, P.; Perez-Jimenez, F.; Lopez-Miranda, J.	*Am. J. Clin. Nutr. 93 (2),* 267–274	2011 Feb
Photodiode array (PDA) and other detection methods in HPLC of plant metabolites	Markowski, W.; Waksmundzka-Hajnos, M.	Chapter 13 in *High Performance Liquid Chromatography in Phytochemical Analysis,* Chromatographic Science Series, Markowski, W., Sherma, J., Eds.; Taylor & Francis Group, LLC: Boca Raton, FL; 331–350	2010 Nov
Determination of water-soluble vitamins in infant milk and dietary supplement using a liquid chromatography on-line coupled to a corona-charged aerosol detector	Márquez-Sillero, I.; Cárdenas, S.; Valcárcel, M.	*J. Chromatogr., A. 1313C,* 253–258	2013 Oct 25
Sensitive high-performance liquid chromatographic method using coulometric electrode array detection for measurement of phytoestrogens in dried blood spots	Melby, M. K.; Watanabe, S.; Whitten, P. L.; Worthman, C. M.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 826 (1–2),* 81–90	2005 Nov 5
Phenolic acids from beer are absorbed and extensively metabolized in humans	Nardini, M.; Natella, F.; Scaccini, C.; Ghiselli, A.	*J. Nutr. Biochem. 17 (1),* 14–22	2006 Jan
High-performance liquid chromatography analysis of plant saponins: An update 2005-2010	Negi, J. S.; Singh, P.; Pant, G. J.; Rawat, M. S.	*Pharmacogn. Rev. 5 (10),* 155–158	2011 Jul
Physicochemical effect of pH and antioxidants on mono- and triglutamate forms of 5-methyltetrahydrofolate, and evaluation of vitamin stability in human gastric juice: Implications for folate bioavailability	Ng, X.; Lucock, M.; Veysey, M.	*Food Chem. 106 (1),* 200–210	2008 Jan
Practical preparation of lacto-*N*-biose I, a candidate for the bifidus factor in human milk	Nishimoto, M.; Kitaoka, M.	*Biosci., Biotechnol., Biochem. 71 (8),* 2101-2104	2007 Aug
Hydrophilic interaction liquid chromatography—charged aerosol detection as a straightforward solution for simultaneous analysis of ascorbic acid and dehydroascorbic acid	Nováková, L.; Solichová, D.; Solich, P.	*J. Chromatogr., A. 1216 (21),* 4574–4581	2009 May 22

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
No effect on adenoma formation in Min mice after moderate amount of flaxseed	Oikarinen, S.; Heinonen, S. M.; Nurmi, T.; Adlercreutz, H.; Mutanen, M.	*Eur. J. Nutr. 44 (5)*, 273–280	2005 Aug
Measurement of isoflavones using liquid chromatography with multi-channel coulometric electrochemical detection	Ouchi, K.; Gamache, P.; Acworth, I.; Watanabe, S.	*BioFactors. 22 (1–4)*, 353–356	2004
Quantitation of clovamide-type phenylpropenoic acid amides in cells and plasma using high-performance liquid chromatography with a coulometric electrochemical detector	Park, J. B.	*J. Agric. Food Chem. 53 (21)*, 8135–8140	2005 Oct 19
Synthesis, HPLC measurement and bioavailability of the phenolic amide amkamide	Park, J. B.	*J. Chromatogr. Sci.* [Epub ahead of print]	2013 May 27
Synthesis of safflomide and its HPLC measurement in mouse plasma after oral administration	Park, J. B.; Chen, P.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci.* 852 (1–2), 398–402	2007 Jun 1
Determination of lignans in human plasma by liquid chromatography with coulometric electrode array detection	Peñalvo, J. L.; Nurmi, T.; Haajanen, K.; Al-Maharik, N.; Botting, N.; Adlercreutz, H.	*Anal. Biochem. 332 (2)*, 384–393	2004 Sep 15
Supercritical antisolvent fractionation of lignans from the ethanol extract of flaxseed	Perretti, G.; Virgili, C.; Troilo, A.; Marconi, O.; Regnicoli, G. F.; Fantozzi, P.	*J. Supercrit. Fluids 75*, 94–100	2013 Mar
Analysis of flavonoids in honey by HPLC coupled with coulometric electrode array detection and electrospray ionization mass spectrometry	Petrus, K.; Schwartz, H.; Sontag, G.	*Anal. Bioanal. Chem. 400 (8)*, 2555–2563	2011 Jun
High-dose supplementation with natural α-tocopherol does neither alter the pharmacodynamics of atorvastatin nor its phase I metabolism in guinea pigs	Podszun, M. C.; Grebenstein, N.; Hofmann, U.; Frank, J.	*Toxicol. Appl. Pharmacol. 266 (3)*, 452–458	2013 Feb 1
Application of high-performance liquid chromatography with charged aerosol detection for universal quantitation of undeclared phosphodiesterase-5 inhibitors in herbal dietary supplements	Poplawska, M.; Blazewicz, A.; Bukowinska, K.; Fijalek, Z.	*J. Pharm. Biomed. Anal. 84*, 232–243	2013 Oct
Isolation and analysis of ginseng: advances and challenges	Qi, L.; Wang, C.; Yuan, C.	*Nat. Prod. Rep. 28 (3)*, 467–495	2011 Mar
Folate analysis in complex food matrices: Use of a recombinant Arabidopsis γ-glutamyl hydrolase for folate deglutamylation	Ramos-Parra, P. A.; Urrea-López, R.; Díaz de la Garza, R. I.	*Food Res. Int. 54 (1)*, 177–185	2013 Nov
Optimisation of gradient HPLC analysis of phenolic compounds and flavonoids in beer using a coularray detector	Rehová, L.; Skeríková, V.; Jandera, P.	*J. Sep. Sci. 27 (15–16)*, 1345–1359	2004 Nov
Chiral separation of (+)/(-)-catechin from sulfated and glucuronidated metabolites in human plasma after cocoa consumption	Ritter, C.; Zimmermann, B. F.; Galensa, R.	*Anal. Bioanal. Chem. 397 (2)*, 723–730	2010 May

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Analysis of alkylresorcinols in cereal grains and products using ultrahigh-pressure liquid chromatography with fluorescence, ultraviolet, and CoulArray electrochemical detection	Ross, A. B.	*J. Agric. Food Chem. 60 (36),* 8954–8962	2012 Sep 12
Rapid and sensitive analysis of alkylresorcinols from cereal grains and products using HPLC-CoulArray-based electrochemical detection	Ross, A. B.; Kochhar, S.	*J. Agric. Food Chem. 57 (12),* 5187–5193	2009 Jun 24
Analysis of soy isoflavone plasma levels using HPLC with coulometric detection in postmenopausal women	Saracino, M. A.; Raggi, M. A.	*J. Pharm. Biomed. Anal. 53 (3),* 682–687	2010 Nov 2
A biosynthetic pathway for BE-7585A, a 2-thiosugar-containing angucycline-type natural product	Sasaki, E.; Ogasawara, Y.; Liu, H. W.	*J. Am. Chem. Soc. 132 (21),* 7405–7417	2010 Jun 2
The senescence-accelerated mouse-prone 8 is not a suitable model for the investigation of cardiac inflammation and oxidative stress and their modulation by dietary phytochemicals	Schiborr, C.; Schwamm, D.; Kocher, A.; Rimbach, G.; Eckert, G. P.; Frank, J.	*Pharmacol. Res. 74,* 113–120	2013 Aug
Comprehensive impurity profiling of nutritional infusion solutions by multidimensional off-line reversed-phase liquid chromatography × hydrophilic interaction chromatography-ion trap mass-spectrometry and charged aerosol detection with universal calibration	Schiesel, S.; Lämmerhofer, M.; Lindner, W.	*J. Chromatogr., A. 1259,* 100–10	2012 Oct 12
The effect of α-tocopherol supplementation on training-induced elevation of S100B protein in sera of basketball players	Schulpis, K. H.; Moukas, M.; Parthimos, T.; Tsakiris, T.; Parthimos, N.; Tsakiris, S.	*Clin. Biochem. 40 (12),* 900–906	2007 Aug
Determination of secoisolariciresinol, lariciresinol and isolariciresinol in plant foods by high performance liquid chromatography coupled with coulometric electrode array detection	Schwartz, H.; Sontag, G.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci.* 838 (2), 78–85	2006 Jul 11
Assessment of probiotic strains ability to reduce the bioaccessibility of aflatoxin M 1 in artificially contaminated milk using an in vitro digestive model	Serrano-Niño, J. C.; Cavazos-Garduño, A.; Hernandez-Mendoza, A.; Applegate, B.; Ferruzzi, M. G.; San Martin-González, M. F.; García, H. S.	*Food Control 31 (1),* 202–207	2013 May
Intestinal uptake of quercetin-3-glucoside in rats involves hydrolysis by lactase phlorizin hydrolase	Sesink, A. L.; Arts, I. C.; Faassen-Peters, M.; Hollman, P. C.	*J. Nutr. 133 (3),* 773–776	2003 Mar
Quercetin glucuronides but not glucosides are present in human plasma after consumption of quercetin-3-glucoside or quercetin-4'-glucoside	Sesink, A. L.; O'Leary, K. A.; Hollman, P. C.	*J. Nutr. 131 (7),* 1938–1941	2001 Jul
Co-administration of quercetin and catechin in rats alters their absorption but not their metabolism	Silberberg, M.; Morand, C.; Manach, C.; Scalbert, A.; Remesy, C.	*Life Sci. 77 (25),* 3156–3167	2005 Nov 4
Nutritional status is altered in the self-neglecting elderly	Smith, S. M.; Mathews Oliver, S. A.; Zwart, S. R.; Kala, G.; Kelly, P. A.; Goodwin, J. S.; Dyer, C. B.	*J. Nutr. 136 (10),* 2534–2541	2006 Oct

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Binding of heterocyclic aromatic amines by lactic acid bacteria: results of a comprehensive screening trial	Stidl, R.; Sontag, G.; Koller, V.; Knasmüller, S.	*Mol. Nutr. Food Res. 52 (3),* 322–329	2008 Mar
Direct separation and detection of biogenic amines by ion-pair liquid chromatography with chemiluminescent nitrogen detector	Sun, J.; Guo, H. X.; Semin, D.; Cheetham, J.	*J. Chromatogr., A. 1218 (29),* 4689–4697	2011 Jul 22
Rapid purification method for fumonisin B1 using centrifugal partition chromatography	Szekeres, A.; Lorántfy, L.; Bencsik, O.; Kecskeméti, A.; Szécsi, Á.; Mesterházy, Á.; Vágvölgyi, C.	*Food Addit. Contam. 30 (1),* 147–155	2013
Determination of coenzyme Q10 in over-the-counter dietary supplements by high-performance liquid chromatography with coulometric detection	Tang, P. H.	*J. AOAC Int. 89 (1),* 35–39	2006 Jan–Feb
α-Tocopherol supplementation restores the reduction of erythrocyte glucose-6-phosphate dehydrogenase activity induced by forced training	Tsakiris, S.; Reclos, G. J.; Parthimos, T.; Tsakiris, T.; Parthimos, N.; Schulpis, K. H.	*Pharmacol. Res. 54 (5),* 373–379	2006 Nov
Tissue distribution of isoflavones in ewes after consumption of red clover silage	Urpi-Sarda, M.; Morand, C.; Besson, C.; Kraft, G.; Viala, D.; Scalbert, A.; Besle, J. M.; Manach, C.	*Arch. Biochem. Biophys. 476 (2),* 205–210	2008 Aug 15
Performance evaluation of charged aerosol and evaporative light scattering detection for the determination of ginsenosides by LC	Wang, L.; He, W. S.; Yan, H. X.; Jiang, Y.; Bi, K. S.; Tu, P. F.	*Chromatographia 70 (3–4),* 603–608	2009 Aug
Catechins are bioavailable in men and women drinking black tea throughout the day	Warden, B. A.; Smith, L. S.; Beecher, G. R.; Balentine, D. A.; Clevidence, B. A.	*J. Nutr. 131 (6),* 1731–1737	2001 Jun
Identification and quantification of polyphenol phytoestrogens in foods and human biological fluids	Wilkinson, A. P.; Wähälä, K.; Williamson, G.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 777 (1–2),* 93–109	2002 Sep 25
Bioavailability and pharmacokinetics of caffeoylquinic acids and flavonoids after oral administration of Artichoke leaf extracts in humans	Wittemer, S. M.; Ploch, M.; Windeck, T.; Müller, S. C.; Drewelow, B.; Derendorf, H.; Veit, M.	*Phytomedicine 12 (1–2),* 28–38	2005 Jan
Validated method for the determination of six metabolites derived from artichoke leaf extract in human plasma by high-performance liquid chromatography-coulometric-array detection	Wittemer, S. M.; Veit, M.	*J. Chromatogr., B: Anal. Technol. Biomed. Life Sci. 793 (2),* 367–375	2003 Aug 15
HPLC in natural product analysis: The detection issue	Wolfender, J. L.	*Planta Med. 75 (07),* 719–734	2009 Jun
Simultaneous determination of isoflavones and bisphenol A in rat serum by high-performance liquid chromatography coupled with coulometric array detection	Yasuda, S.; Wu, P. S.; Hattori, E.; Tachibana, H.; Yamada, K.	*Biosci., Biotechnol., Biochem. 68 (1),* 51–58	2004 Jan
Impurities from polypropylene microcentrifuge tubes as a potential source of interference in simultaneous analysis of multiple lipid-soluble antioxidants by HPLC with electrochemical detection	Yen, H. C.; Hsu, Y. T.	*Clin. Chem. Lab. Med. 42 (4),* 390–395	2004 Apr

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Food, Nutrition, Natural Products, and Supplements

Title	Authors	Publication	Publication Date
Simultaneous determination of triterpenoid saponins from *pulsatilla koreana* using high performance liquid chromatography coupled with a charged aerosol detector (HPLC-CAD)	Yeom, H.; Suh, J. H.; Youm, J. R.; Han, S. B.	*Bull. Korean Chem. Soc. 31 (5),* 1159–1164	2010
DPPH radical scavenging activities of 31 flavonoids and phenolic acids and 10 extracts of Chinese materia medica	Yuan, Y.; Chen, C.; Yang, B.; Kusu, F.; Kotani, A.	*Zhongguo Zhongyao Zazhi 34 (13),* 1695–1700	2009 Jul
Determination of residual clenbuterol in pork meat and liver by HPLC with electrochemical detection	Zhang, X. Z.; Gan, Y. R.; Zhao, F. N.	*Yaoxue Xuebao 39 (4),* 276–280	2004 Apr
Identification of equol producers in a Japanese population by high-performance liquid chromatography with coulometric array for determining serum isoflavones	Zhao, J. H.; Sun, S. J.; Arao, Y.; Oguma, E.; Yamada, K.; Horiguchi, H.; Kayama, F.	*Phytomedicine 13 (5),* 304–309	2006 May
Simultaneous sampling of volatile and non-volatile analytes in beer for fast fingerprinting by extractive electrospray ionization mass spectrometry	Zhu, L.; Hu, Z.; Gamez, G.; Law, W. S.; Chen, H.; Yang, S.; Chingin, K.; Balabin, R. M.; Wang, R.; Zhang, T.; Zenobi, R.	*Anal. Bioanal. Chem. 398 (1),* 405–413	2010 Sep
Comparison of various easy-to-use procedures for extraction of phenols from apricot fruits	Zitka, O.; Sochor, J.; Rop, O.; Skalickova, S.; Sobrova, P.; Zehnalek, J.; Beklova, M.; Krska, B.; Adam, V.; Kizek, R.	*Molecules 16 (4),* 2914–2936	2011 Apr 4

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: HPLC and UHPLC Methods

Lipids

Title	Authors	Publication	Publication Date
Development of analytical procedures to study changes in the composition of meat phospholipids caused by induced oxidation	Cascone, A.; Eerola, S.; Ritieni, A.; Rizzo, A.	*J. Chromatogr., A 1120 (1–2),* 211–220	2006 Jul 7
Evaporative light scattering and charged aerosol detector.	Chaminade, P.	Chapter 5. In *Hyphenated and Alternative Methods of Detection in Chromatography,* Chromatographic Science Series; Shalliker, A., Ed.; Taylor & Francis Group, LLC: Boca Raton, FL.; 145–160	2012
Simple and efficient profiling of phospholipids in phospholipase D-modified soy lecithin by HPLC with charged aerosol detection	Damnjanovic´, J.; Nakano, H.; Iwasaki, Y.	*J. Am. Oil Chem. Soc. 90 (7),* 951–957	2013 Jul
Discriminating olive and non-olive oils using HPLC-CAD and chemometrics	de la Mata-Espinosa, P.; Bosque-Sendra, J. M.; Bro, R.; Cuadros-Rodríguez, L.	*Anal. Bioanal. Chem. 399 (6),* 2083–2092	2011 Feb
Olive oil quantification of edible vegetable oil blends using triacylglycerols chromatographic fingerprints and chemometric tools	de la Mata-Espinosa, P.; Bosque-Sendra, J. M.; Bro, R.; Cuadros-Rodríguez, L.	*Talanta 85 (1),* 177–182	2011 Jul 15
Quantification of triacylglycerols in olive oils using HPLC-CAD	de la Mata-Espinosa, P.; Bosque-Sendra, J.; Cuadros-Rodriguez, L.	*Food Analytical Methods 4 (4), 574–581*	2011 Dec
Quantification of pegylated phospholipids decorating polymeric microcapsules of perfluorooctyl bromide by reverse phase HPLC with a charged aerosol detector	Díaz-López, R.; Libong, D.; Tsapis, N.; Fattal, E.; Chaminade, P.	*J. Pharm. Biomed. Anal. 48 (3),* 702–707	2008 Nov 4
Squalene emulsions for parenteral vaccine and drug delivery	Fox, C. B.	*Molecules 14 (9),* 3286–3312	2009 Sep 1
Interactions between parenteral lipid emulsions and container surfaces	Gonyon, T.; Tomaso, A.; Kotha, P.; Owen, H.; Patel, D.; Carter, P.; Cronin, J.; Green, J.	*PDA J. Pharm. Sci. and Tech. 67 (3),* 247–254	2013 May–Jun
Composition analysis of positional isomers of phosphatidylinositol by high-performance liquid chromatography	Iwasaki, Y.; Masayama, A.; Mori, A.; Ikeda, C.; Nakano, H.	*J. Chromatogr., A 1216 (32),* 6077–6080	2009 Aug 7
Determination of phospholipid and its degradation products in liposomes for injection by HPLC-charged aerosol detection (CAD)	Jiang, Q.; Yang, R.; Mei, X.	*Chinese Pharmaceutical Journal (Zhongguo Yaoxue Zazhi, Beijing, China) 42 (23),* 1794–1796	2007

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Lipids

Title	Authors	Publication	Publication Date
Rapid quantification of yeast lipid using microwave-assisted total lipid extraction and HPLC-CAD	Khoomrung, S.; Chumnanpuen, P.; Jansa-Ard, S.; Ståhlman, M.; Nookaew, I.; Borén, J.; Nielsen, J.	*Anal. Chem. 85 (10),* 4912–4919	2013 May 21
A new liquid chromatography method with charge aerosol detector (CAD) for the determination of phospholipid classes. Application to milk phospholipids	Kieibowicz, G.; Micek, P.; Wawrzenczyk, C.	*Talanta 105,* 28–33	2013 Feb 15
An LC method for the analysis of phosphatidylcholine hydrolysis products and its application to the monitoring of the acyl migration process	Kiełbowicz, G.; Smuga, D.; Gładkowski, W.; Chojnacka, A.; Wawrzeńczyk, C.	*Talanta 94,* 22–29	2012 May 30
Separation of acylglycerols, FAME and FFA in biodiesel by size exclusion chromatography	Kittirattanapiboon, K.; Krisnangkurá, K.	*Eur. J. Lipid Sci. Technol. 110 (5),* 422–427	2008 Mar 17
Quantitation of triacylglycerols from plant oils using charged aerosol detection with gradient compensation	Lísa, M.; Lynen, F.; Holčapek, M.; Sandra, P.	*J. Chromatogr., A. 1176 (1–2),* 135–142	2007 Dec 28
Quantitative study of the stratum corneum lipid classes by normal phase liquid chromatography: comparison between two universal detectors	Merle, C.; Laugel, C.; Chaminade, P.; Baillet-Guffroy, A.	*J. Liq. Chromatogr. Relat. Technol. 33,* 629–644	2010 Mar
The analysis of lipids via HPLC with a charged aerosol detector	Moreau, R. A.	*Lipids 41 (7),* 727–34	2006 Jul
Lipid analysis via HPLC with a charged aerosol detector	Moreau, R. A.	*Lipid Technol. 21* (8–9), 191–194	2009 Oct 23
Extraction and analysis of food lipids	Moreau, R. A.; Winkler-Moser, J. K.	Chapter 6 in *Methods of Analysis of Food Components and Additives,* Second Edition; Ötles, S., Ed.; Taylor & Francis Group, LLC: Boca Raton, FL.; 115–134	2011 Nov
Aerosol based detectors for the investigation of phospholipid hydrolysis in a pharmaceutical suspension formulation	Nair, L.; Werling, J.	*J. Pharm. Biomed. Anal. 49 (1),* 95–99	2009 Jan 15
Structure/function relationships of adipose phospholipase A2 containing a cys-his-his catalytic triad	Pang, X. Y.; Cao, J.; Addington, L.; Lovell, S.; Battaile, K. P.; Zhang, Rao, J. L.; Dennis, E. A.; Moise, A. R.	*J. Biol. Chem. 287 (42),* 35260–35274	2012 Oct 12
Simultaneous assessment of lipid classes and bile acids in human intestinal fluid by solid-phase extraction and HPLC methods	Persson, E.; Löfgren, L.; Hansson, G.; Abrahamsson, B.; Lennernäs, H.; Nilsson, R.	*J. Lipid Res. 48 (1),* 242–251	2007 Jan

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: HPLC and UHPLC Methods

Lipids

Title	Authors	Publication	Publication Date
The use of charged aerosol detection with HPLC for the measurement of lipids	Plante, M.; Bailey, B.; Acworth, I.	*Methods Mol. Biol.* (Totowa, NJ, U.S.) 579, 469–482	2009
Comparison between charged aerosol detection and light scattering detection for the analysis of Leishmania membrane phospholipids	Ramos, R. G.; Libong, D.; Rakotomanga, M.; Gaudin, K.; Loiseau, P. M.; Chaminade, P.	*J. Chromatogr., A. 1209 (1–2),* 88–94	2008 Oct 31
Authentication of geographical origin of palm oil by chromatographic fingerprinting of triacylglycerols and partial least square-discriminant analysis	Ruiz-Samblás, C.; Arrebola-Pascual, C.; Tres, A.; van Ruth, S.; Cuadros-Rodríguez, L.	*Talanta. 116,* 788–793	2013 Nov 15
Simple and precise detection of lipid compounds present within liposomal formulations using a charged aerosol detector	Schönherr, C.; Touchene, S.; Wilser, G.; Peschka-Süss, R.; Francese, G.	*J. Chromatogr., A. 1216 (5),* 781–786	2009 Jan 30
Determination of intralumenal individual bile acids by HPLC with charged aerosol detection	Vertzoni, M.; Archontaki, H.; Reppas, C.	*J. Lipid Res. 49 (12),* 2690–2695	2008 Dec
Neurolipids and the use of a charged aerosol detector	Waraska, J.; Acworth, I.	*Am. Biotechnol. Lab. 26 (1),* 12–13	2008

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Technical Collateral: HPLC and UHPLC Methods

Product Number	Technique	Title
AB 119	UV	Rapid Separation of Paclitaxel and Related Compounds in Paclitaxel Injection
AB 134	MS	LC-MS Analysis of Anthocyanins in Bilberry Extract
AB 139	UV	Separation of Schizandrin, Schizandrin A, and Schizandrin B in a Tablet Sample
AB 153	UV	Save the Flavor – Robust Iso-α-Acids Assaying in Beer within Ten Minutes
AB 155	UV	Monitor the Brewing Process with LC-Transformation of Hop alpha-Acids into Beer Iso-alpha-Acids
AN 109	FLD	Determination of Glyphosate by Cation-Exchange Chromatography with Postcolumn Derivatization
AN 156	UV	The Everlasting Paradigm-Keep Beer Tradition or Prevent Beer from a Skunky Off-Flavor?
AN 196	FLD	Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Edible Oils by Donor-Acceptor Complex Chromatography (DACC)-HPLC with Fluorescent Detection
AN 207	UV	Chromatographic Fingerprinting of *Flos Chrysanthema indici* Using HPLC
AN 213	UV/FLD	Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Tap Water Using on-Line Solid-Phase Extraction Followed by HPLC with UV and Fluorescence Detections
AN 216	UV	Determination of Water- and Fat-Soluble Vitamins in Functional Waters by HPLC with UV-PDA Detection
AN 224	UV	Determination of Melamine in Milk Powder by Reversed-Phase HPLC with UV Detection
AN 232	UV	Determination of Anthraquinones and Stilbenes in Giant Knotweed Rhizome by HPLC with UV Detection
AN 236	UV	Determination of Iodide and Iodate in Seawater and Iodized Table Salt by HPLC-UV Detection
AN 245	UV	Fast Analysis of Dyes in Foods and Beverages
AN 251	UV	Determination of Water- and Fat-Soluble Vitamins in Nutritional Supplements by HPLC with UV Detection
AN 252	UV	HPLC Assay of Water-Soluble Vitamins, Fat-Soluble Vitamins, and a Preservative in Dry Syrup Multivitamin Formulation
AN 261	UV	Sensitive Determination of Microcystins in Drinking and Environmental Waters
AN 264	UV	Fast Determination of Anthocyanins in Pomegranate Juice
AN 266	FLD	Determination of Sialic Acids Using UHPLC with Fluorescence Detection
AN 272	FLD	Faster Yet Sensitive Determination of N-Methylcarbamates in Rice, Potato, and Corn by HPLC
AN 275	UV	Sensitive Determination of Catechins in Tea by HPLC
AN 287	UV	Two-Dimensional HPLC Combined with On-Line SPE for Determination of Sudan Dyes I–IV in Chili Oil
AN 292	UV	Determination of Aniline and Nitroanilines in Environmental and Drinking Waters by On-Line SPE
AN 293	CAD and UV	Steviol Glycoside Determination by HPLC with Charged Aerosol and UV Detections Using the Acclaim Trinity P1 Column
AN 299	UV	HPLC Analysis of Six Active Components of *Caulis lonicerae* Using a Phenyl-1 Column
AN 1008	UV	Determination of Nitidine Chloride, Toddalolactone, and Chelerythrine Chloride by HPLC

Thermo
SCIENTIFIC

Technical Collateral: HPLC and UHPLC Methods

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Product Number	Technique	Title
AN 1020	EC, UV	Chalcinoids and Bitter Acids in Beer by HPLC with UV and ECD
AN 1023	UV	Determination of Sudan Dyes I–IV in Curry Paste
AN 1026	CAD	Fatty Acid Esters at Low Nanogram Levels
AN 1027	CAD	Ginseng
AN 1028	CAD	Ginkgo biloba
AN 1029	CAD	Black Cohosh
AN 1030	CAD	Soy Saponins
AN 1032	CAD	Unsaturated Fatty Acid: Arachidonic, Linoleic, Linolenic and Oleic Acids
AN 1033	CAD	Corn Syrup
AN 1034	CAD	Honey Sugars
AN 1035	CAD	Phenolic Acids
AN 1036	CAD	Water-Soluble Antioxidants: Ascorbic Acid, Glutathione and Uric Acid
AN 1037	CAD	Artificial Sweeteners-Global Method
AN 1039	CAD	Simultaneous Measurement of Glycerides (Mono-, Di- and Triglycerides) and Free Fatty Acids in Palm Oil
AN 1040	CAD	Analysis of Commercially Available Products Containing Stevia
AN 1041	CAD	Phytosterols
AN 1042	UV	Rapid Separation of Anthocyanins in Cranberry and Bilberry Extracts Using a Core-Shell Particle Column
AN 1045	UV	Determination of Phthalates in Drinking Water by UHPLC with UV Detection
AN 1046	UV	Determination of Phenylurea Compounds in Tap Water and Bottled Green Tea
AN 1055	CAD	Determination of Virginiamycin, Erythromycin, and Penicillin in Dried Distillers Grains with Solubles
AN 1063	ECD	Targeted Analyses of Secondary Metabolites in Herbs, Spices, and Beverages Using a Novel Spectro-Electro Array Platform
AN 1064	ECD	Product Authentication and Adulteration Determination Using a Novel Spectro-Electro Array Platform
AN 1067	UV	Determination of Carbendazim in Orange Juice
AN 1069	UV	Two-Dimensional HPLC Determination of Water-Soluble Vitamins in a Nutritional Drink
AN 1070	UV	Determination of Inositol Phosphates in Dried Distillers Grains and Solubles
AN 20583	UV	Determination of Catechins and Phenolic Acids in Red Wine by Solid Phase Extraction and HPLC
AN 20610	UV	Fast Analysis of Coffee Bean Extracts Using a Solid Core HPLC Column
AN 20663	CAD	Comparative Analysis of Cooking Oils Using a Solid Core HPLC Column
AN 20847	CAD	Analysis of a Sports Beverage for Electrolytes and Sugars Using Multi-Mode Chromatography with Charged Aerosol Detection

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Technical Collateral: HPLC and UHPLC Methods

Product Number	Technique	Title
AN 70158	CAD	Novel Universal Approach for the Measurement of Natural Products in a Variety of Botanicals and Supplements
AN 70277	CAD	Simultaneous Analysis of Glycerides and Fatty Acids in Palm Oil
AU 144	UV	Determination of Hexavalent Chromium in Drinking Water Using Ion Chromatography
AU 170	UV	Fast Determination of Vanillin and its Synthesis Precursor by HPLC
AU 182	CAD	Measuring Lactose in Milk: A Validated Method
AU 184	CAD, UV	Mogroside V Determination by HPLC with Charged Aerosol and UV Detections
CAN 106	UV	Determination of the Punicalagins Found in Pomegranate by High Performance Liquid Chromatography
CAN 111	CAD	Determination of Triterpenes in *Centella asiatica* (Gotu Kola) by HPLC-CAD
CAN 112	CAD	Determination of Ginsenosides in Panax ginseng by HPLC-CAD
CAN 115	FLD	Clean-Up and Analysis of Aflatoxins and Ochratoxin A in Herbs and Spices
LPN 2062	MS	Profiling Analysis of 15 Prominent Naturally Occurring Phenolic Acids by LC-MS
LPN 2069	FLD	Fast and Effective Determination of Aflatoxins in Grains or Food Using Accelerated Solvent Extraction followed by HPLC
LPN 2421	UV	Achieving Maximum Productivity by Combining UHPLC with Advanced Chromatographic Techniques
LPN 2818	CAD	Analysis of Fat-Soluble Vitamins and Antioxidants in Supplements by RP-HPLC
LPN 2870	FLD	Benefits of High-Speed Wavelength Switching in UHPLC Methods Using Fluorescence Detection
LPN 2930	CAD	Determination of the Composition of Natural Products by HPLC with Charged Aerosol Detection
LPN 2923	CAD	Simple and Direct Analysis of Falcarinol and Other Polyacetylenic Oxylipins in Carrots by Reversed-Phase HPLC and Charged Aerosol Detection
LPN 2931	CAD	Quantification of Underivatized Omega-3 and Omega-6 Fatty Acids in Foods by HPLC CAD
LPN 2932	ECD	A Versatile Detector for the Sensitive and Selective Measurement of Numerous Fat-Soluble Vitamins and Antioxidants in Human Plasma and Plant Extracts
LPN 2934	CAD	Sensitive Analysis of Commonly Used Artificial and Natural Sweeteners Including Stevia and Their Impurities and Degradation Products
LPN 2991	CAD	Evaluation of Methods for the Characterization and Quantification of Polysorbates and Impurities Along with Other Surfactants and Emulsifiers Used in the Food and Pharmaceutical Industries
PN 70026	CAD	Carbohydrate Analysis Using PAD, FLD, CAD and MS Detectors
PN 70037	CAD	Sensitive HPLC Method for Triterpenoid Analysis Using Charged Aerosol Detection with Improved Resolution
PN 70055	CAD	Direct Analysis of Surfactants using HPLC with Charged Aerosol Detection
PN 70138	UV	Rapid Determination of Polyphenol Antioxidants in Green Tea and Cranberry Extract Using Core Shell Columns
PN 70538	CAD	Analysis of Silicone Oils by HPLC-CAD
PN 70540	CAD, ECD	Profiling *Hoodia* Extracts by HPLC with CAD, ECD, Principal Component Analysis

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

References

Ion Chromatography References

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Technical Collateral: Ion Chromatography Methods

Product Number	Technique	Title
AB 127	IC-PAD	Determination of Carbohydrates in Fruit Juice Using Capillary High-Performance Anion-Exchange Chromatography
AB 135	IC-SC	Determination of Anions and Organic Acids in Brewed Coffee Samples Using Capillary IC
AB 137	IC-SC	Determination of Inorganic and Organic Acids in Apple and Orange Juice Samples Using Capillary IC
AN 25	IC-SC	Determination of Inorganic Ions and Organic Acids in Non-Alcoholic Carbonated Beverages
AN 37	IC-PAD	Determination of Iodide and Iodate in Soy- and Mil-Based Infant Formulas
AN 46	IC-PAD	Ion Chromatography: A Versatile Technique for the Analysis of Beer
AN 54	IC-PAD	Determination of Total and Free Sulfite in Foods and Beverages
AN 67	IC-PAD	Determination of Plant-Derived Neutral Oligo- and Polysaccharides
AN 81	IC-SC	Ion Chromatographic Determination of Oxyhalides and Bromide at Trace Level Concentrations in Drinking Water Using direct Injection
AN 82	IC-PAD	Analysis of Fruit Juice Adulterated with Medium Invert Sugar from Beets
AN 87	IC-PAD	Determination of Sugar Alcohols in Confections and Fruit Juices by High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection
AN 101	IC-SC	Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography
AN 112	IC-UV	Determination of Nitrate and Nitrite in Meat Using High-Performance Anion-Exchange Chromatography
AN 121	IC-SC	Analysis of Low Concentrations of Perchlorate in Drinking Water and Ground Water by Ion Chromatography
AN 123	IC-SC	Determination of Inorganic Anions and Organic Acids in Fermentation Broths
AN 133	IC-SC	Determination of Inorganic Anions in Drinking Water by Ion Chromatography
AN 136	IC-SC and IC-UV	Determination of Inorganic Oxyhalide Disinfection Byproduct Anions and Bromide in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis
AN 140	IC-SC	Fast Analysis of Anions in Drinking Water by Ion Chromatography
AN 143	IC-SC	Determination of Organic Acids in Fruit Juices
AN 149	IC-SC	Determination of Chlorite, Bromate, Bromide, and Chlorate in Drinking Water by Ion Chromatography with an On-Line-Generated Postcolumn Reagent for Sub-µg/L Bromate Analysis
AN 150	IC-PAD	Determination of Amino Acids in Cell Cultures and Fermentation Broths
AN 154	IC-SC	Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column
AN 155	IC-PAD	Determination of Trans-Galactooligosaccharides in Foods by AOAC Method 2001.02

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Technical Collateral: Ion Chromatography Methods

Product Number	Technique	Title
AN 165	IC-SC	Determination of Benzoate in Liquid Food Products by Reagent-Free Ion Chromatography
AN 167	IC-SC	Determination of Trace Concentrations of Oxyhalides and Bromide in Municipal and Bottled Waters Using a Hydroxide-Selective Column with a Reagent-Free Ion Chromatography System
AN 168	IC-UV	Determination of Trace Concentrations of Disinfection By-Product Anions and Bromide in Drinking Water Using Reagent-Free Ion Chromatography Followed by Postcolumn Addition of Iol-Dianisidine for Trace Bromate Analysis
AN 169	IC-SC	Rapid Determination of Phosphate and Citrate in Carbonated Soft Drinks Using a Reagent-Free Ion Chromatography System
AN 172	IC-SC	Determination of Azide in Aqueous Samples by Ion Chromatography with Suppressed Conductivity Detection
AN 173	IC-PAD	Direct Determination of Cyanide in Drinking Water by Ion Chromatography with Pulsed Amperometric Detection (PAD)
AN 178	IC-SC	Improved Determination of Trace Concentrations of Perchlorate in Drinking Water Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection
AN 182	IC-SC and IC-PAD	Determination of Biogenic Amines in Alcoholic Beverages by Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detections
AN 183	IC-SC and IC-PAD	Determination of Biogenic Amines in Fermented and Non-Fermented Foods Using Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detections
AN 187	IC-SC	Determination of sub-µg/L Bromate in Municipal Waters Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection
AN1 88	IC-PAD	Determination of Glycols and Alcohols in Fermentation Broths Using Ion-Exclusion Chromatography and Pulsed Amperometric Detection
AN 197	IC-PAD	Determination of Glucosamine in Dietary Supplements Using HPAE-PAD
AN 227	ICE-PAD	Determination of Total Cyanide in Municipal Wastewater and Drinking Water Using Ion-Exclusion Chromatography with Pulsed Amperometric Detection (ICE-PAD)
AN 248	IC-PAD	Determination of Lactose in Lactose-Free Milk Products by High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection
AN 253	IC-PAD	HPAE-PAD Determination of Infant Formula Sialic Acids
AN 270	IC-PAD	Determination of Hydroxymethylfurfural in Honey and Biomass
AN 273	IC-SC	Determination of Organic Acids in Fruit Juices and Wines by High-Pressure IC
AN 279	IC-SC	Time Savings and Improved Reproducibility of Nitrate and Nitrite Ion Chromatography Determination in Milk Samples
AN 280	IC-PAD	Carbohydrates in Coffee: AOAC Method 995.13 vs a New Fast Ion Chromatography Method
AN 295	IC-SC	Determination of Phytic Acid in Soybeans and Black Sesame Seeds
AN 1007	IC-SC	Determination of Mono-, Di-, and Triphosphates and Citrate in Shrimp by Ion Chromatography

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Technical Collateral: Ion Chromatography Methods

Product Number	Technique	Title
AN 1044	IC-SC	Determination of Anions in Dried Distillers Grains with Solubles
AN 1068	IC-SC	Determination of Organic Acids in Fruit Juices and Wines by High-Pressure IC
AU 132	IC-UV	Determination of Nitrite and Nitrate in drinking Water by Ion Chromatography with Direct UV Detection
AU 144	IC-UV	Determination of Hexavalent Chromium in Drinking Water Using Ion Chromatography
AU 148	IC-SC	Determination of Perchlorate in Drinking Water Using Reagent-Free Ion Chromatography
AU 150	IC-PAD	Determination of Plant-Derived Neutral Oligo- and Polysaccharides Using the CarboPac PA200
AU 151	IC-PAD	Determination of Sucralose in Reduced- Carbohydrate Colas using High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection
AU 189	IC-SC	Determination of Choline in Infant Formula and Other Food Samples by IC
LPN 2982	IC-SC	Determination of Inorganic Anions and Organic Acids in Beverages Using a Capillary IC on a Monolith Anion-Exchange Column
PN 70743	IC-SC	Determination of Perchlorate Levels in Food and Soil Samples Using Accelerated Solvent Extraction and Ion Chromatography
TN 20	IC-PAD	Analysis of Carbohydrates by High-Performance Anion-Exchange Chromatography with Pulsed Amperometric Detection (HPAE-PAD)
TN 126	IC-SC	Determination of Organic Acids in Beer Samples Using a High-Pressure Ion Chromatography System
TN 135	IC-PAD	Determinations of Monosaccharides and Disaccharides in Beverages by Capillary HPAE-PAD

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

References

Sample Preparation References

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Accelerated, microwave-assisted, and conventional solvent extraction methods affect anthocyanin composition from colored grains	Abdel-Aal el-SM; Akhtar, H.; Rabalski, I.; Bryan, M.	*J. Food Sci. 79 (2),* C138–46	2014 Feb
Multiresidue method for the analysis of pesticide residues in fruits and vegetables by accelerated solvent extraction and capillary gas chromatography	Adou, K.; Bontoyan, W. R.; Sweeney, P. J.	*J. Agric. Food Chem. 49 (9),* 4153–4160	2001 Sep
The development of an optimized sample preparation for trace level detection of 17α-ethinylestradiol and estrone in whole fish tissue	Al-Ansari, A. M.; Saleem, A.; Kimpe, L. E.; Trudeau, V. L.; Blais, J. M.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 879 (30),* 3649–52	2011 Nov
Determination of polyphenolic profiles of basque cider apple varieties using accelerated solvent extraction	Alonso-Salces, R. M.; Korta, E.; Barranco, A.; Berrueta, L.A.; Gallo, B.; Vicent, F.	*J. Agric. Food Chem. 49 (8),* 3761–376	2001
Pressurized liquid extraction for the determination of polyphenols in apple	Alonso-Salces, R. M.; Korta, E.; Barranco, A.; Berrueta, L. A.; Gallo, B.; Vicente, F.;	*J. Chromatogr., A. 933 (1–2),* 37–43	2001 Nov
Methods for extraction and determination of phenolic acids in medicinal plants: a review	Arceusz, A.; Wesolowski, M.; Konieczynski, P.	*Nat. Prod. Commun. 8 (12),* 1821–9	2013 Dec
Study of an accelerated solvent extraction procedure for the determination of acaricide residues in honey by high-performance liquid chromatography-diode array detector	Bakkali, A.; Korta, E.; Berrueta, L. A.	*J. Food Protection 65 (1),* 161–166	2002
Pressurized liquid extraction of medicinal plants	Benthin, B.; Danz, H.; Hamburger, M.	*J. Chromatogr., A. 837 (1-2),* 211–9	1999 Apr
Comparison of the chemical composition of extracts from *Scutellaria lateriflora* using accelerated solvent extraction and supercritical fluid extraction versus standard hot water or 70% ethanol extraction	Bergeron, C.; Gafner, S.; Clausen, E.; Carrier, D. J.	*J. Agric. Food Chem. 53 (8),* 3076–80	2005 Apr
Polybrominated diphenyl ethers (PBDEs) in Mediterranean mussels (*Mytilus galloprovincialis*) from selected Apulia coastal sites evaluated by GC-HRMS	Bianco, G.; Novario, G.; Anzilotta, G.; Palma, A.; Mangone, A.; Cataldi, T. R.	*J. Mass Spectrom. 45 (9),* 1046–55	2010 Sep
Free and bound phenolic compounds in barley (*Hordeum vulgare* L.) flours. evaluation of the extraction capability of different solvent mixtures and pressurized liquid methods by micellar electrokinetic chromatography and spectrophotometry	Bonoli, M.; Marconi, E.; Caboni, M. F.	*J. Chromatogr., A.19; 1057 (1-2),* 1–12	2004 Nov
Pressurized liquid extraction of lipids for the determination of oxysterols in egg-containing food	Boselli, E.; Velazco, V.; Caboni, M. F.; Lercker, G.	*J. Chromatogr., A. 11; 917 (1-2),* 239–44	2001 May
Optimisation of accelerated solvent extraction of cocaine and benzoylecgonine from coca leaves	Brachet, A.; Rudaz, S.; Mateus, L.; Christen, P.; Veuthey, J-L.	*J. Sep. Sci. 24 (10-11),* 865–873	2001 Nov

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Multi-residue determination of 130 multiclass pesticides in fruits and vegetables by gas chromatography coupled to triple quadrupole tandem mass spectrometry	Cervera, M.I.; Medina, C.; Portolés, T.; Pitarch, E.; Beltrán, J.; Serrahima, E.; Pineda, L.; Muñoz, G.; Centrich, F.; Hernández, F.	*Anal. Bioanal. Chem. 397 (7),* 2873–91	2010 Aug
Influence of extraction methodologies on the analysis of five major volatile aromatic compounds of citronella grass (*Cymbopogon nardus*) and lemongrass (*Cymbopogon citratus*) grown in Thailand	Chanthai, S.; Prachakoll, S.; Ruangviriyachai, C.; Luthria, D. L.	*J. AOAC Int. 95 (3),* 763–72	2012 May-Jun
Accelerated solvent extraction of vitamin K_1 in medical foods in conjunction with matrix solid-phase dispersion	Chase, G. W.; Thompson, B.	*J. AOAC Int. 83 (2),* 407–10	2000
Development of a liquid chromatography-tandem mass spectrometry with pressurized liquid extraction method for the determination of benzimidazole residues in edible tissues	Chen, D.; Tao, Y.; Zhang, H.; Pan, Y.; Liu, Z.; Huang, L.; Wang, Y.; Peng, D.; Wang, X.; Dai, M; Yuan, Z.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 879 (19),* 1659–67	2011 Jun
Determination of 88 pesticide residues in tea using gas chromatography-tandem mass spectrometry	Chen, H.; Liu, X.; Wang, Q.; Jiang, Y.	*Se Pu. 29 (5),* 409–16	2011 May
Optimization of accelerated solvent extraction for the determination of chlorinated pesticides from animal feed	Chen, S.; Gfrerer, M.; Lankmayr, E.; Quan, X.; Yang, F.	*Chromatographia 58,* 631–636	2003
Uptake of oxytetracycline, sulfamethoxazole and ketoconazole from fertilised soils by plants	Chitescu, C. L.; Nicolau, A. I.; Stolker, A. A.	*Food Addit. Contam. Part A Chem. Anal. Control Expo. Risk Assess. 30 (6),* 1138–46	2013
Ultrasonic or accelerated solvent extraction followed by U-HPLC-high mass accuracy MS for screening of pharmaceuticals and fungicides in soil and plant samples	Chitescu, C. L.; Oosterink, E.; de Jong, J.; Stolker, A. A.	*Talanta 2012; 88,* 653–62	2011 Jan
Evaluation of analytical methods for determining pesticides in baby foods and adult duplicate-diet samples	Chuang, J. C.; Hart, K.; Chang, J. S.; Boman, L. E.; Van Emon, J. M.; Reed, A. W.	*Anal. Chim. Acta. 444 (1),* 87–95	2001 Oct
Comparison of extraction techniques and modeling of accelerated solvent extraction for the authentication of natural vanilla flavors	Cicchetti, E.; Chaintreau, A..	*J. Sep. Sci. 32 (11),* 1957–64	2009 Jun
Development of a fast and convenient method for the isolation of triterpene saponins from *Actaea racemosa* by high-speed countercurrent chromatography coupled with evaporative light scattering detection	Cicek, S. S.; Schwaiger, S.; Ellmerer, E. P.; Stuppner, H.	*Planta. Med. 76 (5),* 467–73	2010 Mar
Extraction of bitter acids from hops and hop products using pressurized solvent extraction (PSE)	Culík, J;. Jurková, M.; Horák, T.; Cejka, P; Kellner, V.; Dvorák, J.; Karásek, P.; Roth, M.	*J. Inst. Brew. 115 (3),* 220–225	2009
Comparison of methods for extraction of flavanones and xanthones from the root bark of the osage orange tree using liquid chromatography	da Costa, C. T.; Margolis, S. A.; Benner, Jr. B.A.; Horton, D.	*J. Chromatogr., A. 831 (2),* 167–178	1999 Jan
Pressurized liquid extraction prior to liquid chromatography with electrochemical detection for the analysis of vitamin E isomers in seeds and nuts	Delgado-Zamarreño, M. M.; Bustamante-Rangel, M.; Sánchez-Pérez, A.; Carabias-Martínez, R.	*J. Chromatogr., A. 12; 1056 (1-2),* 249–52	2004 Nov

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Pressurized fluid extraction of carotenoids from *Haematococcus pluvialis* and *Dunaliella salina* and kavalactones from *Piper methysticum*	Denery, J. R.; Dragull, K.:Tang, C. S.; Li, Q. X.	*Anal. Chim. Acta. 501 (2),* 175–181	2004 Jan
Development and comparison of two multiresidue methods for the analysis of 17 mycotoxins in cereals by liquid chromatography electrospray ionization tandem mass spectrometry	Desmarchelier, A.; Oberson, J. M.; Tella, P.; Gremaud, E.; Seefelder, W.; Mottier, P.	*J. Agric. Food Chem. 58 (13),* 7510–9	2010 Jul
Identification, extraction and quantification of the synthetic cannabinoid JWH-018 from commercially available herbal marijuana alternatives	Dunham, S. J.; Hooker, P. D.; Hyde, R. M.	*Forensic Sci. Int. 223 (1-3),* 241–4	2012 Nov
Evaluation of polyphenol contents in differently processed apricots using accelerated solvent extraction followed by high-performance liquid chromatography-diode array detector	Erdogan, S.; Erdemoglu, S.	*Int. J. Food Sci. Nutr. 62 (7),* 729–39	2011 Nov
Determination of 2,4,6-trichloroanisole and guaiacol in cork stoppers by pressurised fluid extraction and gas chromatography–mass spectrometry	Ezquerro, Ó.; Garrido-López, Á.; Tena, M. T.	*J. Chromatogr., A. 1102 (12),* 18–24	2006 Jan
Multiwalled carbon nanotubes as matrix solid-phase dispersion extraction absorbents to determine 31 pesticides in agriculture samples by gas chromatography-mass spectrometry	Fang, G.; Min, G.; He, J.; Zhang, C.; Qian, K.; Wang, S.	*J. Agric. Food Chem. 57 (8),* 3040–5	2009 Apr
High-anthocyanin strawberries through cultivar selection	Fredericks, C. H.; Fanning, K. J.; Gidley, M. J.; Netzel, G.; Zabaras, D.; Herrington, M.; Netzel, M.	*J. Sci. Food Agric. 93 (4),* 846–52	2013 Mar
Optimal extraction and fingerprint analysis of *Cnidii fructus* by accelerated solvent extraction and high performance liquid chromatographic analysis with photodiode array and mass spectrometry detections	Gao, F.; Hu, Y.; Ye, X.; Li, J.; Chen, Z.; Fan, G.	*Food Chem. 1 141 (3),* 1962–71	2013 Dec
Simultaneous analysis of seven alkaloids in *Coptis-evodia* herb couple and Zuojin pill by UPLC with accelerated solvent extraction	Gao, X.; Yang, X. W.; Marriott, P. J.	*J. Sep. Sci. 33 (17-18),* 2714–22	2010 Sep
Determination of chromones in *Dysophylla stellata* by HPLC: method development, validation and comparison of different extraction methods	Gautam, R.; Srivastava, A.; Jachak, S. M.	*Nat. Prod. Commun. 5 (4),* 555–8	2010 Apr
Comparison of different extraction techniques for the determination of chlorinated pesticides in animal feed	Gfrerer, M.; Chen, S.; Lankmayr, E.; Xie, Q.; Yang, F.	*Anal. Bioanal. Chem. 378 (7),* 1861–1867	2004
Speciation analysis of selenium compounds in yeasts using pressurised liquid extraction and liquid chromatography–microwave-assisted digestion–hydride generation–atomic fluorescence spectrometry	Gómez-Ariza, J. L.; Caro de la Torre, M. A.; Giráldez, I.; Morales, E.	*Anal. Chim. Acta. 524, (1–2),* 305–314	2004 Oct

Thermo SCIENTIFIC

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Multianalysis of 35 mycotoxins in traditional Chinese medicines by ultra-high-performance liquid chromatography-tandem mass spectrometry coupled with accelerated solvent extraction	Han, Z.; Ren Y.; Zhu, J.; Cai, Z.; Chen, Y.; Luan, L.; Wu, Y.	*J. Agric. Food Chem. 60 (33),* 8233-47.	2012 Aug
Pressurized liquid extraction-capillary electrophoresis-mass spectrometry for the analysis of polar antioxidants in rosemary extracts	Herrero, M.; Arráez-Román, D.; Segura A.; Kenndler, E.; Gius, B.; Raggid, M. A.; Ibáñez, E.; Cifuentes, A.	*J. Chromatogr., A.1084 (1-2),* 54–62.	2005 Aug
Accelerated solvent extraction of alkylresorcinols in food products containing uncooked and cooked wheat	Holt, M D.; Moreau, R A,.;DerMarderosian, A.; McKeown, N.; Jacques, P. F.	*J. Agric. Food Chem. 60 (19),* 4799–802	2012 May
Application of response surface methodology to optimize pressurized liquid extraction of antioxidant compounds from sage (*Salvia officinalis* L.), basil (*Ocimum basilicum* L.) and thyme (*Thymus vulgaris* L.)	Hossain, M. B.; Brunton, N. P.; Martin-Diana, A. B.; Barry-Ryan, C.	*Food Funct. 1(3),* 269–77	2010 Dec
A review of modern sample-preparation techniques for the extraction and analysis of medicinal plants	Huie, C. W.	*Anal. Bioanal. Chem. 373 (1-2),* 23–30.	2002 May
Polychlorinated dioxins, furans, and biphenyls, and polybrominated diphenyl ethers in a U.S. meat market basket and estimates of dietary intake	Huwe, J. K.; Larsen, G. L.	*Environ. Sci. Technol. 39 (15),* 5606–5611	2005
Study of the effect of sample preparation and cooking on the selenium speciation of selenized potatoes by HPLC with ICP-MS and electrospray ionization MS/MS	Infante, H. G.; Borrego, A. A.; Peachey, E.; Hearn, R.; O'Connor, G.; Barrera, T G.; Ariza, J. L.	*J. Agric. Food Chem. 57(1),* 38–45.	2009 Jan
Pentacyclic triterpene distribution in various plants – rich sources for a new group of multi-potent plant extracts	Jäger, S.; Trojan, H.; Kopp, T.; Laszczyk, M. N.; Scheffler, A.	*Molecules. 14 (6),* 2016–31.	2009 Jun
Comprehensive multiresidue method for the simultaneous determination of 74 pesticides and metabolites in traditional Chinese herbal medicines by accelerated solvent extraction with high-performance liquid chromatography/tandem mass spectrometry	Jia, Z.; Mao, X.; Chen, K.; Wang, K.; Ji S.	*J. AOAC Int.; 93(5),* 1570–88.	2010 Sep-Oct
Gas chromatography-mass spectrometry (GC-MS) method for the determination of 16 European priority polycyclic aromatic hydrocarbons in smoked meat products and edible oils	Jira, W.; Ziegenhals, K.; Speer, K.	*Food Addit. Contam. Part A Chem. Anal. Control Expo. Risk Assess. 25 (6),* 704–13.	2008 Jun
Assessing pressurized liquid extraction for the high-throughput extraction of marine-sponge-derived natural products	Johnson, T. A.; Morgan, M. V.; Aratow, N. A.; Estee, S. A.; Sashidhara, K. V.; Loveridge, S. T.; Segraves, N L.; Crews, P.	*J. Nat. Prod. 73 (3),* 359–64.	2010 Mar
Lipophilic stinging nettle extracts possess potent anti-inflammatory activity, are not cytotoxic and may be superior to traditional tinctures for treating inflammatory disorders	Johnson, T. A.; Sohn, J.; Inman, W. D.; Bjeldanes, L. F.; Rayburn, K.	*Phytomedicine 20(2),* 143–7.	2013 Jan
Effects of solvent and temperature on pressurized liquid extraction of anthocyanins and total phenolics from dried red grape skin	Ju Z. Y.; Howard, L. R.	*J. Agric. Food Chem. 51 (18),* 5207–13.	2003 Aug

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Accelerated solvent extraction of ochratoxin A from rice samples	Juan, C.; González, L.; Soriano, J. M.; Moltó, J. C.; Mañes, J.	*J. Agric. Food Chem. 53 (24)*, 9348–9351	2005
Accelerated solvent extraction of paclitaxel and related compounds from the bark of *Taxus cuspidate*	Kawamura, F.; Kikuchi, Y.; Ohira, T.; Yatagai, M.	*J. Nat. Prod. 62 (2)*, 244–7.	1999 Feb
Determination of polybromodiphenyl ethers (PBDEs) in milk cream by gas chromatography-mass spectrometry	Kinani, S.; Bouchonnet, S.; Abjean, J.; Campargue, C.	*Food Addit. Contam. Part A Chem. Anal. Control Expo. Risk Assess. 25 (8)*, 1007–14	2008 Aug
Determination of isoflavones in soy bits by fast column high-performance liquid chromatography coupled with UV–visible diode-array detection	Klejdus, B.; Mikelová, R.; Petrlová, J.; Potešil, D.; Adam, V.; Stiborová, J.; Hodek, P.; Vacek, J.; Kizek, R.; Kubán, V.	*J. Chromatogr., A. 1084 (1–2), 19*, 71–79	2005 Aug
Accelerated solvent extraction of lignin from *Aleurites moluccana* (candlenut) nutshells	Klein, A. P.; Beach, E. S.; Emerson, J. W.; Zimmerman, J. B.	*J. Agric. Food Chem. 58 (18)*, 10045–8	2010 Sep
Application of TLC method with video scanning in estimation of daily dietary intake of specific flavonoids – preliminary studies	Koch, W.; Kukuła-Koch, W.; Marzec, Z.; Marc, D.	*Acta Pol. Pharm. 70 (4)*, 611–20	2013 Jul-Aug
Evaluation of a fibrous cellulose drying agent in supercritical fluid extraction and pressurized liquid extraction of diverse pesticides	Lehotay, S. J.; Lee, C. H.	*J. Chromatogr., A.785 (1-2)*, 313–27	1997 Oct
Application of accelerated solvent extraction to the investigation of saikosaponins from the roots of *Bupleurum falcatum*	Li, W.; Liu, Z.; Wang, Z.; Chen, L.; Sun, Y.; Hou, J.; Zheng, Y.	*J. Sep. Sci. 33 (12)*, 1870–6	2010 Jun
Applicability of accelerated solvent extraction for synthetic colorants analysis in meat products with ultrahigh performance liquid chromatography-photodiode array detection	Liao, Q. G.; Li ,W. H.; Luo, LG.	*Anal. Chim. Acta. 716*, 128–32	2012 Feb
Extraction, isolation, and purification of analytes from samples of marine origin – a multivariate task	Liguori, L.; Bjørsvik, H. R.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 910*, 46–53	2012 Dec
Investigation on levels of polybrominated diphenyl ethers in retail fish and egg products in Shenzhen	Liu, B.; Zhang, L. S.; Zhang, J. Q.; Jiang, Y. S.; Zhou, J.; Huang, H. Y.	*Zhonghua Yu Fang Yi Xue Za Zhi. 45 (12)*, 1068–72	2011 Dec
Characterization of secondary volatile profiles in *Nigella sativa* seeds from two different origins using accelerated solvent extraction and gas chromatography-mass spectrometry	Liu, X.; Abd El-Aty, A. M.; Cho, S. K.; Yang, A.; Park, J. H.; Shim, J. H.	*Biomed. Chromatogr. 26 (10)*, 1157–62	2012 Oct
Accelerated solvent extraction of monacolin K from red yeast rice and purification by high-speed counter-current chromatography	Liu, Y.; Guo, X.; Duan, W.; Wang, X.; Du, J.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 878 (28)*, 2881–5	2010 Oct
Multiresidue determination of organophosphorus pesticides in ginkgo leaves by accelerated solvent extraction and gas chromatography with flame photometric detection	Lu, Y.; Yi, X.	*J. AOAC Int. 88 (3)*, 729–735	2005

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Influence of sample preparation on assay of phenolic acids from eggplant	Luthria, DL.; Mukhopadhyay, S.	*J. Agric. Food Chem. 54 (1),* 41–47	2006
Pressurised solvent extraction for organotin speciation in vegetable matrices	Marcic, C.; Lespe,s G.; Potin-Gautier, M.	*Anal. Bioanal. Chem. 382 (7),* 1574–83	2005 Aug
Comparison of different methods for the determination of the oil content in oilseeds	Matthäus, B.; Brühl, L.	*J. AOCS 78* 95–102.	2001 Jan
A comparison of automated and traditional methods for the extraction of arsenicals from fish	McKiernan, J. W.; Creed, J. T.; Brockhoff, C. A.; Caruso, J. A.; Lorenzana, R. M.	*J. Anal. At. Spectrom. 14,* 607–613	1999
Subcritical solvent extraction of anthocyanins from dried red grape pomace	Monrad, J. K.; Howard, L. R.; King, J.;, Srinivas, K.; Mauromoustakos, A.	*J. Agric. Food Chem. 58 (5),* 2862–8	2010 Mar
Subcritical solvent extraction of procyanidins from dried red grape pomace	Monrad, J. K.; Howard, L. R.; King, J. W.; Srinivas, K.; Mauromoustakos, A.	*J. Agric. Food Chem.58 (7),* 4014–21	2010 Apr
Pressurized liquid extraction of polar and nonpolar lipids in corn and oats with hexane, methylene chloride, isopropanol, and ethanol	Moreau, R. A.; Powell, M. J.; Singh, V.	*J. Oil Fat Industr. 80 (11),* 1063–1067	2003 Jan
Accelerated solvent extraction for natural products isolation	Mottaleb, M. A.; Sarker, S. D.	*Methods Mol. Biol. 864,* 75–87	2012
Optimization of extraction process for phenolic acids from black cohosh (*Cimicifuga racemosa*) by pressurized liquid extraction	Mukhopadhyay, S,.;Luthria, D. L,.;Robbins, R. J.	*J. Sci. Food Agric. 86 (1),* 156–162, 15	2006 Jan
Anxiolytic activity of a supercritical carbon dioxide extract of *Souroubea sympetala* (Marcgraviaceae)	Mullally, M.; Kramp, K.; Cayer, C.; Saleem, A.; Ahmed, F, McRae, C.; Baker, J.; Goulah, A.; Otorola, M.; Sanchez, P.; Garcia, M.; Poveda, L.; Merali, Z.; Durst, T.; Trudeau, V. L.; Arnason, J. T.	*Phytother. Res. 25 (2),* 264–70	2011 Feb
On-line clean-up of pressurized liquid extracts for the determination of polychlorinated biphenyls in feedingstuffs and food matrices using gas chromatography–mass spectrometry	Müller, A.; Björklund, E.; von Holst, C.	*J. Chromatogr., A. 925 (1–2),* 197–205	2001 Aug
Analysis of multiple herbicides in soybeans using pressurized liquid extraction and capillary electrophoresis	Nemoto, S.; Lehotay, S. J.	*J. Agric. Food Chem.; 46 (6),* 2190–2199	1998
Comparison of sample preparation methods, validation of an UPLC-MS/MS procedure for the quantification of tetrodotoxin present in marine gastropods and analysis of pufferfish	Nzoughet, J. K.; Campbell, K.; Barnes, P.; Cooper, K. M.; Chevallier, O. P, Elliott, C. T.	*Food Chem. 15; 136 (3-4),* 1584–9	2013 Feb
Multiresidue analysis of pesticides in vegetables and fruits using two-layered column with graphitized carbon and water absorbent polymer	Obana, H.; Akutsu, K.; Okihashi, M.; Hori, S.	*The Analyst 123,* 711–714	1998
Analysis of 2-alkylcyclobutanones with accelerated solvent extraction to detect irradiated meat and fish	Obana, H.; Furuta, M.; Tanaka, Y.	*J. Agric. Food Chem. 53 (17),* 6603–8	2005 Aug

Thermo SCIENTIFIC

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Determination of organophosphorus pesticides in foods using an accelerated solvent extraction system	Obana, H.; Kikuchi, K.; Okihashi, M.; Hori, S.	*Analyst 122 (3),* 217–20	1997 Mar
Pressurized hot water extraction of berberine, baicalein and glycyrrhizin in medicinal plants	Ong, E. S.; Shea Mei, L.	*Anal. Chim. Acta. 482 (1),* 81–89	2003 Apr
Pressurized liquid extraction of berberine and aristolochic acids in medicinal plants	Ong E. S.; Woo S. O.; Yong, Y. K.	*J. Chromatogr., A. 904 (1),* 57–6422	2000 Dec
Rapid determination of pesticide multiresidues in vegetables and fruits by accelerated solvent extraction coupled with online gel permeation chromatography-gas chromatography-mass spectrometry	Ouyang, Y.; Tang, H.; Wu, Y.; Li, G.	*Se Pu. 30(7),* 654–9	2012 Jul
Determination of zearalenone from wheat and corn by pressurized liquid extraction and liquid chromatography-electrospray mass spectrometry	Pallaroni, L.; von Holst, C.	*J. Chromatogr., A. 993,* 39–45	2003
Development of an extraction method for the determination of zearalenone in corn using less organic solvents	Pallaroni, L.; von Holst, C.	*J. Chromatogr., A. 5 1055 (1-2),* 247–9	2004 Nov
Stability of phenolic compounds during extraction with superheated solvents	Palma, M.; Piñeiro, Z.; Barroso, C. G.	*J. Chromatogr., A. 6 921 (2),* 169–74	2001 Jul
Extraction and analysis of trace amounts of cyclonite (RDX) and its nitroso-metabolites in animal liver tissue using gas chromatography with electron capture detection (GC-ECD)	Pan, X.; Zhang, B.; Cobb, G. P.	*Talanta 67 (4),* 816–23	2005 Oct
Simultaneous determination of 405 pesticide residues in grain by accelerated solvent extraction then gas chromatography-mass spectrometry or liquid chromatography-tandem mass spectrometry	Pang, G.; Liu, Y.; Fan, C.; Zhang, J.; Cao, Y.; Li, X.; Li, Z.; Wu, Y.; Guo, T.	*Anal. Bioanal. Chem. 384,* 1366–1408	2006 Mar
Automated sample preparation by pressurized liquid extraction-solid-phase extraction for the liquid chromatographic-mass spectrometric investigation of polyphenols in the brewing process	Papagiannopoulos, M.; Mellenthin, A.	*J. Chromatogr., A. 8 976 (1-2),* 345–8	2002 Nov
Online coupling of pressurized liquid extraction, solid-phase extraction and high-performance liquid chromatography for automated analysis of proanthocyanidins in malt	Papagiannopoulos, M.; Zimmermann, B.; Mellenthin, A.; Krappe, M.; Maio, G.; Galensa, R.	*J. Chromatogr., A. 7 958 (1-2),* 9–16	2002 Jun
Simultaneous determination of 13 quinolones from feeds using accelerated solvent extraction and liquid chromatography	Pecorelli, I.; Galarini, R.; Bibi, R.; Floridi, A. I.; Casciarri, E.; Floridi, A.	*Anal. Chim. Acta. 483 (1-2),* 81–89	2003 April
Comparison of soxhlet, ultrasound-assisted and pressurized liquid extraction of terpenes, fatty acids and Vitamin E from *Piper gaudichaudianum* Kunth	Péres, V. F.; Saffi, J.; Melecchi, M. I.; Abad, F. C.; de Assis Jacques, R.; Martinez, M. M.; Oliveira, E. C.; Caramão, E. B.	*J. Chromatogr., A. 1105 (1-2),* 115–8	2006 Feb
Pressurised fluid extraction (PFE) as an alternative general method for the determination of pesticide residues in rape seed	Pihlström, T.; Isaac, G.; Waldebäck, M.; Osterdahl, B. G.; Markides, K. E.	*Analyst 127 (4),* 554–9	2002 Apr
Determination of catechins by means of extraction with pressurized liquids	Piñeiro, Z.; Palma, M.; Barroso C. G.	*J. Chromatogr., A. 13 1026 (1-2),* 19–23.	2004 Feb

Thermo SCIENTIFIC

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
An improved clean-up strategy for simultaneous analysis of polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF), and polychlorinated biphenyls (PCB) in fatty food samples	Pirard, C.; Focant, J. F.; De, P. E.	*Anal. Bioanal. Chem. 372 (2)*, 373–81.	2002 Jan
Extraction of polar and hydrophobic pollutants using accelerated solvent extraction (ASE)	Pörschmann, J., Plugge, J.	*Fresen. J. Anal. Chem. 364 (7)*, 643–645	1999
Quantification of the total amount of artemisinin in leaf samples by thin layer chromatography	Quennoz, M.; Bastian, C.; Simonnet, X.; Grogg, A. F.	*Chimia (Aarau) 64 (10)*, 755–7.	2010
Determination of fat in dairy products using pressurized solvent extraction	Richardson, R. K.	*J. AOAC Int. 84 (5)*, 1522–1533	2001
Influence of altitudinal variation on the content of phenolic compounds in wild populations of *Calluna vulgaris*, Sambucus nigra, and *Vaccinium myrtillus*	Rieger, G.; Müller, M.; Guttenberger, H.; Bucar, F.	*J. Agric. Food Chem. 56 (19)*, 9080–6.	2008 Oct
Pressurized liquid extraction of isoflavones from soybeans	Rostagno, M. A.; Palma, M.; Barroso, C. G.	*Anal. Chim. Acta. 522 (2)*, 169–177.	2004 Sep
A multi-residue method for the analysis of organophosphorus residues in cooked and polished rice using accelerated solvent extraction and dispersive-solid phase extraction (D-SPE) technique and uncertainty measurement	Sanyal, D.; Rani, A.; Alam, S.	*J. Environ. Sci. Health, B 44 (7)*, 706–16.	2009 Sep
Accelerated solvent extraction of lipids for determining the fatty acid composition of biological material	Schäfer, K.	*Anal. Chim. Acta. 358 (1)*, 69–77	1998 Jan
HPLC analysis of kaempherol and quercetin derivatives isolated by different extraction techniques from plant matrix	Skalicka-Wozniak, K.; Szypowski, J.; Głowniak, K.	*J. AOAC Int. 94 (1)*, 17–21.	Jan-Feb 2011
Statistical evaluation of fatty acid profile and cholesterol content in fish (common carp) lipids obtained by different sample preparation procedures	Spiric, A.; Trbovic, D.; Vranic, D.; Djinovic, J.; Petronijevic, R.; Matekalo-Sverak, V.	*Anal. Chim. Acta. 672 (1-2), 66–71.*	2010 Jul
Application of accelerated solvent extraction in the analysis of organic contaminants, bioactive and nutritional compounds in food and feed	Sun, H.; Ge, X.; Lv, Y.; Wang, A.	*J. Chromatogr., A. 1237*, 1–23.	2012 May
Development of an accelerated solvent extraction, ultrasonic derivatisation LC-MS/MS method for the determination of the marker residues of nitrofurans in freshwater fish	Tao, Y.; Chen, D.; Wei, H.; Yuanhu, P.; Liu, Z.; Huang, L.; Wang, Y.; Xie, S.; Yuan, Z.	*Food Addit. Contam. Part A Chem. Anal. Control Expo. Risk Assess. 29 (5)*, 736–45.	2012
Simultaneous determination of lincomycin and spectinomycin residues in animal tissues by gas chromatography-nitrogen phosphorus detection and gas chromatography-mass spectrometry with accelerated solvent extraction	Tao, Y.; Chen, D.; Yu, G.,;Yu, H.; Pan, Y.; Wang, Y.; Huang, L.; Yuan, Z.	*Food Addit. Contam. Part A Chem. Anal. Control Expo. Risk Assess. 28 (2)*, 145–54.	2011 Feb
Determination of 17 macrolide antibiotics and avermectins residues in meat with accelerated solvent extraction by liquid chromatography-tandem mass spectrometry	Tao, Y.; Yu, G.; Chen, D.; Pan, Y.; Liu, Z.; Wei, H.; Peng, D.; Huang, L.; Wang, Y.; Yuan, Z.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 897*, 64–71.	2012 May
Determination of seven toxaphene congeners in ginseng and milkvetch root by gas chromatography tandem mass spectrometry	Tian, S.; Mao, X.; Miao, S.; Jia, Z.; Wang, K.; Ji, S.	*Se Pu. 30 (1)*, 14–20.	2012 Jan

Table of Contents

Introduction

Analytical Technologies

Artificial Sweeteners

Natural Sweeteners

Absorbance Properties of Common Sweeteners

Stevia

Mongrosides

Aspartame

Equal

Sucralose

Splenda

Saccharin

Sweet'N Low

Sorbitol and Xylitol

Global Method

References

Thermo SCIENTIFIC

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
A consecutive preparation method based upon accelerated solvent extraction and high-speed counter-current chromatography for isolation of aesculin from *Cortex fraxinus*	Tong, X.; Zhou, T, Xiao, X.; Li, G.	*J. Sep. Sci. 35 (24)*, 3609–14	2012 Dec
Characterization of anthocyanins and anthocyanidins in purple-fleshed sweetpotatoes by HPLC-DAD/ESI-MS/MS	Truong, V. D.; Deighton, N.; Thompson, R. T.; McFeeters, R. F.; Dean, L. O.; Pecota, K. V.; Yencho, G. C.	*J. Agric. Food Chem. 58 (1)*, 404–10	2010 Jan
Fat extraction from acid- and base-hydrolyzed food samples using accelerated solvent extraction	Ullah, S. M.; Murphy, B.; Dorich, B.; Richter, B.; Srinivasan, K.	*J. Agric. Food Chem. 59 (6)*, 2169–74.	2011 Mar
Analysis of zearalenone in cereal and swine feed samples using an automated flow-through immunosensor	Urraca, J. L.; Benito-Peña, E.; Pérez-Conde, C.; Moreno-Bondi, M. C.; Pestka, J. J.	*J. Agric. Food Chem. 53 (9)*, 3338–3344	2005
Accelerated solvent extraction and gas chromatography/mass spectrometry for determination of polycyclic aromatic hydrocarbons in smoked food samples	Wang, G.; Lee, A. S.; Lewis, M.; Kamath, B.; Archer, R. K.	*J. Agric. Food Chem. 47 (3)*, 1062–6.	1999 Mar
Subcritical water extraction of alkaloids in *Sophora flavescens* Ait. and determination by capillary electrophoresis with field-amplified sample stacking	Wang, H.; Lu, Y.; Chen, J.; Li, J.; Liu, S.	*J. Pharm. Biomed .Anal. 58*, 146–51.	2012 Jan
Evaluation of Soxhlet extraction, accelerated solvent extraction and microwave-assisted extraction for the determination of polychlorinated biphenyls and polybrominated diphenyl ethers in soil and fish samples	Wang, P.; Zhang, Q.; Wang, Y.; Wang, T.; Li X.; Ding, L.; Jiang, G.	*Anal. Chim. Acta. 663 (1)*, 43–8.	2010 Mar
Determination of ten pesticides of pyrazoles and pyrroles in tea by accelerated solvent extraction coupled with gas chromatography-tandem mass spectrometry	Xu, D.; Lu, S.; Chen, D.; Lan, J.; Zhang, Z.; Yang, F.; Zhou, Y.	*Se Pu.; 31 (3)*, 218–22.	2013 Mar
Online cleanup of accelerated solvent extractions for determination of adenosine 5'-triphosphate (ATP), adenosine 5'-diphosphate (ADP), and adenosine 5'-monophosphate (AMP) in royal jelly using high-performance liquid chromatography	Xue, X.; Wang, F.; Zhou, J.; Chen, F.; Li, Y.; Zhao, J.	*J. Agric. Food Chem. 57 (11)*, 4500–5.	2009 Jun
Identification and quantitation of eleven sesquiterpenes in three species of *Curcuma* rhizomes by pressurized liquid extraction and gas chromatography–mass spectrometry	Yang, F. Q.; Li ,S.; Chen, Y.; Lao, S. C.; Wang, YT.; Dong, T. T. X.; Tsim, K. W. K.	*J. Pharm. Biomed. Anal. 39 (3/4)*, 552–558	2005 Sep
Dispersive solid-phase extraction cleanup combined with accelerated solvent extraction for the determination of carbamate pesticide residues in *Radix glycyrrhizae* samples by UPLC-MS-MS	Yang, R. Z.; Wang, J. H.; Wang, M. L.; Zhang, R.; Lu, X. Y.; Liu, W. H.	*J. Chromatogr. Sci. 49 (9)*, 702–8.	2011 Oct
Simultaneous determination of amitraz and its metabolite residue in food animal tissues by gas chromatography-electron capture detector and gas chromatography-mass spectrometry with accelerated solvent extraction	Yu, H.; Tao, Y.; Le, T.; Chen, D.; Ishsan, A.; Liu, Y, Wang, Y.; Yuan, Z.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 878 (21)*, 1746–52.	2010 Jul
Simultaneous determination of fluoroquinolones in foods of animal origin by a high performance liquid chromatography and a liquid chromatography tandem mass spectrometry with accelerated solvent extraction	Yu, H.; Tao, Y.; Chen, D.; Pan, Y.; Liu, Z.; Wang, Y.; Huang, L.; Dai, M.; Peng, D.; Wang, X.; Yuan, Z.	*J. Chromatogr. B Analyt. Technol. Biomed. Life Sci. 885-886*, 150–9.	2012 Feb

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Peer Reviewed Journals: Sample Preparation Methods

Title	Authors	Publication	Publication Date
Determination of pentachlorophenol residue in meat and fish by gas chromatography-electron capture detection and gas chromatography-mass spectrometry with accelerated solvent extraction	Zhao, D.	*J. Chromatogr. Sci.*	2013 May
Response surface modeling and optimization of accelerated solvent extraction of four lignans from *fructus schisandrae*	Zhao, L. C.; He, Y, Deng.; X, Yang, G. L.; Li, W.; Liang, J.; Tang, Q. L.	*Molecules. 17 (4),* 3618–29	2012 Mar
Determination of acetanilide herbicides in cereal crops using accelerated solvent extraction, solid-phase extraction and gas chromatography-electron capture detector	Zhang, Y.; Yang, J.; Shi, R.; Su, Q.; Yao, L.; Li, P.	*J. Sep. Sci. 34 (14),* 1675–82	2011 Jul
Application of accelerated solvent extraction coupled with high-performance counter-current chromatography to extraction and online isolation of chemical constituents from *Hypericum perforatum* L	Zhang, Y.; Liu, C.; Yu, M.; Zhang, Z.; Qi, Y.; Wang, J.; Wu, G.; Li, S.; Yu, J.; Hu, Y.	*J. Chromatogr., A. 1218 (20),* 2827–34	2011 May
Analysis of volatile components in Qingshanlvshui tea using solid-phase microextraction/accelerated solvent extraction-gas chromatography-mass spectrometry	Zhan, J.; Lu, S.; Meng, Z.; Xiang, N.; Cao, Q.; Miao, M.	*Se Pu. 26 (3),* 301–5.	2008 May

Thermo SCIENTIFIC

Technical Collateral: Sample Preparation Methods

Product Number	Technique	Title
AN 326	HPLC-UV	Extraction of Drugs from Animal Feeds Using Accelerated Solvent Extraction (ASE)
AN 335	HPLC-UV	Accelerated Solvent Extraction (ASE) of Active Ingredients from Natural Products
AN 356	IC-conductivity	Determination of Perchlorate in Vegetation Samples Using Accelerated Solvent Extraction and Ion Chromatography
AN 357	HPLC	Extraction of Phenolic Acids from Plant Tissue Using Accelerated Solvent Extraction (ASE)
AN 363	HPLC	Extraction of Herbal Marker Compounds Using Accelerated Solvent Extraction Compared to Traditional Pharmacopoeia Protocols

Table of Contents

Introduction
Analytical Technologies
Artificial Sweeteners
Natural Sweeteners
Absorbance Properties of Common Sweeteners
Stevia
Mongrosides
Aspartame
Equal
Sucralose
Splenda
Saccharin
Sweet'N Low
Sorbitol and Xylitol
Global Method
References

Thermo SCIENTIFIC

Africa +43 1 333 50 34 0
Australia +61 3 9757 4300
Austria +43 810 282 206
Belgium +32 53 73 42 41
Canada +1 800 530 8447
China 800 810 5118 (free call domestic)
400 650 5118
Denmark +45 70 23 62 60
Europe-Other +43 1 333 50 34 0
Finland +358 9 3291 0200
France +33 1 60 92 48 00
Germany +49 6103 408 1014
India +91 22 6742 9494
Italy +39 02 950 591
Japan +81 45 453 9100
Korea +82 2 3420 8600
Latin America +1 561 688 8700
Middle East +43 1 333 50 34 0
Netherlands +31 76 579 55 55
New Zealand +64 9 980 6700
Norway +46 8 556 468 00
Russia/CIS +43 1 333 50 34 0
Singapore +65 6289 1190
Spain +34 914 845 965
Sweden +46 8 556 468 00
Switzerland +41 61 716 77 00
UK +44 1442 233555
USA +1 800 532 4752

Thermo SCIENTIFIC
A Thermo Fisher Scientific Brand

AI71470-EN 08/16S