

Embedding versatility: How Biochemie Lab future-proofed its environmental air analysis

How do you ensure your contract lab can cope with changing analytical demands? Facing an increased number of ‘whole-air’ analysis requests from industrial clients but wanting to keep their options open, Mattia Belli and colleagues at Biochemie Lab decided to invest in a versatile system from Markes able to handle canisters, Bottle-Vacs™, Tedlar® bags and sorbent tubes. As we describe in this case-study, the results are not only excellent analytical performance and streamlined workflows, but an ability to adapt easily to whatever the future may bring.

Accommodating changing needs in industrial air monitoring

Contract analysis of industrial air brings with it several challenges – including a wide range of sample concentrations, long lists of chemically disparate target analytes, the requirement to align with tough standard methods, and the need to adapt to changing customer preferences for sampling modality.

Back in 2022, it was the latter issue that was bothering GC–MS analysts at [Biochemie Lab](#), based in Florence, Italy – a family-founded contract lab with a focus on analysis of environmental samples, foodstuffs, and food contact materials, and with an analytical throughput approaching 200,000 samples per year.

For some while, they’d been serving industrial customers, primarily in Italy, who although usually using charcoal tubes for air monitoring by CEN/TS 13649, were increasingly asking for canisters analysed in accordance with US EPA Method TO-15A. However, although Biochemie Lab had a wide range of sampling equipment for GC–MS, they didn’t have a canister sampling system, and so initially they were outsourcing analysis of these samples to a third-party.

But as **Mattia Belli**, Environmental Analytical Chemist at Biochemie Lab, explains, this process was more costly, and not particularly efficient: “Coordinating subcontracted analyses meant aligning our schedules with the external laboratory, and turnaround times could easily stretch. Managing all the logistics around shipping, receiving and planning the analyses made the process very time-consuming for certain projects”.

So Mattia and the team – which included his supervisor **Dario Vannucchi** and Operations Manager **Roberto Riccio** – decided to investigate options for canister sampling systems. The challenge, said Mattia, is that they needed to embed versatility in the system they chose, because they weren’t just looking for the ability to run canisters: they



CUSTOMER

Biochemie Lab, Florence, Italy

APPLICATION

Contract industrial air monitoring

CHALLENGE

Bringing canister analysis in-house while also being able to offer other sampling modalities

SOLUTION

UNITY–ULTRA–CIA Advantage-xr™ with Kori-xr™

RESULTS

Excellent analytical performance and streamlined operation for canisters, Bottle-Vacs™, Tedlar® bags and tubes, all on a single system

“ The fact that our UNITY–ULTRA–CIA Advantage-xr can carry out analysis of both tubes and canisters is a great gain! ”

also needed to be able to analyse other whole-air sampling devices, including Bottle-Vacs and Tedlar bags. In addition, they were interested in making the system fully future-proof by having the capability to analyse sorbent tubes too. “We needed the platform to be capable of sustaining all future requests from our customers... and with space tight in the lab, the system needed to be compact as well”, he explains.

The answer to this conundrum came by way of a recommendation from staff at their local environmental agency, who were happily using Markes’ equipment for analysing air samples collected using canisters. Encouraged by the knowledge that this system was working successfully for them, the team at Biochemie Lab aimed to mirror this setup, and so got in touch with Markes’ local distributors [SRA Instruments](#) to explain their needs.

Excellent performance with adaptable workflows

The result is that the team now have a UNITY-ULTRA-CIA Advantage-xr platform with Kori-xr for water management, capable of running canisters, Bottle-Vacs and Tedlar bags, and automating the analysis of sorbent tubes in compliance with US EPA Method TO-17. They also have a canister cleaning system to take the hard work out of getting their canisters spotless. This ability to run various sample types on a single system simplifies their workflows, says Mattia, and is the major advantage for them: “The fact that it can carry out analysis of both tubes and canisters is a great gain, because we can easily switch between them to make best use of the time available, while maintaining the same chromatography and the same calibration responses”.

The UNITY-ULTRA-CIA Advantage-xr platform, with Kori-xr water management, used by the GC-MS team at Biochemie Lab, set ready for analysis of 6 L canisters (left), Tedlar bag (centre) and Bottle-Vac collection vessels (right).



The Kori-xr water management module is an important part of their system because of the very variable humidity of the samples they receive. Mattia explains that, although he performs calibration using canisters humidified to 50% RH, sometimes the samples he receives are near 100% RH. But now, thanks to Kori-xr, they don’t see any water interference with the compounds that they analyse routinely: “The Kori-xr water management is very good!”, he says.

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Most of their canister work involves assessing samples for the presence of the ‘air toxics’ listed in Method TO-15A, although some customers request a modified method for aliphatic and aromatic hydrocarbons, and occasionally sulfur hexafluoride. Their system can handle all of these, he explains, and they’ve been very pleased with the performance.

In fact, Mattia explains that the laboratory has demonstrated that the system can reach the sensitivity required by US EPA Method TO-15A (20 pptv), even though industrial customers typically don’t require detection limits this low, instead generally being in the ppbv range.

Expanding analytical capabilities to address customer needs

Mattia says that the team didn’t have previous experience running a TD system, but their learning curve was made a lot easier thanks to the in-built analytical templates in the system software, the application notes on the Markes site, and the support they received from staff. “I found the customer care of Markes really, really superior – congratulations on building such a great team!”, he says.

And with their compact TD system now firmly embedded in their lab's workflow, the team at Biochemie Lab are pleased with what it's offering them in terms of performance. "Other techniques just don't compare", Mattia says: "For a high-throughput laboratory like ours, being able to reliably perform target analyses of many samples from different sites for different clients is so important". The TO-17 capability is also a big plus, he says, to enable them to adapt to customer needs and ensure they're ready for whatever the future brings.

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That robustness and versatility are helping them expand what they offer to customers. "We're now one of the few labs that perform in-house canister analyses of industrial air in Italy", Mattia points out. And with strong demand for their canister analysis service, they're already considering adding a CIA Satellite module to increase their capacity even further. "We're very happy with our configuration, and its versatility has really enabled us to move our work forward!", Mattia concludes.



Mattia Belli is an experienced environmental analytical chemist with both academic and corporate expertise in GC techniques. At Biochemie Lab, he specialises in analysis and method development using GC and GC-MS, using diverse injection systems such as liquid, headspace, purge-and-trap, and thermal desorption. His expertise includes EPA method compliance and the development of operational protocols for identifying and quantifying VOCs and SVOCs in various environmental matrices, including air, water and soil.

Dario Vannucchi is a supervisor for the Environmental Department at Biochemie Lab, where he has responsibility for all the processes involved in the analysis of air and water samples. Previously, he was a senior specialist with over a decade of experience in GC-MS and GC-MS/MS analysis in various matrices.

Roberto Riccio is Technical Director at Biochemie Lab, where he has been since 2016. Prior to that, he was a Field Support Specialist and Team Leader for GC and MS instrumentation at Hewlett Packard/Agilent Technologies, where his work included training engineers and developing methods for chemical analysis and regulatory compliance.

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