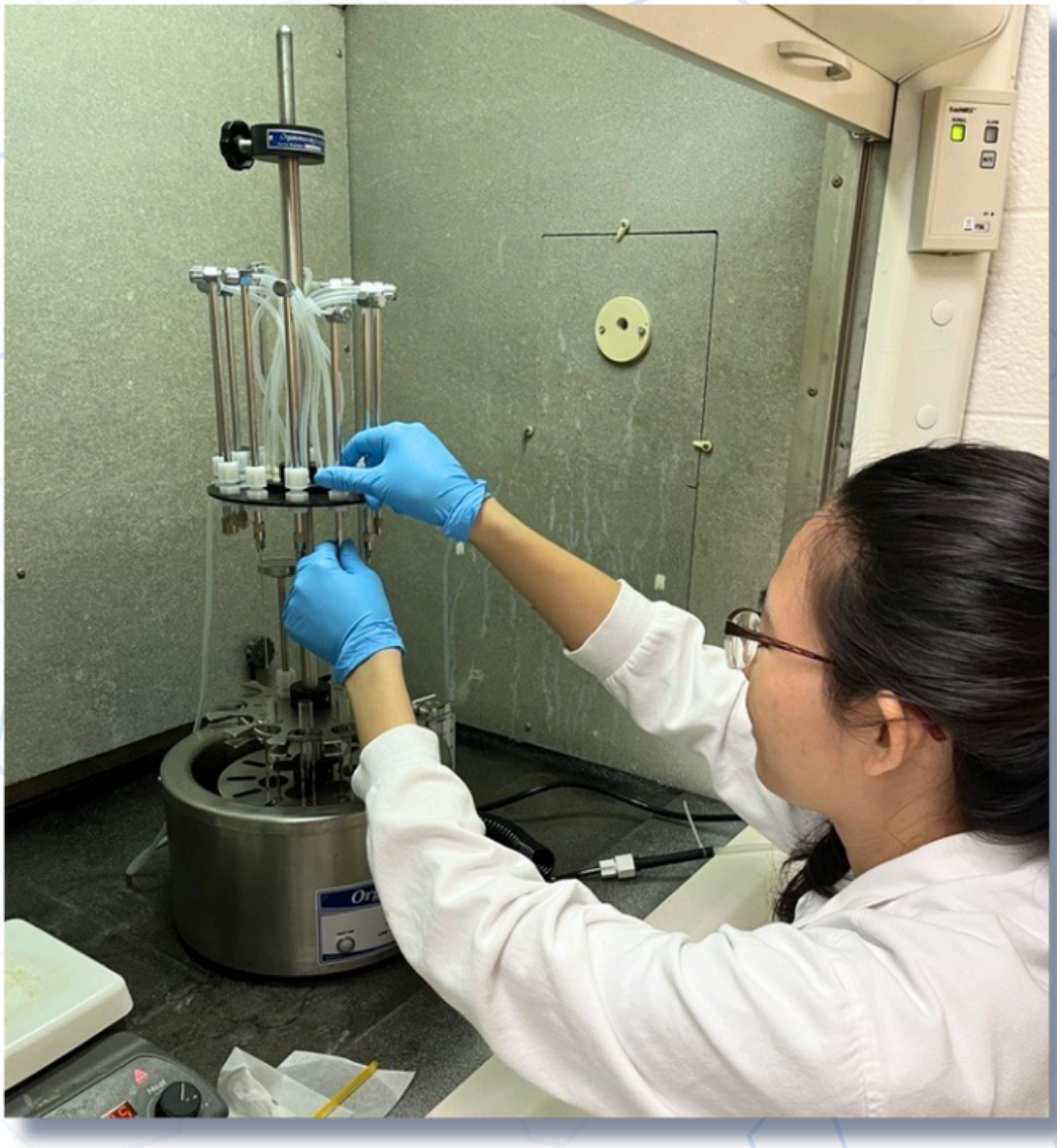
Organomation
266 River Rd West, Belin, MA 01503 | +1 (978) 838-7300 | sales@organomation.com

University of CINCINNATI



Case Study:

University of Cincinnati Transitions to a N-EVAP Nitrogen Evaporator to Speed Up Environmental Sample Preparation

APPLICATION

The Department of Chemical & Environmental Engineering at the University of Cincinnati specializes in analyzing environmental samples, including water and sediment, with a focus on quantifying organic pollutants such as PFAS (per- and polyfluoroalkyl substances) and PPCPs (pharmaceuticals and personal care products). A critical part of their analysis involves Solid Phase Extraction (SPE) using the Oasis HLB followed by Liquid Chromatography-Mass Spectrometry (LC-MS) using the Agilent Q-TOF.

THE CHALLENGE

Due to the sensitivity of their LC-MS unit, the lab must concentrate their samples prior to analysis. They typically have 10 samples per batch - each sample is 5 mL of either methanol or acetonitrile that must be evaporated to complete dryness.

Like many university labs, new equipment budgets remain low and grant funding can be few and far between. Because of this, they resorted to drying their samples with a makeshift evaporation setup in their fume hood. The setup allowed the mouth of the test tube to be pointed toward the compressed air outlet in their fume hood. Without a source of heat to the samples, this method took a little over 2 hours to dry down their excess solvent, and that wasn't even to complete dryness. They were also only able to evaporate 1 sample at a time, causing a bottleneck in their entire workflow.

With some end of year budgets available, the laboratory team started looking into acquiring sample evaporation equipment which is how they came across Organomation.

THE SOLUTION

Organomation has been manufacturing and supplying solvent concentration equipment to laboratories for over 65 years. Our team of industry experts was able to find a fitted solution for the University of Cincinnati that could meet their application's needs while staying within budget. The lab decided to go with a 12 position N-EVAP nitrogen evaporator from our refurbished inventory selection, which is a great way to acquire like-new equipment for a fraction of the cost. The 12 position N-EVAP was the perfect fit for their typical batch size of 10 samples, and even has room to include extra blanks if desired.

BENEFITS OF THE N-EVAP

Immediately after implementing the N-EVAP into their workflow, their team noticed significant improvement to their sample preparation process and overall efficiency. The biggest benefits the N-EVAP has provided the university include:

Time Savings:

The N-EVAP has drastically reduced evaporation time from more than two hours per sample to just one hour for a batch of 10 samples. This efficiency gain is significant in a busy research environment where productivity is crucial. The complete breakdown of these time savings will be covered in the next section.

Precision and Control:

The ability to individually adjust the flow rate and needle height for each sample allows for consistent and controlled evaporation. This level of precision was not achievable with their previous homemade setup.

Ease of Use:

The N-EVAP's simple design and ability to be left unattended has streamlined the evaporation process, reducing the need for manual intervention & minimizing potential errors.

Enhanced Sensitivity:

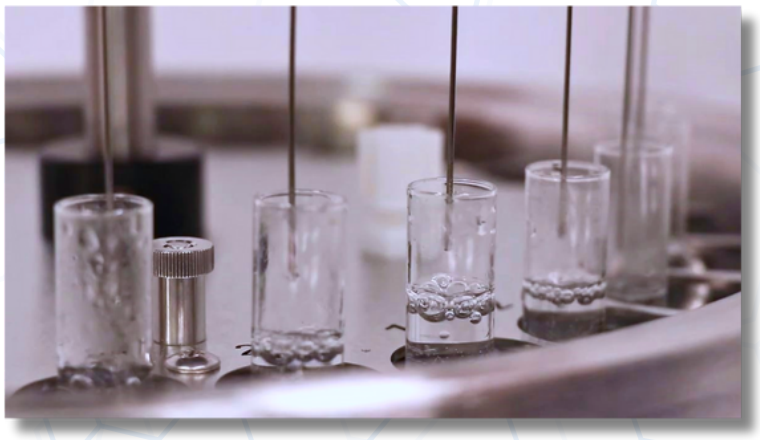
The N-EVAP easily evaporates their samples to complete dryness unlike their previous dry down process, allowing for more accurate detection of low-concentration analytes with their Agilent LC-MS.

20x FASTER RESULTS

All in all, the N-EVAP nitrogen evaporator has allowed the lab to prepare the same batch of samples 20x faster and with better results than their previous evaporation setup. Let's break down exactly where this number is coming from and what changes the lab has made to result in such a drastic increase in efficiency.

Increased Capacity:

The most obvious cause for these faster results is the ability to process up to 12 samples at once, rather than pain-stakingly drying one at a time.



Introduction of Heat:

When evaporating their samples in the fume hood previously, they were not able to use heat which resulted in fairly slow evaporation rates. Because the N-EVAP includes a gentle water bath, they are now able to introduce a source of heat to their samples, vastly increasing the evaporation rate of their excess methanol and acetonitrile. The university currently heats their environmental samples to about 35 °C. Depending on the heat tolerance of your

samples, the N-EVAP's water bath can reach temperatures up to 90 °C, resulting in even faster evaporation rates.

Switch from Compressed Air to Nitrogen:

One change the laboratory made that is unrelated to their new evaporation system is the switch from using compressed air to nitrogen gas to dry down their solvent. Because nitrogen is a dryer gas than even dry compressed air, it's able to produce ~10% faster evaporation rates. *Learn more:* Why nitrogen is ideal for drying samples

Before acquiring the N-EVAP, evaporation took about 2 hours per sample. To dry down a typical batch of 10 samples, it would take nearly 20 hours and they weren't fully dried as desired. After acquiring the N-EVAP, evaporation for a full batch of 10 samples to complete dryness only takes around 1 hour - **a significant 20X time savings**.

CONCLUSION

The switch to the N-EVAP nitrogen evaporator has proven to be a game-changer for the University of Cincinnati's workflow. By moving from a makeshift fume hood setup to an automated evaporation system, the department has significantly enhanced their analytical efficiency and accuracy. The N-EVAP has not only saved them valuable time but also improved the quality of their results, aligning perfectly with their goals of precise and reliable environmental analysis.

For more information on The University's Department of Chemical & Environmental Engineering and their work, visit their website here.

At Organomation, we are thrilled to support such impactful work and look forward to continuing to provide solutions that drive scientific and operational excellence. To discuss your specific evaporation needs and find the best solution for you, contact our experts at sales@organomation.com, or use our quick sample evaporator product finder.