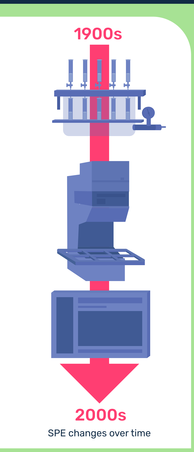
Bioanalysis ZONE
IN THE ZONE

Q² Solutions

Automation of sample preparation



SPE changes over time

Why is automation important?

Automating sample preparation for complex assays pays dividends to scientists and project management, as liquid handlers can streamline workflows and provide audit trails documenting every step of the extraction.

Q² Solutions was an early adopter of TomTec Quadra instruments. TomTecs **significantly increased speed and throughput** for solid phase extractions compared to inline-SPE. Similarly, more recent liquid handling platforms offer a similar jump in efficiency and productivity.

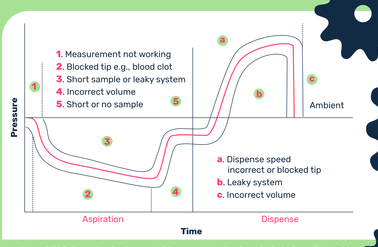
In 2010, we purchased our first **Hamilton STAR** instruments and have increased our fleet to a total of 7 across three bioanalytical sites. Utilization of Hamilton robotics have allowed extraction analysts to prepare anywhere from 10-30 assays per day to support both large and small molecule sample analysis.

The key to our success is creating a user-friendly experience. The programming for these robots can be challenging to understand, so clear prompts are embedded within each program to enhance the user experience and minimize errors.

Liquid detection and how to handle errors

To aliquot samples and prepare standards or quality controls, it is important to employ at least one form of liquid detection. Conductive detection can find the liquid surface, while pressure detection can monitor for clogs or other imperfect transfers.

Hamilton instruments come with both features, as well as anti-droplet control and total aspiration and dispense monitoring, TADM. TADM monitors the pressure in the pipetting chamber over the entire liquid handling process, and tolerance bands can be set to identify clogs, bubbles, and empty samples.



Hamilton STAR Total Aspiration and Dispense Monitoring (TADM) Over Time [1]

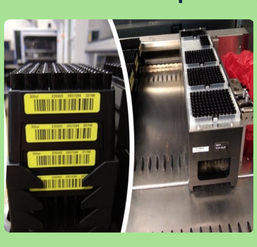
Because nearly all liquid handlers on the market use air displacement pipetting, it is crucial to optimize liquid class parameters. New liquid classes should be validated to ensure accuracy and precision.

Liquid removed prompt

Additional, there should be procedures to handle errors. We have more than 10 years of experience developing hybrid immunocapture-LC-MS methods to quantitatively measures peptides, proteins, and other large molecule therapeutics. If you are using a liquid handler such as a **Hamilton STAR**, immunocapture beads may need to be washed and conditioned, which involves adding reagent and then removing all liquid from a plate. For these types of transfers, it is important that residual rinse solvent is not left in the plate. It may be beneficial to allow the end user to perform an additional transfer should a tip become clogged.

When pressure detection is available, the user should not only be notified if a clog is formed but also how to proceed:
Does the tip need to be discarded? Is the sample empty?
Lorem ipsum

The future of liquid handling



Innovated approaches, such as microsampling, continue to generate interest in the regulated bioanalytical space. Our Ithaca lab has extensive experience with dried blood and plasma spot analysis, and more recently, Volumetric Absorptive Microsampling Tips, VAMS. VAMS are easily automated on liquid handlers. The amount of time the tips spend in the sample or extraction well is crucial and with automated liquid handlers, you can accurately define the dwell time. This is particularly relevant since this technique utilizes very small sampling volumes.

When evaluating where to save tips, it is important to ask: Does the change impact the liquid class being used? Will residual reagent in the tips cause any performance issues, such as liquid-level detection errors? While tip washers can produce savings, we found that this simple change was more labor and cost effective.

The evolution of automation has significantly impacted how we approach bioanalytical method development. With analytical approaches and drug modalities becoming increasingly complex, automation will continue to influence how we develop and optimize bioanalytical assays. We envisage R&D efforts will further revolutionize automation through enhanced programming software, simplified user interfaces, and a reduced physical footprint without compromising accuracy, precision, speed or throughput.


Microsampling with Mitra Tips

Lastly, microsampling has generated much interest in regulated bioanalysis. Our Ithaca lab has extensive experience with dried blood and plasma spots, and more recently Volumetric Absorptive Microsampling Tips, VAMS. VAMS are easy to automate on liquid handlers. The amount of time the tips spend in the sample or extraction well is crucial, and with automated liquid handlers you can accurately define the dwell time.

[1] Image provided by Hamilton AG; www.hamiltoncompany.com

This infographic has been created as part of a Bioanalysis Zone feature in association with Q² Solutions.

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