Fast and Flexible

How to optimize your extraction for the wildest application range

In your every day laboratory work, you must overcome many challenges, such as the need for fast and reliable results, high sample loads and limited human resources. No wonder you are always striving for process optimization. The following guide contains valuable input on how to improve your workflows, with a specific focus on speeding up extraction tasks for any number of demanding applications.

Fast

Flexible

To achieve reliable results for a broad variety of applications and samples, it is important that the instruments used can be perfectly adapted to specific needs. Flexible configurations that can be changed quickly and easily or even the possibility to run different extraction methods in parallel help to fulfill your demanding tasks.

Challenge 1

Get fast extraction and high sample throughput

You need analytical results of high sample loads as fast as possible. To reach this goal, you have to analyze your workflow and identify the bottlenecks.

Increase the number of samples processed in parallel. Add extraction positions or perform working steps in parallel for better multitasking.

Optimize your extraction process in terms of speed. See if the applied extraction time can be shortened or the number of cycles reduced.

Use rugged methods to avoid repetition due to failure. Compliant methods reduce analytical risks and time-consuming validation.

Automated and reliable instrumentation reduces operator intervention and frees time for other laboratory tasks.

Integrated workflows and elimination of unnecessary sample transfer steps increase the sample throughput.

BUCHI Solution

Flexible, Integrated workflows comprising of homogenization, recirculating chillers and parallel evaporation **from one supplier.**

Optimized processes for fast extraction with full compliance (Soxhlet).

Six positions in one fully automated system.

BUCHI Service Packages for smooth operation with no down-times. IQ / OQ procedures ensure perfect performance of your equipment.

Challenge 2

Reach exhaustive extraction in minimal time

Only an optimal choice of parameters ensures extractions with accurate and reproducible results and lowest detection limits.

Choose a solvent with similar polarity to that of the analyte. There are no general guidelines on how to choose the ideal solvent, consider publications and standard methods.

As a rule of thumb, a temperature increase of 10°C doubles the extraction speed. Consider the limitations: degradation of heat sensitive compounds and possible side reactions.

Pick a sufficient turnover of solvent / number of extraction cycles. The evaporation rate should be > 10 mL / min. Choose the heating power depending on boiling enthalpy, the ambient temperature and the altitude.

Keep an eye on extraction efficiency. Increase the turnover of solvent or the contact time with the sample matrix by choosing the appropriate extraction method.

Use dry and dispersed samples. Use dry and dispersed samples. The larger the surface, the higher the contact area with solvent and the more efficient the extraction.

BUCHI Solution

High quality BUCHI consumables for dispersing and drying (Celite®, quartz sand) and extraction thimbles.

Flexibility in the choice of extraction methods (Soxhlet, Soxhlet warm, Hot extraction, Twisselmann and Continous flow) allows users to choose the optimal method, ideal extraction temperature and sample-solvent interaction for any application.

Large database of application notes for many sample types.

Borosilicate glass and resistant materials enable work with the best suited solvents (organic or water).

Comprehensive solvent library with preset heating steps and powerful heaters ensure fast and equal heating of a wide range of samples, including high boiling solvents.

Challenge 3

Benefit from more analytical safety

To get reliable results, it is crucial that the analytes are not deteriorated, especially when extraction is used as a sample preparation step.

Prevent side-reactions or deterioration of the analyte by choosing the right solvent and extraction temperature. Take measures against oxidation or sun-light exposure.

Apply the same conditions to all sample replicate and blanks within one batch and from one batch to the other (Number of cycles, contact time between solvent and sample).

Avoid contamination from previous samples, the laboratory environment or leaching materials. All of the materials in contact with the sample and analyte need to be cleaned or pre-extracted.

Use the appropriate sample size: The ideal sample weight is determined by the analyte concentration and homogeneity. Small sample amounts reduce solvent consumption and shorten Soxhlet cycles. Use sufficient sample to reach low detection limits and high reproducibility.

BUCHI Solution

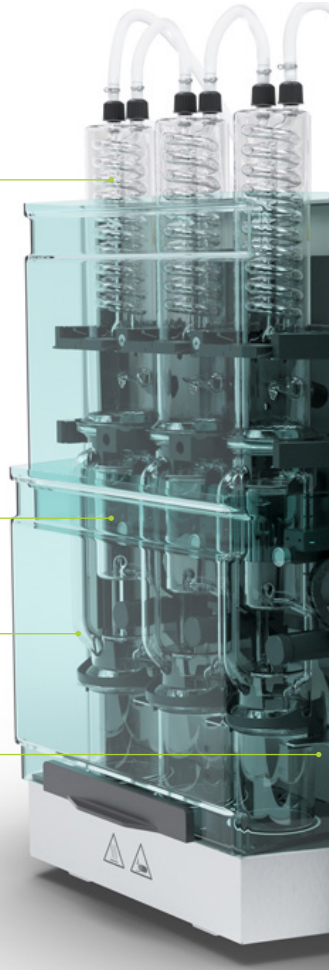
Use of resistant or inert material and fast, easy disassembly of glass-parts for cleaning.

Programmable number of cycles and extraction times ensure reproducible extractions.

Large sample volume option to reach the required detection limits.

Inert gas supply protects against oxidation.

Analyte protection sensor prevents deteroriation by heat.



Challenge 4

Achieve better operator safety

It is essential to protect the health of the operators and prevent environmental damage when performing solvent extraction.

Minimize solvent exposure. Ensure tightness of the extraction system by using intact glass parts and sealings.

Choose a cooling media temperature according to the boiling point of the used solvent. A minimum difference of 25°C is required.

Use a fume hood when handling toxic solvents and analytes.

Recover the solvent after extraction for re-use or for correct disposal.

Use well defined working processes and safe equipment. Instruct laboratory staff on instrument use and related procedures.

BUCHI Solution

BUCHI's recirculating chillers allow users to choose the ideal coolant temperature without any water consumption.

Intuitive operation and easy to use equipment with specialized safety features ensure a safe working environment. Large collection of application notes and technical information facilitate use of optimized and safe procedures.

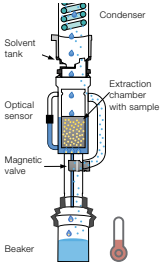
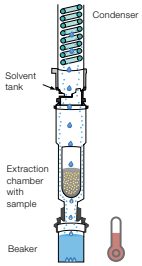
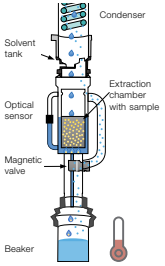
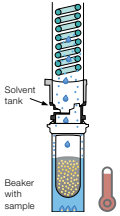
Unique flange-z-seal system and high performance condensers lead to a high solvent recovery (>90%).

The recovered solvent is collected in a detachable bottle for easy handling.

Challenge 5

Find the best extraction method for your extraction tasks

Every solvent extraction method has its characteristics, advantages and drawbacks. Find in the table below the best extraction method for your application.

	Extraction with traditional Soxhlet glassware	Automated Soxhlet extraction	Economic Continuous Extraction = Twisselmann	Soxhlet warm extraction	HotExtraction = Randall = Submersion
Method and apparatus					
Method characteristics	· Separation of sample and extract · Freshly distilled solvent for each extraction cycle · Very gentle process at low sample temperature	· Separation of sample and extract · Freshly distilled solvent for each extraction cycle · Very gentle process at low temperature · Light barrier detects solvent level and triggers the clearing of the extraction chamber for faster cycle times.	· Separation of sample and extract · High extraction efficiency · Two-fold interaction between sample and solvent (vapors up/ condensate down)	· Separation of sample and extract · Freshly distilled solvent for each extraction cycle · Solvent in extraction chamber is heated which leads to increased efficiency of each cycle. · Light barrier detects solvent level and triggers the clearing of the extraction chamber for faster cycle times.	· No sample-extract separation · Elevated temperature of sample leads to increased exchange · High extraction efficiency
Typical process time incl. extraction, rinsing and drying (fat determination)	2.5 h (reduced to 3 h)	2.5 h (reduced to 1 h 30 min)	1 h	2.5 h (reduced to 1 h 30 min)	45 min
Solvent consumption (per position)	250 mL	100 mL	70 mL	120 mL	50 mL
Compliance / Reference methods	ISO / AOAC / EPA	ISO / AOAC / EPA	ISO / LFGB	ISO / AOAC / EPA	ISO / AOAC / EPA
Fat Extraction		FatExtractor E-500 SOX / E-500 SOX LSV	FatExtractor E-500 ECE		FatExtractor E-500 HE
Universal Extraction tasks		UniversalExtractor E-800 Standard or Pro / LSV	UniversalExtractor E-800 ECE or Pro / Pro LSV	UniversalExtractor E-800 Pro	UniversalExtractor E-800 Pro / Pro LSV

The BUCHI Extraction Systems

FatExtractor E-500: Quick and Compliant

The FatExtractor E-500 is designed for quick and compliant fat extraction. Gain the flexibility to readily adapt your FatExtractor E-500 to changing needs with the interchangeable glass assembly and execute extractions according to Soxhlet, Randall or Twisselmann.

UniversalExtractor E-800
Powerful and perfect for Multitasking

The UniversalExtractor E-800 is perfectly suited to any demanding extraction task. Six distinct extraction positions enable individual process control and simultaneous operation of different extraction methods. High-speed heaters combined with sophisticated process control allow for the fastest and most reproducible extraction processes.

HydrolEx H-506: Complementary and Robust

The HydrolEx H-506 performs acid hydrolysis as a sample preparation step prior to fat extraction for total fat determination. The HydrolEx H-506 offers a smooth and safe process with convenient system handling.

Play the extraction game and learn more about fast and flexible extraction.
www.buchi.com/fast-and-flexible-extraction

Learn more about the extraction portfolio from BUCHI
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Quality in your hands