

FLEXIBLE AUTOMATION FOR ALL STEPS IN SAMPLE PREPARATION

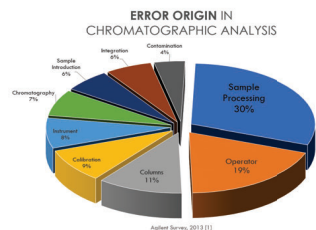
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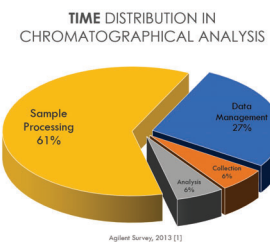
THE PROBLEM

Sample preparation is often the most significant cost (estimated at 60-75% of a laboratory budget) and the most common source of error in analytical laboratories.



The processes involved in sample preparation are generally basic liquid handling, however these tasks are often time sensitive due to sample expiration and lab work flow efficiency.

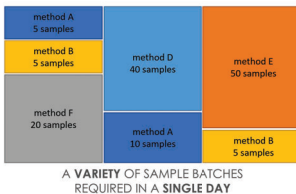
Due to variations in preparation methods and the significant time required, a samples integrity can be impacted by user fatigue, distraction, and skill level. In addition, the high level of repetition and handling of differing samples is likely to contribute to qualitative and quantitative errors.



Error free sample preparation would result in enormous efficiency gains for most chromatography laboratories, as both the preparation and analysis tasks would require less repetition due to invalid results.

The most obvious solution to these issues is automation. However, a typical analytical laboratory will process a variety of sample batches with differing preparation methods and quantities each day.

To justify automation, the instrument needs to be flexible, adaptive and range in functionality to allow for a high number of small batches with diverse preparation method needs.



THE SOLUTION

ePrep - Flexible Sample Preparation Workstation

- MicroSPE
 - Filtering
 - Aliquoting
 - Dilution
 - Mixing
- Environmental
 - Food Analysis
 - Clinical
 - Pharmaceutical
 - Biomedical
 - University Research

- Accuracy
 - Repeatability
 - Validation
 - Chain of Custody
- Calibration Standards
 - Standards
 - Sample Preparation
 - Method Development

The ePrep Workstation is designed specifically for the analytical chromatography laboratory. Its simplicity, flexibility, and reliability enables a comprehensive range of sample preparation techniques, all built into a modular, off-line instrument. The robust set of features allows for automation in diverse contexts, ultimately reducing the time sink and error origins of traditional sample preparation methods.

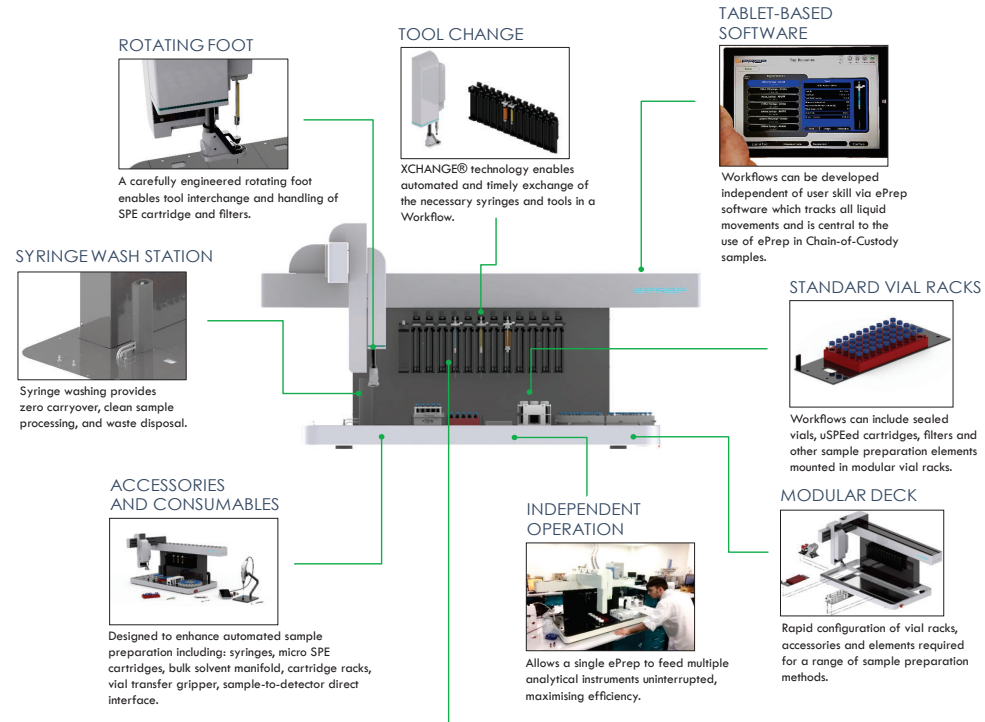
μXact³ - Digital Syringe Driver



The μXact³ complements the ePrep. Its programmed liquid dispensing is ideally suited to Workflow development and small-scale, high accuracy and high pressure requirements.

THE FEATURES

A suite of innovative technologies and solutions have been implemented in the ePrep Sample Preparation Workstation to achieve the flexibility and reliability required for automated sample preparation.



ANALYTICAL SYRINGES

ePrep uses Analytical syringes, providing unique advantages over air pipette instruments. Such syringes can handle organic, aqueous solutions with incredible accuracy and reproducibility down to nL levels. Analytical syringes also enable delivery of micro flowrates at high pressure allowing micro (SPE) separation cartridges, disk filtering, and membrane tasks to be included workflow sequences.

THE ACCESSORIES

In further pursuit of flexibility, a range of specialised tools have been developed as accessories for the ePrep for specialised uses beyond basic liquid handling. With ePrep's modular design, these add-ons are easily combined or interchanged for the desired usage.



PRECISION & ACCURACY

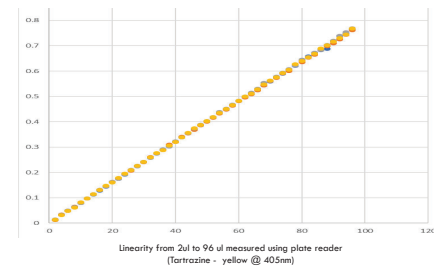
A combination of purpose built software, scientific instrumentation, and innovative technologies the ePrep Workstation can achieve accuracy and reliability well beyond those of traditional sample preparation techniques.

Dispensed Volume Accuracy and Reproducibility

	Hexane: Toluene (1:1)	Chloroform	Acetone	Water
Programmed Volume	20μL	20μL	20μL	20μL
Average Dispense Volume	19.70	19.60	19.45	20.14
SD	0.05	0.04	0.07	0.09
%RSD	0.24	0.22	0.36	0.47

100μL syringe measured at 20% of the total syringe volume over 12 aliquots measured gravimetrically (non-calibrated syringes)

Standard Curve Linearity at 2μL Intervals



APPLICATIONS

1) Drugs in Serum, Blood, Saliva and Urine

Automated direct trapping of drug panel standards, 1 to 200ppb, sequenced on an ePrep Workstation using μSPEd cartridges.

Trapping of Drug Panel in pure blood on μSPEd cartridge

2) Pesticides in River Water Sediments

One step method to isolate pesticides from sedimentary water samples. Standards and samples prepared using ePrep and μSPEd.

Sedimentary River water sample

Trapping of pesticides on μSPEd cartridge

3) Trypsin Digest of Proteins

Digests of Bovine Serum Albumin (BSA) and Cytochrome C in under 2 minutes. μSPEd immobilised Trypsin cartridges are sequenced on ePrep and then used for protein digestion at ambient temperature. (See 'Workflow' left)

Trap and elute pesticide from sedimentary river water using C18 μSPEd cartridge. Chromatographed using GC/MS, DBS-MS, 1μL injection

CONCLUSION

ePrep provides a flexible and comprehensive platform for sample preparation in the Analytical Chemistry Laboratory. Its ability to automate most tasks, removes laborious and error prone sample preparation processes. A range of unique functions and accessories allows ePrep to be rapidly configured and programmed for a variety of sample batch sizes making it a viable option to automate sample preparation.

REFERENCES

- [1] Sample Preparation Fundamentals for Chromatography, 5991-3326H, Agilent Technologies, 2013 <https://www.agilent.com/cs/library/primers/public/5991-3326EN_SPHB.pdf>
- [2] Duong K, Malekian S, Minett A, Bishop D, Doble P. Immobilised Enzymes on Micro Solid-Phase Cartridges for Automated Protein Digestion. Proceedings of the 66th American Society for Mass Spectrometry Conference on Mass Spectrometry and Allied Topics, June 3-7, San Diego, USA; 2018.