

Meeting the Laboratory Productivity Needs of High Volume, Ultra Trace Analysis with DualData GC-MS Workflow Solution

WESSLING Group, Altenberge, Germany

Introduction

WESSLING Group, founded in 1983 in Westphalia, Germany by Dr. Erwin Wessling, has grown into an international enterprise of approximately 1,000 employees with 32 locations in 10 countries. WESSLING provides a wide range of engineering and chemical analysis testing services for food and environmental samples: waste, soil, air, energy, food, animal feed, consumer products, pharmaceuticals, cosmetics, health/safety, and water.

Analyzing food, feed, and environmental samples for dioxins and dioxin-like polychlorinated biphenyls (PCBs) is an important part of the company's business. In a typical year, the organization analyzes several thousand samples. The WESSLING laboratory in Altenberge, Germany is the worldwide "center of competence" for dioxin analysis. Food samples include eggs, milk, meat, and animal feeds. Environmental samples include air, water, and sewage sludge.

The internationally operating WESSLING Group pioneered the DualData Acquisition configuration using the Thermo Scientific™ DFS™ high resolution GC-MS to streamline analysis of ultra trace levels of dioxins and dioxin-like PCBs.



WESSLING Group laboratory manager Olaf Wellermann.

The company emphasizes fast customer service. Savings of time and costs are extremely important. In addition, WESSLING prides itself on its ability to respond to crises such as the discovery of dioxin in chicken eggs in Germany traced to contaminated feed. The main challenge is that the European Union requires detection of dioxins in food and water down to ultra trace levels. Analysts frequently work in a concentration range of a few femtograms per 10 g.

DualData Acquisition High Resolution GC-MS

To address this challenge, WESSLING adopted the Thermo Scientific DFS High Resolution GC-MS system, which offers outstanding sensitivity for persistent organic pollutants like dioxins. WESSLING then pioneered the DualData Acquisition configuration to boost sample throughput. WESSLING worked closely with the development team from Thermo Fisher Scientific™ in Bremen, Germany, to configure two gas chromatographs connected in parallel to a single mass spectrometer, and to develop a "dual data" acquisition feature

for the standard operating software. This allowed them to greatly increase throughput by utilizing what was previously "dead time" when no analytes elute from the column. Now, when the first column is sending analytes to the mass spectrometer, the next injection for the other column can be prepared while high boiling eluents are baked out the second column. The bottom line is the ability to fully utilize the mass spectrometer's capacity.

"The throughput of such a system is 60% to 70% higher than a single GC-MS system," observes Dr. Heinrich Ruholl, WESSLING managing director of production and technology. "During standard operation, we often use two different chromatographic columns for different analyses such as PCBs and dioxins/dibenzofurans. In rush times it is very straightforward to configure both GCs to the same column and use them in DualData Mode."

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Accelerated Sample Preparation

The workflow of the WESSLING dioxin analysis lab includes sample registration, freeze drying, homogenization, and fat extraction. To further increase throughput, WESSLING also adopted the Thermo Scientific™ Dionex™ ASE™ 350 automated accelerated solvent extraction system. The system extracts fat from a sample in the range of minutes compared to up to 24 hours of the previous workflow utilizing Soxhlet extraction.



Dionex ASE 350 automated accelerated solvent extraction system.

Accelerated solvent extraction is a proprietary technique for the extraction of solid and semisolid sample matrices using common solvents at elevated temperatures and pressures. The Dionex ASE 350 system features a carousel that holds as many as 24 samples, 1 to 100 g each.

Conclusion

WESSLING's DFS High Resolution GC-MS system configured for DualData Acquisition is normally in routine operation 24-hours-per-day, seven-days-per-week. Technical teams from WESSLING and Thermo Fisher Scientific worked closely together to develop and optimize the DualData acquisition solution, and both companies agree that the benefits are well worth the effort. Dr. Ruholl says the lab is very happy with the system's performance and also with the support provided by the team from Thermo Fisher Scientific in Bremen. In fact, after using the system for about 18 months, WESSLING recently took delivery of a second DFS GC-MS system configured for DualData operation.



New instruments are delivered to a WESSLING laboratory.

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Dr. Heinrich Ruholl, WESSLING Managing Director of Production and Technology.

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