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Goh Lin-Tang, *PhD*

Senior Manager (Mass Spectrometry)

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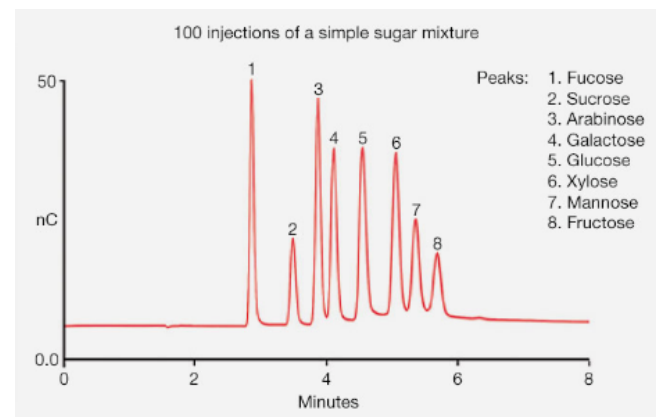




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Food and Beverage Applications Notes using HPIC

- Application Proofs and Updates
 - [A Fast Method for Sugar Analysis of Instant Coffee Samples](#)
 - [Sugars in Functional Drinks](#)
 - [Sugar Concentrations in Rice Wine](#)
 - [Sugars in Fruit Juice](#)
 - [Sugar Concentrations in Balsamic Vinegar](#)
 - [Glucosamine in Dietary Supplements](#)

Food and Beverage

	<p>A Fast Method for Sugar Analysis of Instant Coffee Samples Application Update</p> <p>Download</p>		<p>Sugars in Fruit Juice Application Proof Note</p> <p>Download</p>
	<p>Sugars in Functional Drinks Application Proof Note</p> <p>Download</p>		<p>Sugar Concentrations in Flavored Rum Liquor Application Proof Note</p> <p>Download</p>
	<p>Sugar Concentrations in Sparkling Wine Application Proof Note</p> <p>Download</p>		<p>Sugar Concentrations in Irish Whiskey Application Proof Note</p> <p>Download</p>
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Thermo Fisher Scientific Wins R&D 100 Award for Thermo Scientific Vanquish Flex UHPLC

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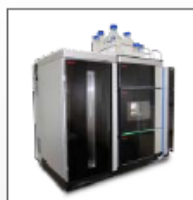
WALTHAM, Mass.--(BUS) announced that the R&D system instruments among



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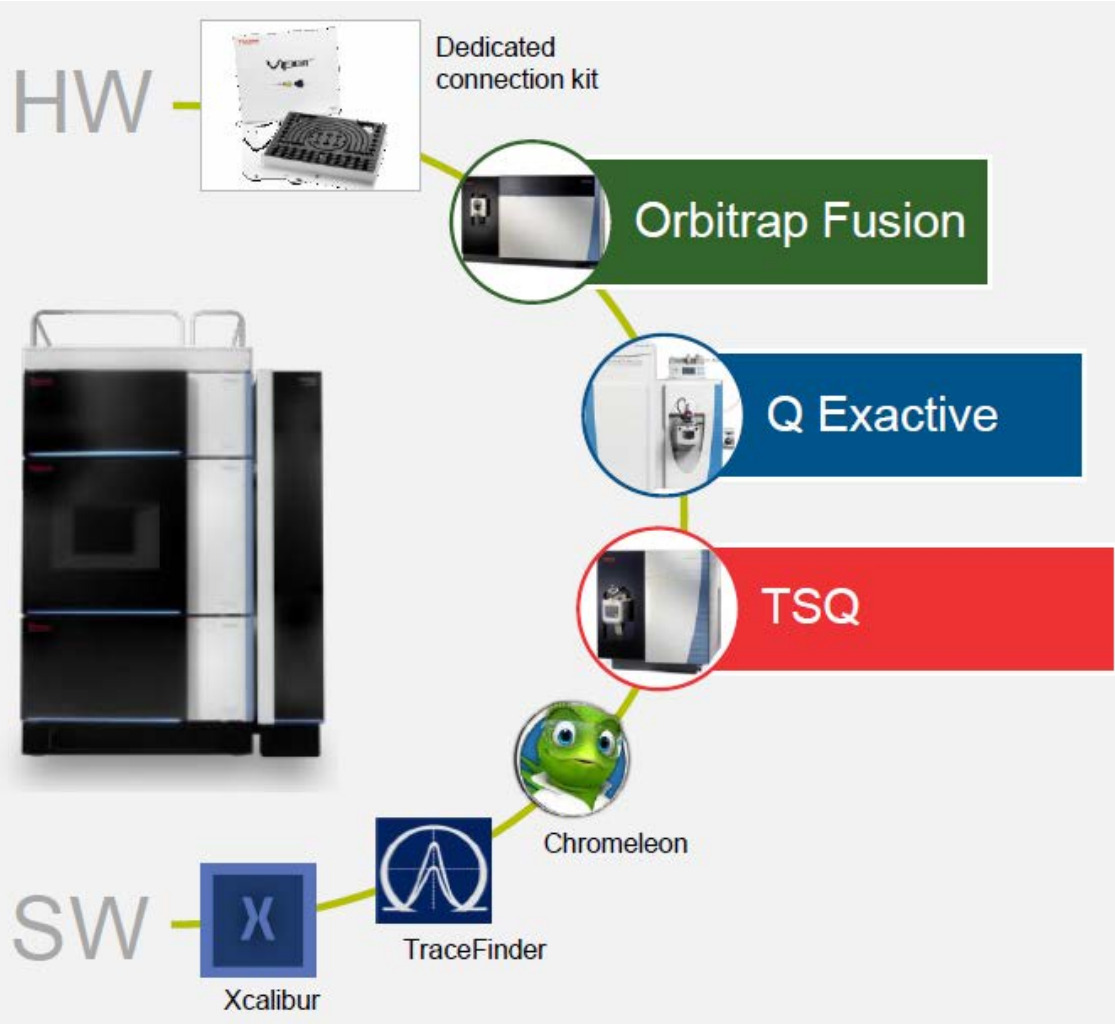
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Food and Beverage Applications Notes using UHPLC

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APPLICATION NOTE 21671

Rapid and sensitive UHPLC screening for water soluble vitamins in sports beverages

Authors
Jon Bardsley, Thermo Fisher Scientific, Runcorn, UK

Keywords
Vanquish Flex, Acclaim PolarAdvantage II, rapid analysis, water soluble vitamins, beverage analysis, UHPLC, Pyridoxine HCl, Ascorbic acid, Nicotinic acid, Nicotinamide, D-Pantothenic acid, Cyanocobalamin, Folic acid

Goal
• To demonstrate the capability of the Thermo Scientific Vanquish Flex UHPLC system for the rapid separation of water soluble vitamins in sports beverages.
• To show that the system provides superior resolution and sensitivity for the analysis of vitamins in sports beverages.

Introduction
Vitamins are essential nutrients that are required for the body to function properly. They are found in a wide range of foods and supplements. However, many people do not get enough vitamins from their diet. This can lead to a variety of health problems, including fatigue, weakness, and a compromised immune system. Therefore, it is important to ensure that your diet is rich in vitamins. One way to do this is by taking a vitamin supplement. However, it is important to choose a high-quality supplement that contains the right blend of vitamins. The Thermo Scientific Vanquish Flex UHPLC system is a powerful tool for the analysis of vitamins in sports beverages. It provides superior resolution and sensitivity, allowing for the rapid and accurate detection of even the most trace amounts of vitamins.

Due to its excellent performance, the Vanquish Flex UHPLC system is the ideal choice for the analysis of vitamins in sports beverages.

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APPLICATION NOTE 21672

Rapid and sensitive UHPLC screening of food dyes in carbonated beverages using UV/Vis wavelength switching

Author
Aaron Lamb, Thermo Fisher Scientific, Runcorn, UK

Keywords
Vanquish Flex, Hypersil GOLD VANQUISH C18, Rapid Analysis, Food Dyes, Beverage Analysis, UHPLC, Tartrazine, Amaranth, Indigo Carmine, New Coccine, Sunset Yellow FCF, Fast Green FCF, Eosin Y, Erythrosine, Phloxine B, Bengal Rose B

Goal
• To demonstrate the capability of the Thermo Scientific Hypersil GOLD VANQUISH C18 column and Thermo Scientific Vanquish Flex Binary UHPLC system combination for the rapid separation of dyes in carbonated beverages with excellent linearity, reproducibility, and recoveries.
• To show the capability of the Vanquish Flex Binary UHPLC system to support fast UHPLC methods with excellent performance.
• To demonstrate the capability of the Vanquish Flex Binary UHPLC system to enhance method sensitivity with the use of wavelength switching.

Introduction
The analysis of food dyes in carbonated beverages is important as many of these dyes are either controlled substances or are being phased out in certain countries due to their reported adverse health effects. Being able to identify and quantify food dyes in beverages quickly and with high sensitivity is therefore important.

Reversed-phase chromatography is an excellent technique for the analysis of dyes. Many dyes are readily soluble in reversed-phase eluents and have strong visible and UV absorbance properties. This method demonstrates the

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APPLICATION NOTE 21673

Rapid and sensitive UHPLC screening of additives in carbonated beverages with a robust organic acid column

Authors
Aaron Lamb and Brian King, Thermo Fisher Scientific, Runcorn, UK

Keywords
Vanquish Flex, Acclaim Organic Acid, OA, Rapid Analysis, Food Additives, Beverage Analysis, UHPLC

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APPLICATION NOTE 21674

Rapid analysis of natural sweeteners found in food and beverages using an advanced UHPLC system

Author
Derek Hilbeck, Thermo Fisher Scientific, Runcorn, UK

Keywords
Vanquish Flex, Synchro HILIC, UHPLC, dulcicide, steviol, rebaudioside, steviolglycosides, sweeteners

Goal
To demonstrate the development of a rapid method for the analysis of steviol glycoside based sweeteners on a Thermo Scientific Vanquish Flex system using a Thermo Scientific Synchro HILIC, 1.7 μ m column.

Introduction
Over the last decade there has been a growing interest in low-calorie alternatives to carbohydrate-based sweeteners. Recent publications have shown a dramatic increase in attention toward natural extracts such as the Stevia rebaudiana plant, not only for its sweetening effect but also for additional health benefits attributed to the plant. The major sweetening components are steviol, rebaudioside A, rebaudioside C, and dulcicide A, each of which is over 300 times sweeter than sucrose-based sweeteners. Because of this they are widely used in beverages and foodstuffs.

The chromatographic separation of these components is difficult as they are structurally very similar (Figure 1), differing only in the number and configuration of the satellite glucose units. Because of these they are very polar, which implies that analysis by reversed-phase HPLC can be particularly challenging. The method described here demonstrates the full resolution of six steviol glycosides using an alternative HILIC-based method.

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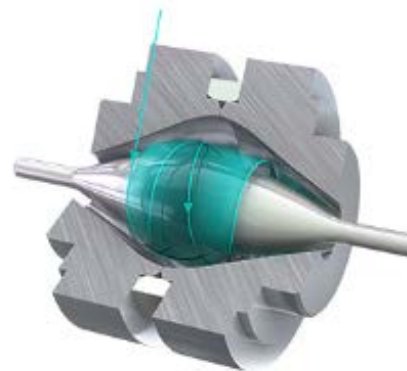
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Exactive GC Orbitrap GC-MS System

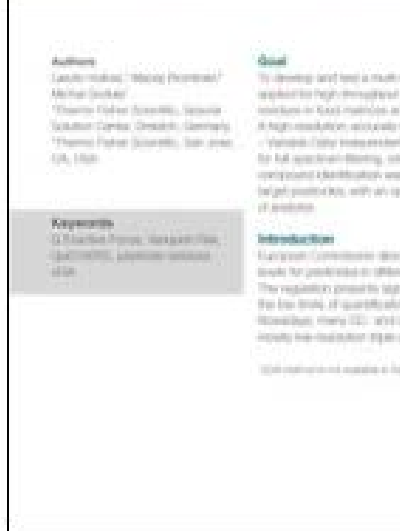
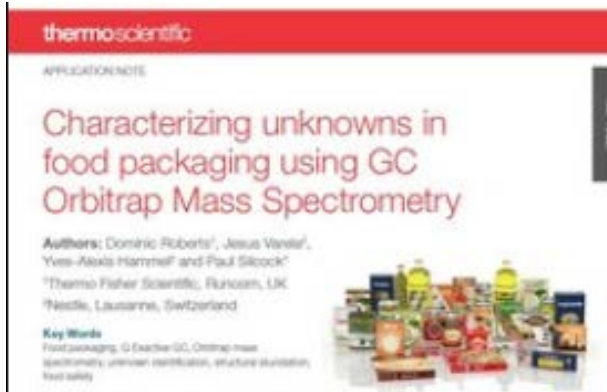
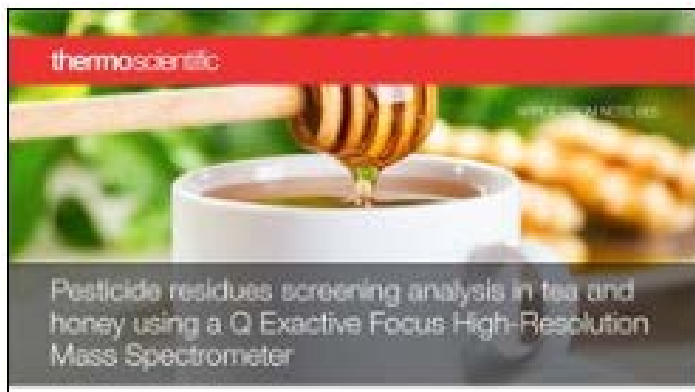


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Food and Beverage Applications Notes using GC Orbitrap MS



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APPLICATION NOTE

Routine Quantitative Method of Analysis for Pesticides using GC Orbitrap Mass Spectrometry in accordance with SANTE/11945/2015 Guidelines

Authors: Dominic Roberts¹, Samanta Ucles Duque², Amadeo Fernández-Alba³ and Paul Slcock⁴; Thermo Fisher Scientific, Runcom, United Kingdom; ²European Union Reference Laboratory for Pesticide Residues in Fruits and Vegetables, University of Almería, Spain

Keywords: Pesticides, QuEChERS, Complex matrices, GC Orbitrap Mass Spectrometry, Quantitation, Accurate Mass, TraceFinder

Introduction

The international trade in food commodities has enabled a wide variety of fruits and vegetables to be made available year round. However, this also creates a challenge for food safety regulators who seek to ensure a safe food supply chain, particularly with regard to the potentially hundreds of different pesticides in use across the globe. The European Union (EU) has some of the most stringent pesticide residue regulations. In 2008, it implemented regulation EC No. 396/2005¹, which sets default maximum residue levels (MRLs) at 10 µg/Kg for all pesticide/commodity combinations for which no substantive MRL had been set. Further to this, in 2009, the pesticide safety review EU 914/4/EEC² led to the approval of approximately 250 pesticides and effectively set the permissible level for all other pesticides to the default limit (10 µg/Kg). Recently, at the beginning of 2016, the latest version of the SANTE/11945/2015 guidance document on analytical

quality control and validation procedures for pesticide residues in food and feed took effect.³ This document describes the method validation and analytical quality control (AQ) requirements to support the validity of data reported within the framework of official controls on pesticide residues and used for checking compliance with maximum residue levels (MRLs), enforcement actions, or assessment of consumer exposure. It is intended for use by official control laboratories in Europe, but in practice it is used by pesticide laboratories worldwide. Implementation of the stringent requirements present a major challenge to testing laboratories who seek to provide an accurate and cost competitive service.

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APPLICATION NOTE

Fast Screening, Identification, and Quantification of Pesticide Residues in Baby Food Using GC Orbitrap MS Technology

Authors: Cristian Copcaru¹, Dominic Roberts², Michael T. Hermans³, Richard J. Fussell⁴ and Paul Slcock⁵; ¹Thermo Fisher Scientific, Runcom, UK; ²Food and Environment Research Agency (FERA), York, UK

Keywords: Baby Food, Exact Mass, Screening, Food Safety, GC Orbitrap, High Resolution GC-MS, Pesticide Analysis, Quantification, TraceFinder

Introduction

Pesticides are chemicals widely used to control a variety of pests, such as insects, plant pathogens, weeds, etc. The use of pesticides may result in residues in crops, therefore, strict regulations are in place to control the use of these chemicals and to ensure that concentrations do not exceed statutory maximum residue levels (MRLs).

Pesticides are measured almost exclusively by liquid chromatography (LC) and gas chromatography (GC) analytical methodologies. GC coupled to a mass spectrometer (MS) as a detector is widely used in many pesticide residue laboratories, because many pesticides are not amenable to LC-MS or ionize poorly under soft ionization techniques. GC offers good separation efficiency and a choice of MS detectors, including single or triple quadrupoles. Quadrupole mass analyzers are selective, sensitive, and cost-effective instruments that operate at nominal mass resolution. When using quadrupole MS, the selectivity required to separate target pesticides from chemical background is achieved by the use of either selected ion monitoring (SIM) or selected reaction monitoring (SRM). Both SIM and SRM are used in targeted experiments in which the mass spectrometer is pre-programmed using a list of predicted pesticides. However, targeting specific compounds during acquisition limits the scope of analysis and can result in false negative results (non-detection) for both unknown and unexpected compounds, which may be of concern with respect to food safety.

This limitation has led to increased interest in developing methods using MS analyzers that can operate in full scan with a higher mass resolving power than triple quadrupoles, but provide similar levels of selectivity and quantitative performance. Until now, high-resolution, accurate-mass GC-MS instruments have not gained wide acceptance due to their limited ability to provide full scan selectivity and quantitative performance comparable to triple quadrupole instruments operated in SRM.

In this work, we demonstrate the use of GC coupled to Orbitrap[®] MS technology for fast, high-throughput pesticide residues analysis in baby food samples, with an almost unlimited scope in the analysis through full scan acquisition. Quantitative performance comparable to triple quadrupoles and compliance with SANCO guidelines⁴ will also be demonstrated.

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