

# Laboratory EQUIPMENT<sup>®</sup>

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LaboratoryEquipment.com

Featured New Product



## High-Temperature Digestion System

*Designed to Handle Smaller Sample Loads*

Responding to the needs of smaller labs, SCP SCIENCE has introduced its DigiPREP high-temperature digestion system in a more compact, 10-position model. Improvements from the original DigiPREP HT blocks include deeper wells—which increase heat transfer to the samples and in turn speed up digestions—and an integrated dual-glass window, which makes it easier to keep an eye on samples.

All DigiPREP HT blocks operate with a high-temperature thick-film heating mat coupled to an energy-efficient coated graphite digestion block, which provides a better than  $\pm 3$  C variation across the block. Offering a maximum temperature of 450 C, the block can heat to 380 C

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Special Feature by Bernard Tului

# Keeping Food Safe

*The Latest Analytical Tools and Techniques for Monitoring Food Safety*

A stellar outcome from the rapid growth in international commerce and trade has been a dramatic increase in the variety of foods crossing national and regional boundaries. While this has engendered almost unlimited consumer choices, it has also caused grave concerns about the spread of contaminants and toxins and the overall safety of our food.

"The biggest issue is the proliferation of chemical materials that are used either in farming or in the food industry," states Jim Willis, managing director, Chemical Analysis, Waters Corporation. "Pesticides, veterinary drug residues and other substances that farmers add to enhance the growth of their animals or food stocks or to prevent dis-



ease could be deleterious to consumer health," says Willis.

"The potential risk has increased because the right mechanisms for monitoring or the standards for compar-

isons are not set up universally," adds Sandra Rasmussen, director of EcoAnalytix and Strategic Programs for Analytical Sciences at PerkinElmer. She notes that while there are efforts to apply the same standards to food globally, they are hardly all in place now.

Her colleague, Alessandro Baldi, business manager for Liquid Chromatography (LC) at PerkinElmer, further explains that most foods con-

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sist of organic materials and appropriate regulated additives that enhance shelf life, color, taste or flavor. These regulations are firmly entrenched in the United States and Europe. "In some other parts of the world not all the regulations are in place, and now that foods from many other countries are entering the U.S. or European markets, they may pose a risk," says Baldi.

Such substances have been in the food supply for some time and their public health effects are not known with any degree of certainty. Willis believes there has been much more public awareness during the last five years. This has been driven by highly visible public reports of tainted agricultural products, seafood and pet food among others imported from several countries.

To be sure, there are considerable efforts afoot to find answers to this issue. Yet Rasmussen doesn't think there is a single answer. In October 2007, she participated in a cross functional panel held in Washington, DC that comprised government agencies, the public, and private sector industries. She notes that it was clear from the proceeding that "we will not be able to enforce our way to safety."

"Regulation is absolutely critical, however, it is also necessary to provide guidance, education and training to the entities that are importing or exporting food," she explains. "Other countries cannot just enforce our regulations; we need to help them understand the importance of the regulation and how to achieve the ability to become compliant."

According to Rasmussen, a big part of the answer is appropriate measurement tools and the attainment of a solid understanding of both the regulations and how to apply the measurements to ensure compliance.

This is already translating into increased demand for food analysis instrumentation. "In the food safety area, we have definitely seen an increase in demand for specifically our inorganic and chromatography products," says Rasmussen.

"We believe this is a very strongly growing market," affirms Willis, "and we do not see that changing over

the next ten years."

"PE has the breadth of technologies—hardware, software or consumables—to address the complete value chain of food safety issues," says Rasmussen. "In addition to offering a wide breadth of technologies, we also focus on specific applications and design analyzers for specific concerns, such as melamine analysis."

With some 70 years in the analytical instrumentation business, PE's product offerings embody an impressive range of technologies. In the food safety area, its instruments and technologies include GC-MS for the determination of the type of pesticide and residue amounts on raw foods; ICP-OES for the measurement of metal contamination in raw foods, such as lead (Pb); GC-MS analysis of finished products for melamine and related adulterants; and HPLC for the analysis of aflatoxins in nuts, wine and seeds. The company also offers laboratory information management systems (LIMS) that enable customers to manage the information from the analyses.

In food safety analysis, there are two different scenarios, according to Baldi. One entails routine analysis with well-known and established systems backed by a solid base of literature. "In this scenario we offer analyzers that help to speed up the ramp-up period and minimize errors. These are well established, so we provide standard operating procedures and a robust supporting infrastructure," says Baldi.

There is also the emergency scenario where unexpected compounds show up in samples. "I remember being personally involved in a case in 1998 in Europe where we found dioxin in sausages," Baldi shares. "The pigs they were made from were fed, among other feedstock, mineral oil from transformers. This was completely unexpected, and we had to develop a solution in a timely manner to address a new need and to train people for something completely new."

PE also has a series of spectroscopy instruments to determine the composition of packaging materials, especially plastic, which is used extensively for this purpose. The instruments help to establish whether plastic wrapping is food

quality or a counterfeit that may contain chemical and toxic contaminants, which may leach out, according to Rasmussen.

Biotage offers products for food analysis, including extraction columns that have a range of chemistries for the analysis of different compounds. A four-step method built around its Isolute Multimode SPE columns is used for the extraction and clean-up of acrylamide from various foodstuffs.

"The detection of acrylamide has become paramount over the last six years or so in many food testing labs," says Joanna Smith, associate product manager, IST Sample Preparation &

*"In the food safety area, we have definitely seen an increase in demand for specifically inorganic and chromatography products."*

Work-Up Products at Biotage. Acrylamide, which is believed to be linked to cancer, was accidentally discovered by a group of Swedish scientists in 2002. Large amounts of the chemical are present in starchy foods like potato chips and bread.

"The Isolute system contains three different types of retention mechanisms, which facilitate the removal of matrix components like proteins, fats and sugars such that only acrylamide, which is water soluble, remains in the extract," says Smith. The major users of this system include food safety agencies, government laboratories, food manufacturers, public analyst groups, and contract research organizations among groups that need to analyze food for particular substances such as pesticides and dyes.

"In essence, our system cleans up the sample, making analysis a lot easier by imposing less strain on the analytical technique," she says. This application, which is based on solvent extraction, is simple and easy to implement, she adds.

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"Waters offers a complete range of technological solutions and analytical instrumentation for food analysis," says Willis. With more than 45 years in the field, the company offers instruments that incorporate liquid chromatography, mass spectrometry, informatics software,

*"Food is a very complex market so, most of the time, one shot at a sample is not enough—but must be done several times to validate results."*

and column technologies, backed up with services. Its food safety offerings include a broad spectrum of food safety applications along with methods to identify and quantify xenobiotics at trace-levels in everyday foods.

The company's Alliance LC-MS, LC-MS-MS, and GC-MS systems are widely

used for compound verification and deliver the level of specificity required for the processing of complex analyses. Its ACQUITY Ultra Performance LC system is designed to help laboratories reduce analysis times, accelerate sample throughput and enhance chromatographic resolution.

According to Willis, by combining its laboratory informatics data management software—including eLab Notebook, Nugensis SDMS, Analytical WorkFlow Manager, Empower and MassLynx—with its analytical instrumentation, the company is able to provide end users with a complete laboratory solution, which is especially valuable within a regulated environment.

"In the near future, analytical instrumentation will become much more user friendly; prices will continue to come down and there will be more dedicated systems for specific applications," says Willis.

He adds that more countries will take on a role in the testing of their exports before they leave the country, adding

that this could well result in cleaner food and water throughout the world.

Willis believes, "The volume of samples will go up dramatically so there will be a need to process them faster. There will probably be an increase in the ability to automate sample preparation."

"From the technology standpoint, there will be a big demand for sensitivity, throughput and informatics," says Baldi. "First there will be the need to run a lot of samples to generate data redundancy. Food is a very complex market so, most of the time, one shot at a sample is not enough—but must be done several times to validate results."

"From the market view, I would say that these trends will continue," he adds. "Consumers here need the assurance that products on the shelf are safe and viable regardless of their origin. As other countries develop and grow, the same standards will be expected by their populations."

"I think the demand will continue," agrees Rasmussen. "In addition to standard analytical technologies that are expanding in the marketplace, there will be a continuing or even growing need for simpler screening technologies that give a certain level of understanding about the status of a product that might then go through a more rigorous confirmatory analysis." ●

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### Featured New Product

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in 35 minutes. Coupled with a touch-screen controller, the block can be programmed with up to six steps to optimize the digestion sequence.

"We found there were labs that digest smaller sample loads," says SCP SCIENCE New Business Development Manager Art Ross. "With the proven technology and with more than 300 of the larger units in labs around the world, it was a no-brainer to produce a smaller unit with all of the features and benefits of the DigiPREP HT system." ●

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