

# Novel Technologies for Sample Preparation



# Introduction

Sample preparation is a critical step for chromatography to ensure samples are optimised for analysis. This step involves various techniques such as, solid phase extraction (SPE), phospholipid removal (PLR) or protein precipitation. Without proper sample preparation, chromatographic performance can be compromised, leading to inaccurate and irreproducible data.

Porvair Sciences' comprehensive range of products for sample preparation includes a wide selection of consumables, such as the Microlute® range, sample collection plates, and vials. Additionally, we provide instruments such as the Ultravap® evaporators, vacuum manifold and UltraPPM LITE positive pressure manifold to ensure optimal sample preparation.

## Sample Preparation Collection

- **Microlute® CSi for silica solid phase extraction (SPE)**
- **Microlute® PLR for phospholipid removal**
- **Microlute® PPP for protein precipitation**
- **Microlute® SLE for supported liquid extraction**
- **Deep well microplates for sample collection, handling and storage**
- **Ultraseal™ range of adhesive and heat sealers for sample protection and storage**
- **Ultravap® range of blowdown evaporators for sample concentration**
- **UltraPPM LITE for positive pressure processing**

For more information, check out [www.microplates.com](http://www.microplates.com) to learn more.

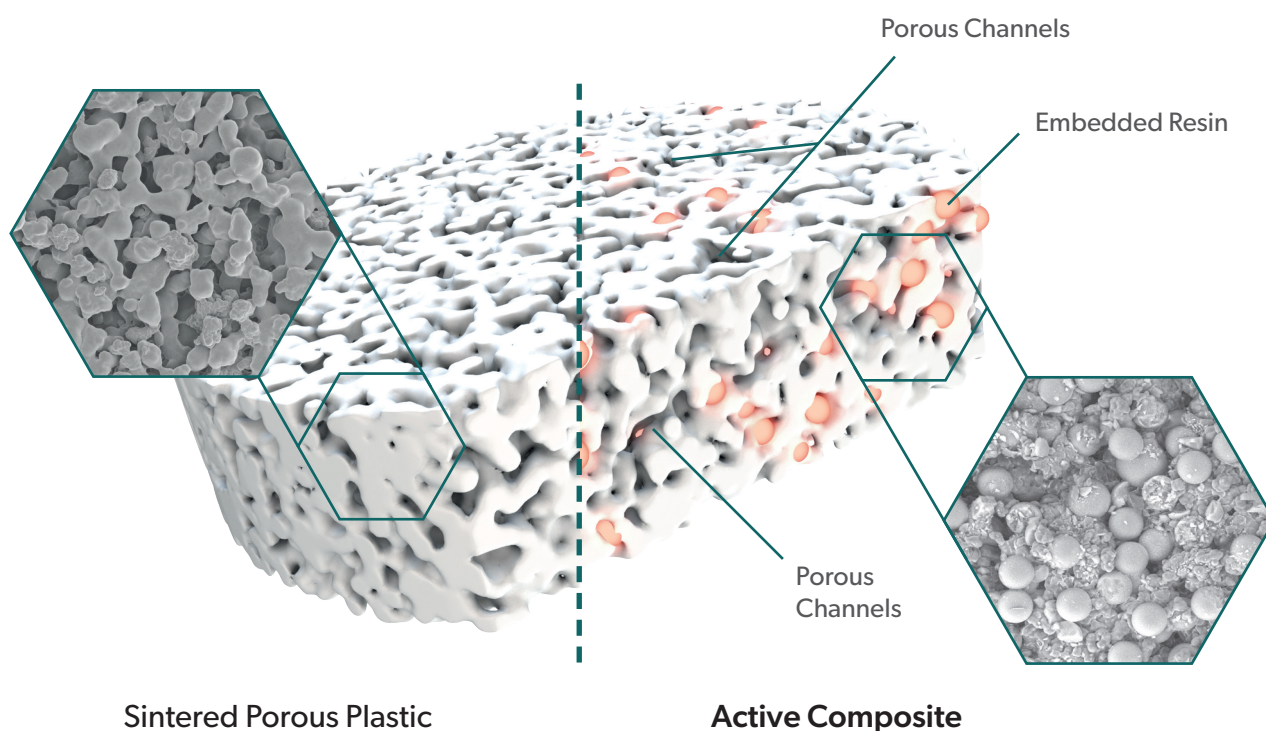


# Microlute® Composite Technology

For many years, Solid Phase Extraction (SPE) has been performed using plates and cartridges packed with a bed of loose media. Extracting samples of interest while removing contamination from samples presented to the chromatography system results in lower costs associated with detector maintenance and extends column lifespan. Cleaner samples also improve specificity in analysis and increase sensitivity. Traditional products, however, have inherent limitations in reproducibility of flow and recovery. The innovative composite technology found in the Microlute® range greatly improves flow consistency providing a step change in the reproducibility of processing and analyte recovery.

The Microlute® technology features a robust porous plastic structure that contains chromatographically active media immobilised within uniformly distributed pores. This porous composite structure allows for greater control of flow when performing cleanup methods such as SPE. Controlled flow of samples through the active media maximises removal of contaminants and recovery of analytes with greater reproducibility. Microlute® gives you consistency and confidence in your sample preparation method each and every time.

## One Structure, Multiple Advantages



## Features & Advantages

### Rigid Structure

The composite filter is made from sintered porous plastic to form a rigid, inert structure, an ideal foundation for sample clean-up and extraction.

### Porous Channels

The interconnected pores form pathways that are evenly distributed across the composite to allow controlled flow of liquids and gases throughout the material.

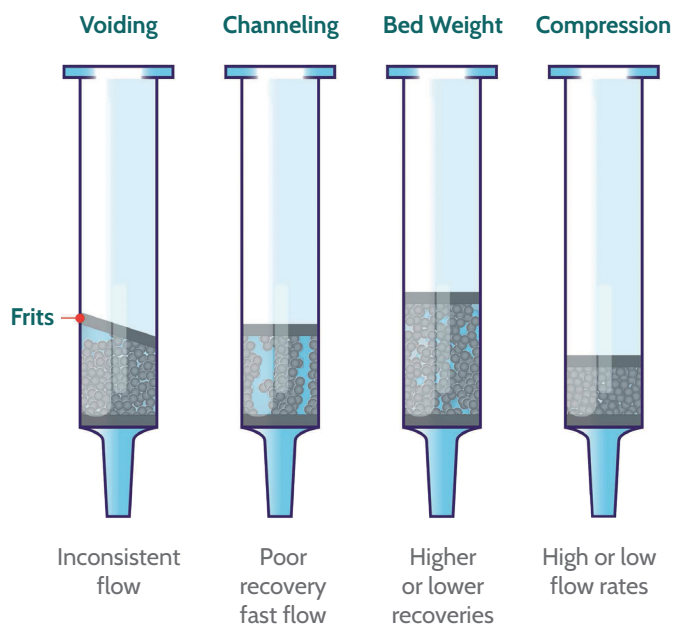
### Embedded Resin

Chromatographically active resins are embedded evenly throughout the porous structure to maximise interactions between analytes and capture media.

# Microlute<sup>®</sup> Composite Technology

## Challenges with Loose Packed Methods

Loose packed formats are traditionally used in sample preparation for chromatography. These are associated with inconsistent flow rates that are often too slow or too fast for optimal analyte capture or release. This is largely due to the inherent problems with packing of loose particles (over-compression, under-compression, inconsistent bed weight and voiding) in plate wells and cartridges.

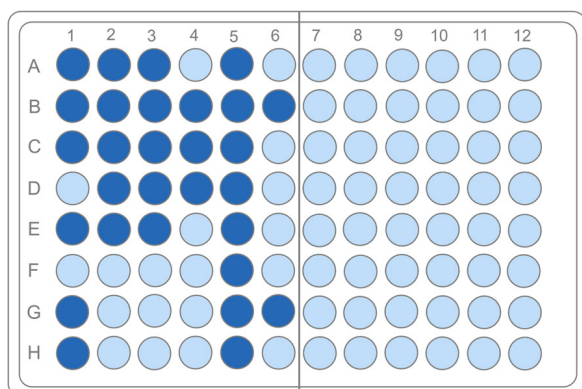


Replacing loose particles with a single composite structure is a key step forward in improving the performance of sample preparation methods. The interconnected network of evenly distributed pores allows liquids to flow smoothly and consistently through the filter.

For methods such as SPE, this open structure enhances interactions between the active solid phase and samples for maximum removal of interferences or retention of analytes.

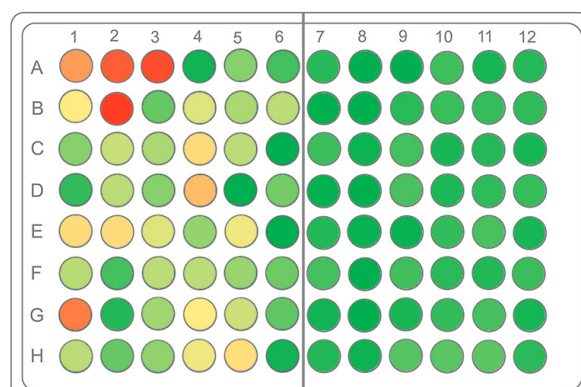
## Uniform Flowthrough

The image below demonstrates a key advantage of composite-based silica SPE; the consistent and uninterrupted flow of samples. The Microlute<sup>®</sup> CSi C18 96-well plate ensures that samples flow seamlessly and consistently through every well, unlike the loose packed plate which sees a highly variable flow rate well-to-well. Achieving uniform sample flow across the wells of a plate enhances analyte recoveries, reduces processing time, optimises the use of reagents, and most importantly leads to exceptionally low relative standard deviations (RSDs).



**Loose packed**  
Inconsistent flow rate through loose packed media

**Composite**  
Uniform flow through the composites across the entire plate



**Loose packed**  
Variable recovery data resulting from inconsistent flow rate through loose packed media

**Composite**  
High recovery, low variability resulting from consistent flowthrough across the plate



Scan the QR code to see the video of the flow through each product

# Microlute<sup>®</sup> Composite Technology

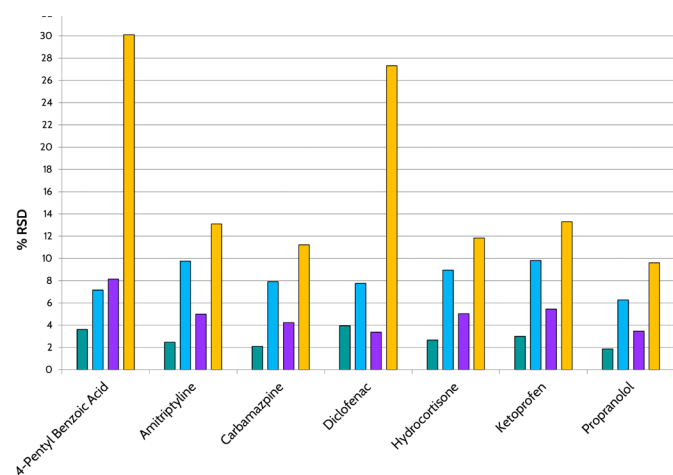
## Enhanced Reproducibility & Reliability

The Microlute<sup>®</sup> composite technology improves the consistency of analyte-resin interactions. This contributes to an increase in the quality of the data generated, which in turn reduces the need for repeated testing. This not only saves time but also boosts confidence in the data.

The data below shows an improvement in reproducibility using a Microlute<sup>®</sup> composite compared to popular loose packed products.

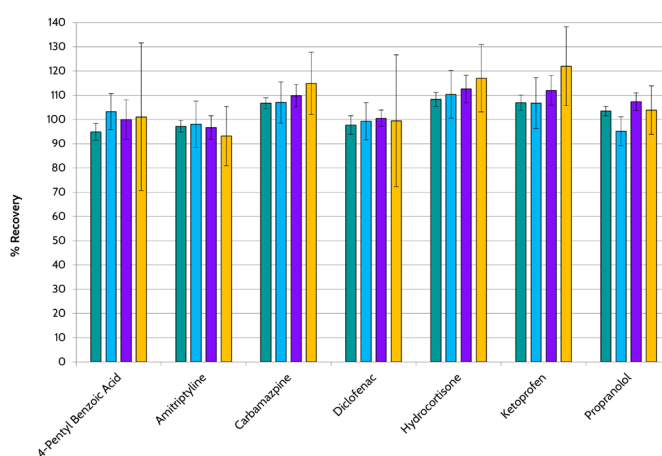
Legend ■ Microlute<sup>®</sup> Composite ■ Competitor A ■ Competitor B ■ Competitor C

### Market Leading Reproducibility



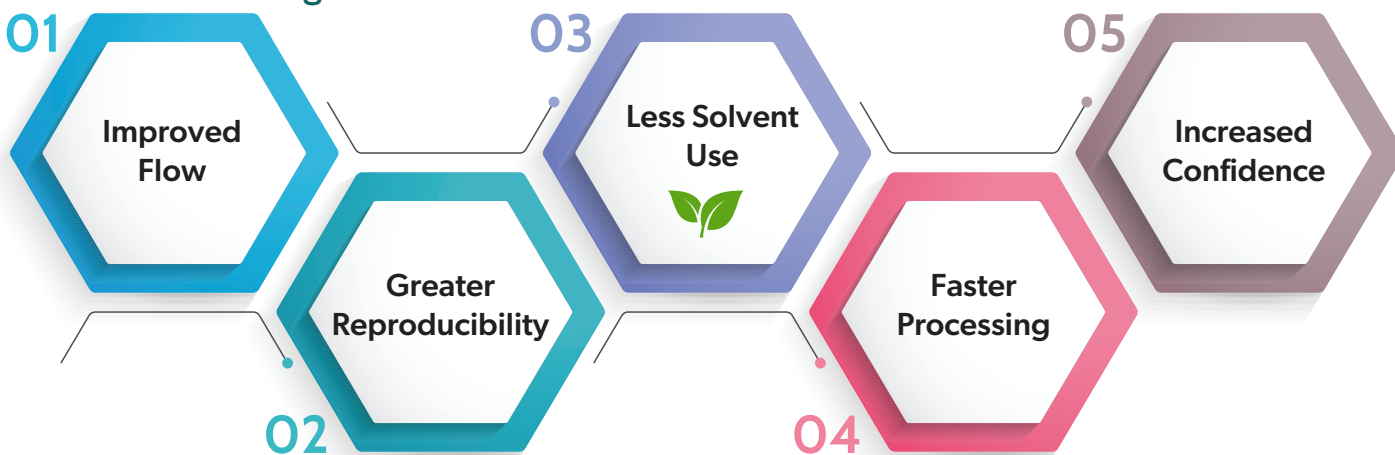
Less than 4% RSD for reliable contaminant removal (e.g. phospholipids) and analyte recovery first time and every time.

### Maximum Recovery



Greater than 90% recovery with high levels of reproducibility for a wide range of acidic, basic or neutral analytes.

## Workflow Advantages



### Did You Know?

The silica composite not only enhances the efficiency of sample clean-up methods but also contributes to a reduction in solvent usage. The Microlute<sup>®</sup> technology ensures optimal analyte recoveries while eliminating unnecessary repetition that leads to wasteful practices. Start your sample preparation workflow with an environmentally conscious approach with Microlute<sup>®</sup> composite technology for a greener and more efficient process!

# Microlute<sup>®</sup> CSi - Silica SPE

Silica-based solid phase extraction (SPE) is an established and widely-used form of sample preparation used in analytical laboratories. Due to its unique selectivity, silica SPE has emerged as the predominant technique for a diverse array of applications over the years. This familiarity and understanding are in part due to the similarities between the silica SPE process and High Performance Liquid Chromatography (HPLC). In essence, the SPE procedure employing silica mirrors that of an HPLC column, thus making it an ideal and coherent choice for sample preparation prior to HPLC analysis.

## Phases:

Reversed Phase (RP)

Strong Cation Exchange (SCX)

Strong Anion Exchange (SAX)

Weak Cation Exchange (WCX)

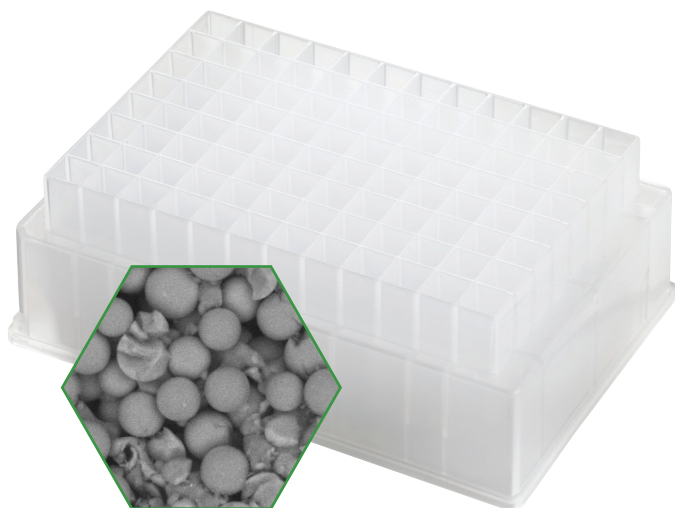
Weak Anion Exchange (WAX)

**Formats:** 96 well microplates

**Bed Weight:** 2 mg/well, 10 mg/well

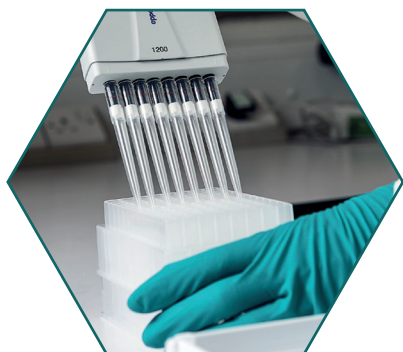
**Analysis:** UHPLC, HPLC, GC, LC-MS, GC-MS

**Applications:** Drug discovery, drugs of abuse, forensic testing, genomics & proteomics, soil and water analysis, cosmetic quality control.



## Key Advantages of Microlute<sup>®</sup> CSi

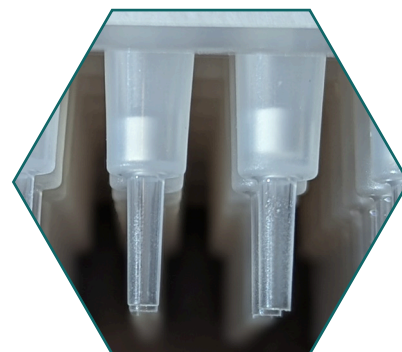
The Microlute<sup>®</sup> CSi uses a unique composite technology designed to streamline and enhance sample clean-up, ensuring both efficiency and reliability throughout sample preparation. This exciting and innovative technology combines a robust porous polymer structure with the versatile properties of silica, resulting in an SPE method that is effortless and reliable.



Improved Reliability and Reproducibility



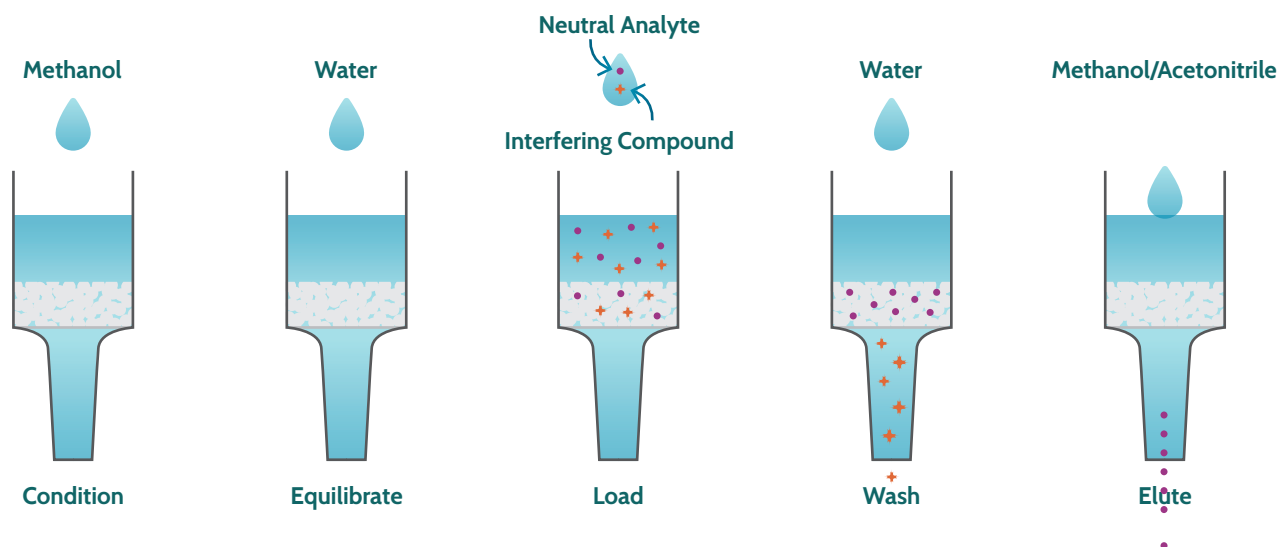
Enhanced Selectivity and Specificity



Perfect for microSPE

# Microlute<sup>®</sup> CSi - Silica SPE

## Effortless Switch to Composite



The Microlute<sup>®</sup> CSi range has been developed to allow easy transfer of SPE methods. It is recommended to try existing methods with the view that some minor method development may be needed to get optimal results.

Whether you're new to SPE or looking to improve your method, we will be there to support you!

Get in touch with our chromatographers by emailing [technical@porvairsciences.com](mailto:technical@porvairsciences.com).

## Microlute<sup>®</sup> CSi Chemistries

	Microlute <sup>®</sup> CSi		
	RP	SCX	SAX
Retention Mechanism	Reversed Phased	Strong Cation Exchange	Strong Anion Exchange
Analyte Retention	Non-ionic, nonpolar to moderately polar analytes	Ionic, basic analytes	Ionic, acidic analytes
Base	Silica	Silica	Silica
Ligand	C18	Aromatic sulphonic acid	Quaternary amine

To find out more about our composite technology, check out [www.microplates.com/the-microlute-composite-technology/](http://www.microplates.com/the-microlute-composite-technology/)

## Ordering Information

Product Name	Product Numbers		Format	Pack Qty
	2 mg	10 mg		
Microlute <sup>®</sup> CSi C18	SC18002P-001	SC18010P-001	96 Well Plate	1
Microlute <sup>®</sup> CSi SCX	SSCX002P-001	SSCX010P-001	96 Well Plate	1
Microlute <sup>®</sup> CSi SAX	SSAX002P-001	SSAX010P-001	96 Well Plate	1
Microlute <sup>®</sup> CSi WCX	Coming Soon	Coming Soon	96 Well Plate	1
Microlute <sup>®</sup> CSi WAX	Coming Soon	Coming Soon	96 Well Plate	1

# UltraPPM LITE

## The Precise Positive Pressure Manifold

The UltraPPM LITE is the latest in cutting-edge manifold design, instilling confidence during sample processing in chromatography workflows. This positive pressure manifold maintains a uniform pressure across all filter wells, guaranteeing a seamless flow of samples for maximum analyte recovery. Offering the flexibility to fine-tune settings, the UltraPPM LITE puts you in control, enabling you to reliably process samples effortlessly and proceed to downstream processes with full confidence.

## Why Choose The UltraPPM LITE?

- Designed and precision engineered to effortlessly process your samples from start to finish
- Perfect for vacuum manifold users looking to increase throughput with ease, consistency and control
- Ideal for processing sensitive and challenging samples e.g. volatile, moisture-sensitive, viscous
- Offers well-to-well uniformity, plate-to-plate reproducibility during sample preparation methods including SPE

## Features & Benefits

Take a closer look at the key features designed to bring ease, control and reliability to your sample processing workflow.



### Optimise for Success

The UltraPPM LITE allows you to adjust the pressure and flow of samples in real-time with precision. This level of control allows users to tailor their specific requirements for a wide range of sample types. Moreover, the capability to fine-tune both flow and pressure significantly minimises the risk of cross-contamination, eliminating the common occurrence of splashing often encountered when using vacuum-based manifolds

- Dual range controls for flow and pressure
- Accessible dials to quickly and easily adjust pressure and flow
- Clearly designed gauges for easy reading
- Lockable pressure to ensure extraction-to-extraction consistency
- 2 button operation feature for safety and prevention of accidental processing

Dual Pressure Gauges  
Improved Readability

Fine-tune Flow  
Sensitive Control



Dual Flow Selector  
Set for Precision & Reliability

Adjustable Dual Controls  
Greater Pressure Control

Dual Push-to-Process Buttons  
Safer Operation





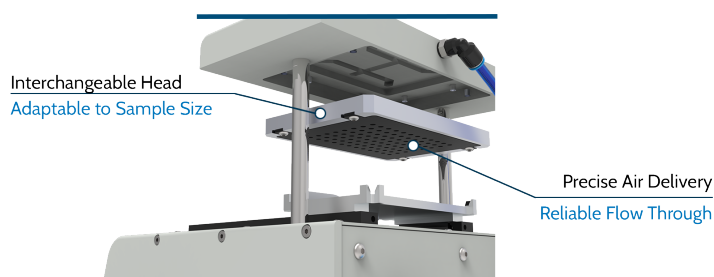
# UltraPPM LITE



## Recover with Confidence

Sample processing is a crucial initial step in sample preparation workflows, ensuring thorough cleaning and retrieval of analytes for downstream applications. This step becomes particularly critical when dealing with small sample volumes or precious samples, where every microlitre matters. The UltraPPM LITE overcomes challenges associated with incomplete flow due to filter blocking or inconsistent air delivery by delivering and maintaining uniform pressure across each well of a processed plate. Our proprietary technology guarantees that every sample flows evenly through every well and every use to give you a robust and reliable system that you can rely on.

- Precise and uniform delivery of air flow from manifold head
- Reliable and consistent delivery of gas for repeated processing\*
- Interchangeable heads for 24, 48, 96, 384-well processing (see ordering for more information)
- Open design for real-time visual confirmation of sample flow through

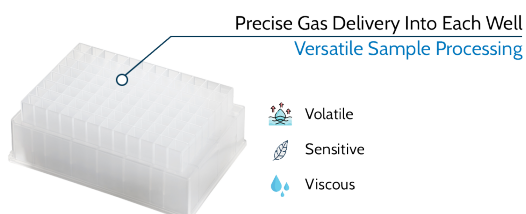


\*The system design was subjected to over 50,000 pressure cycles to ensure robustness.



## Process Many Kinds of Samples

Whether you're working independently or in a multi-disciplinary laboratory, the UltraPPM LITE is designed to handle a wide variety of samples. With the capability to control both pressure and flow, you can easily tailor the settings to match your specific sample requirements. By applying consistent pressure to your samples, the instrument safeguards them against environmental threats like moisture, degradation, and even boiling (in the case of a vacuum manifold setup).



- Volatile: The elimination of boiling when using vacuum-based systems prevents loss of volatile compounds
- Sensitive Compounds: Use of clean, moisture-free gas will protect moisture-sensitive compounds. The option to use nitrogen enables you to protect air-sensitive compounds.
- Viscous: The ability to use higher pressures that exceed atmospheric pressure, allows processing of viscous samples.

## Ordering Information

Product Name	Description	SKU
UltraPPM LITE	Positive pressure manifold for sample preparation. Standard base instrument (well heads sold separately)	250-10083-001
384-well Head	Interchangeable head for the UltraPPM LITE for ANSI/SBS 384-well plates	150-10083-002
96-well Head	Interchangeable head for the UltraPPM LITE for ANSI/SBS 96-well plates	150-10083-001
48-well Head	Interchangeable head for the UltraPPM LITE for ANSI/SBS 48-well plates	150-10083-003
24-well Head	Interchangeable head for the UltraPPM LITE for ANSI/SBS 24-well plates	150-10083-004



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## Our Sister Companies



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