BUCHI Corporation

Concentrations of Samples Complying to US EPA 8270

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- Overview of parallel evaporation
- Importance of solvent recovery
- US EPA SW 846-8270, analytical results
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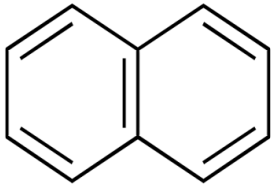
- Questions

US EPA SW 846-8270

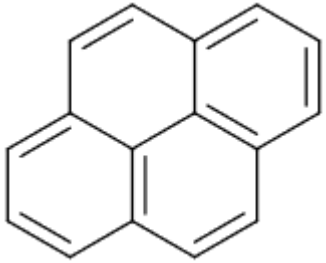
Scope of application

- Determination of the concentration levels of semivolatile organic compounds (SVOC) in extract prepared from solid waste, soils, air media, and water samples by gas chromatography/mass spectrometry (GC/MS)

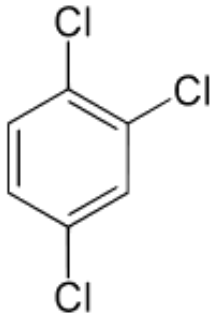
- For example



Naphthalene



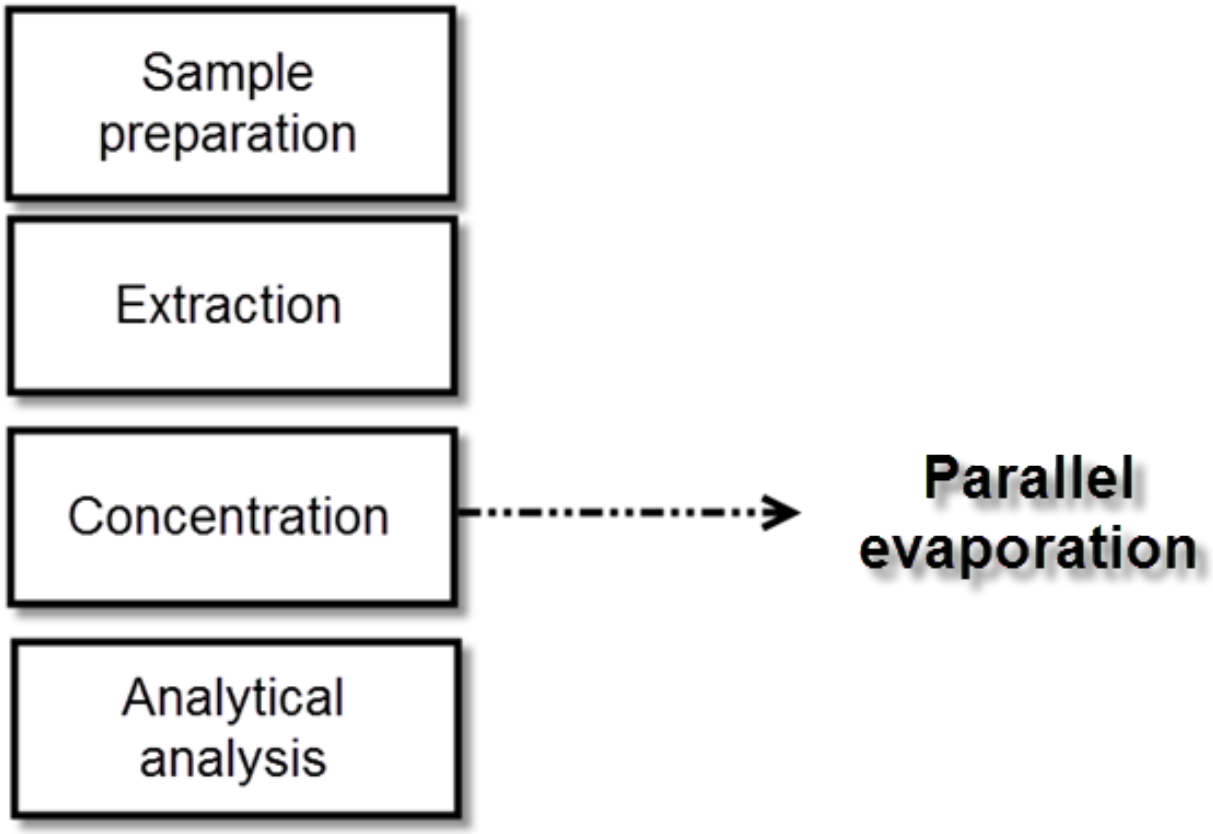
Pyrene



1,2, 4 Trichlorobenzene

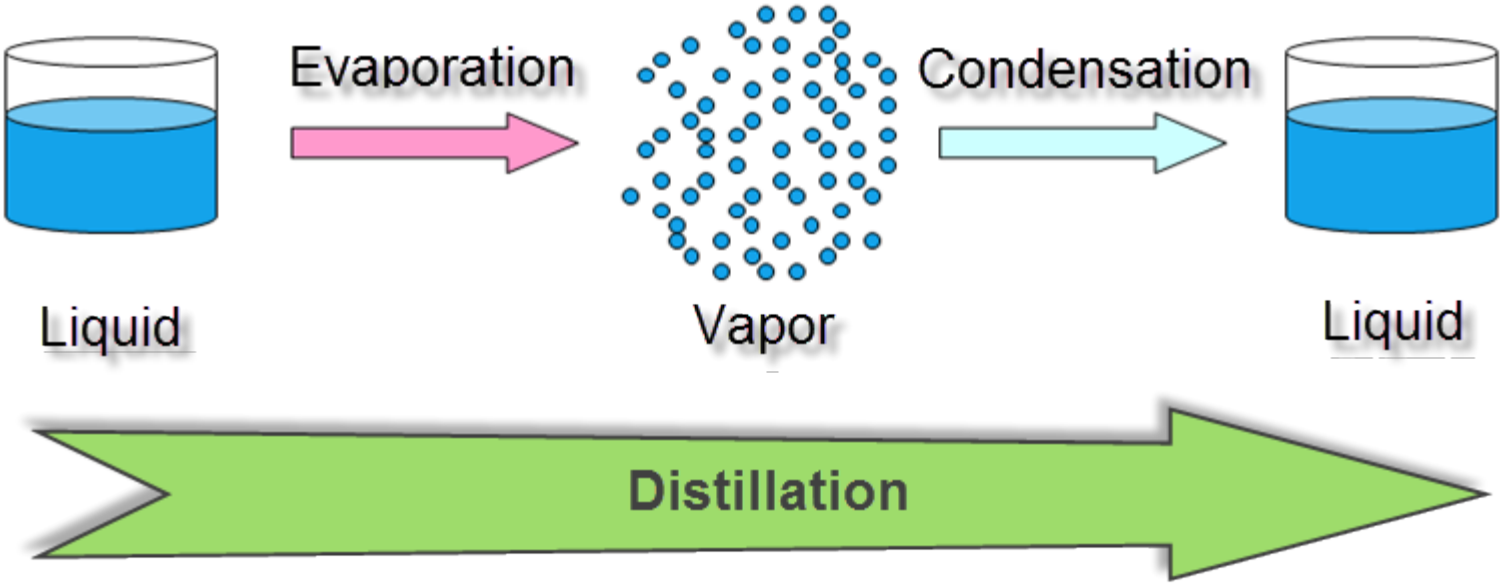
US EPA SW 846-8270

Workflow



Overview of parallel evaporation

Solvent removal of multiple solvents at once



- Evaporate → energy in → **heat**
- Condense → energy out → **coolant**
- Energy must be equal

Overview of parallel evaporation

Utilization of a vacuum source

Why evaporate under vacuum?

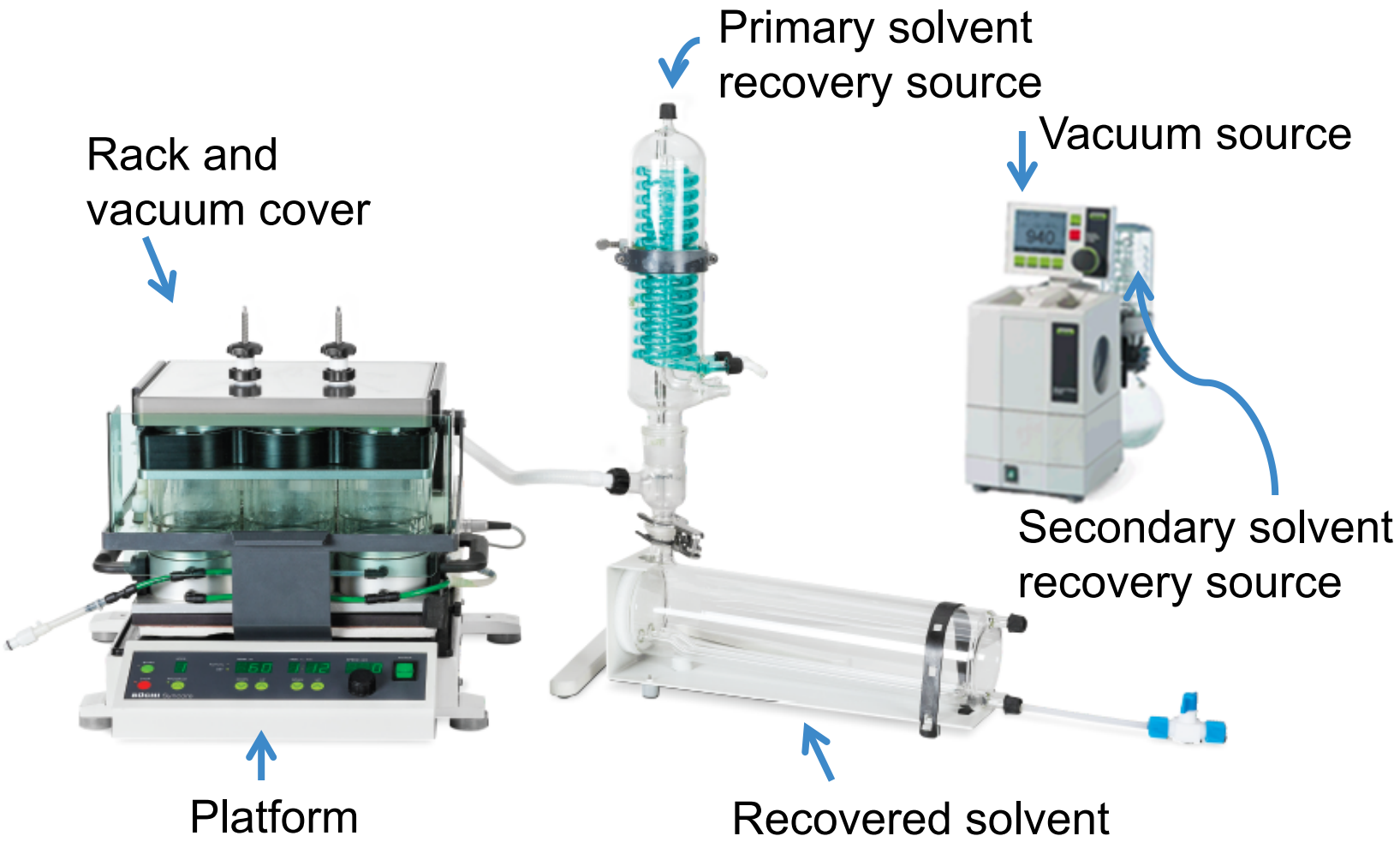
- Boiling point depends strongly on pressure (Clausius-Clapeyron equation)
- Lower pressure → lower boiling point

Advantages:

- Protect thermo-sensitive samples
- Speed up evaporation
- Eliminate N_2 usage

Overview of parallel evaporation

Syncore® Vortex evaporator overview



Importance of solvent recovery

"Emissions Reduction Program"

US EPA Method 3500C and other concentration methods

- Summary of Methods; section 2.2 → "Solvent recovery apparatus is recommended for use in evaporative concentrators. EPA recommends that incorporation type of reclamation system as a method to implement an emissions reduction program."

Source:

http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/3500c.pdf

Importance of solvent recovery

Environmental aspects

No air pollution by organic or chlorinated solvents

- Chlorinated solvents are (potential) carcinogens
- Safe laboratory
- Clean atmosphere

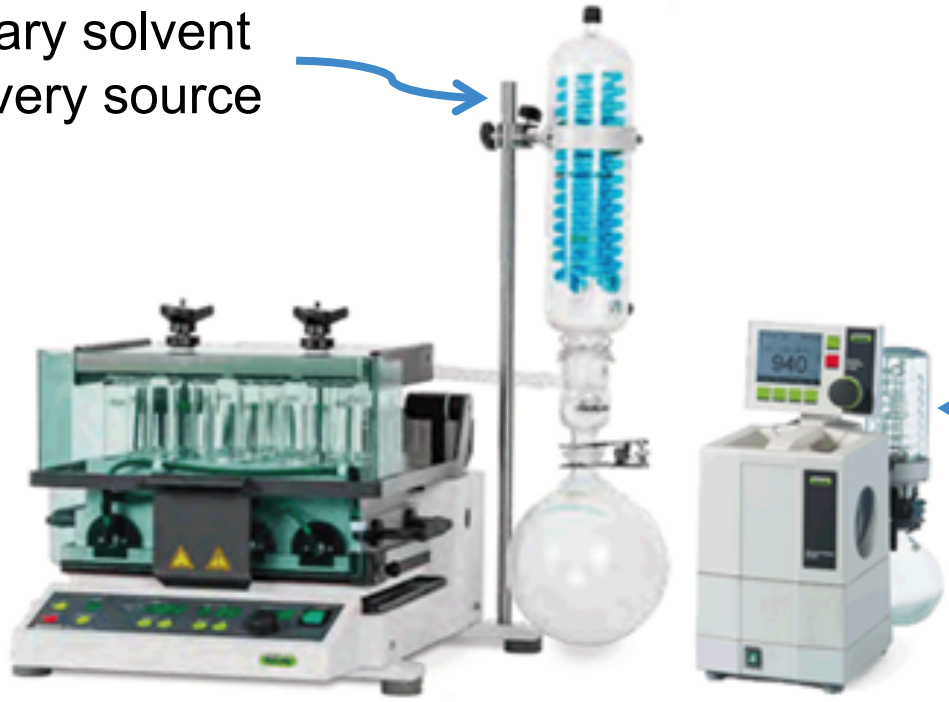
Safe

Sustainable

Importance of solvent recovery

Two solvent recovery sources

Primary solvent recovery source



Secondary solvent recovery source

> 95 % solvent recovery

US EPA SW 846-8270 results

Analytical results: Phoenix Environmental Laboratories, Inc.

Spiked (50/75 ng) and concentrated laboratory control samples were analyzed by GC/MS for all compounds mentioned in US EPA SW 846-8270.

Analytical Method	CAS Number Equivalent	Parameter Name Surrogate Compounds	Spike Level (ng)	Percent Recovery % LCS #1	Percent Recovery % LCS #2
SW8270	367-12-4	% 2-Fluorophenol	75	79	88
SW8270	98904-43-9	% Terphenyl-d14	50	107	114
SW8270	120-82-1	1,2,4-Trichlorobenzene	50	86	92
SW8270	541-73-1	1,3-Dichlorobenzene	50	85	90
SW8270	91-20-3	Naphthalene	50	91	93
SW8270	621-64-7	N-Nitrosodi-n-propylamine	50	95	91
SW8270	87-86-5	Pentachlorophenol	50	103	111
SW8270	129-00-0	Pyrene	50	101	105

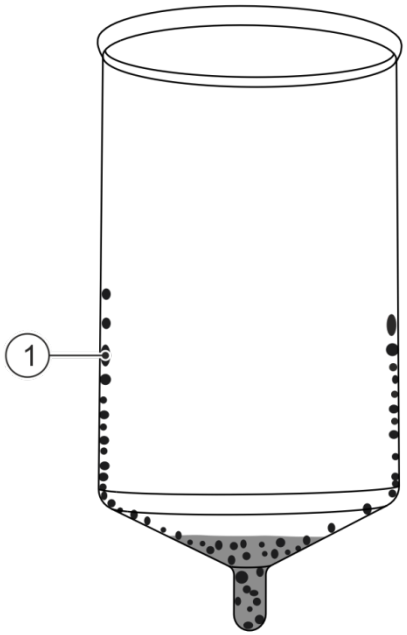
* The elevated % recovery is related to the instrument.

For complet list, please visit www.buchi.com/analytical-resuluts

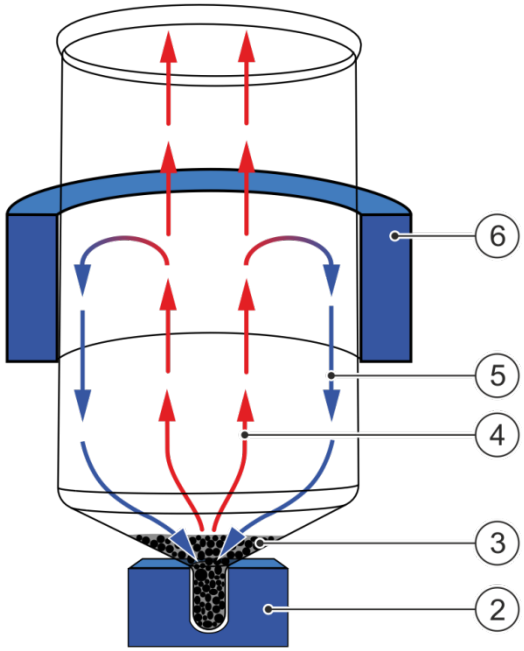
US EPA SW 846-8270 results

Flushback module

Without flushback



With flushback

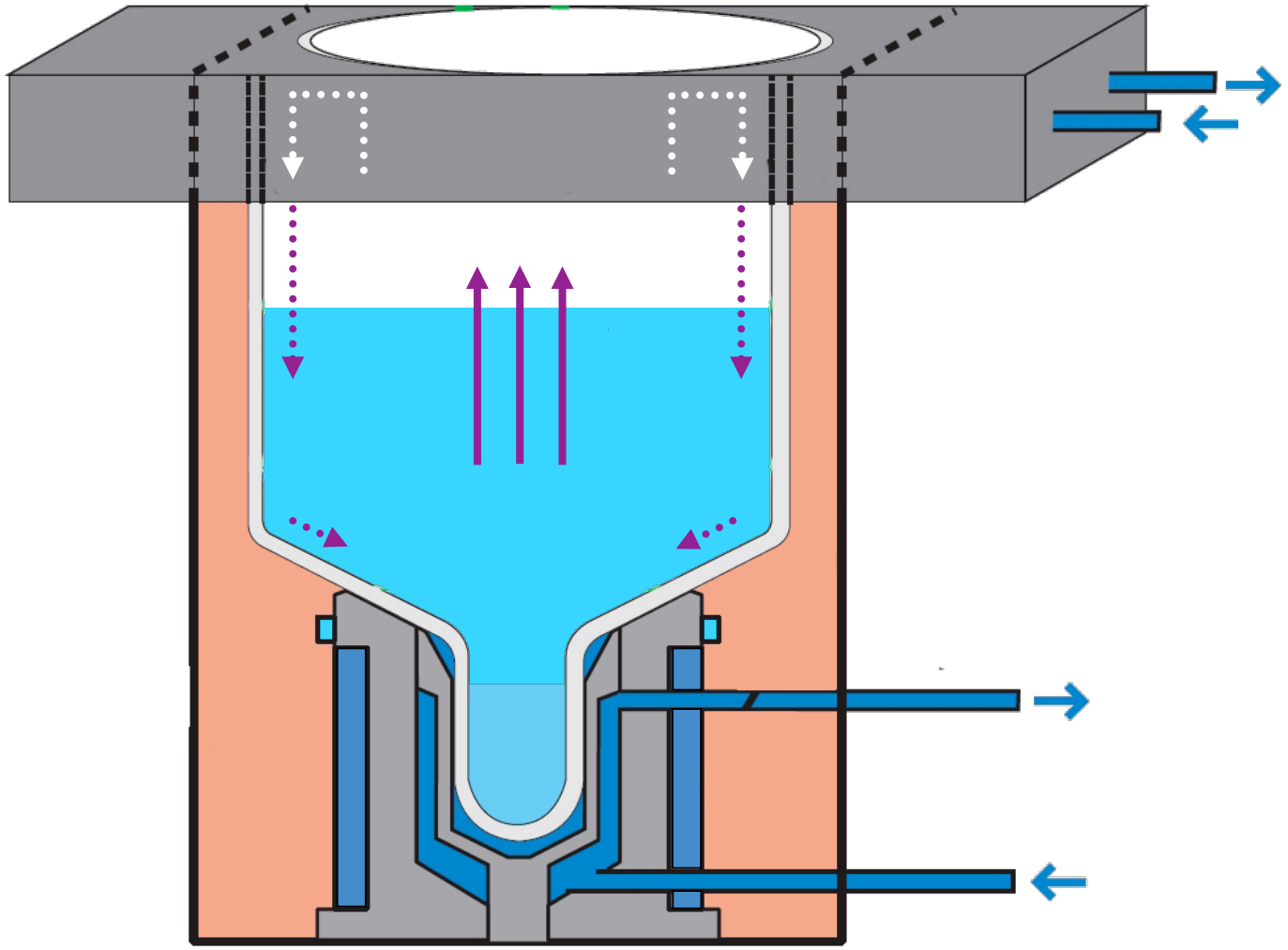


1 Analyte sticks to the wall
2 Cooling
3 Concentrated analyte

4 Evaporation
5 Flushback effect
6 Cooling

US EPA SW 846-8270 results

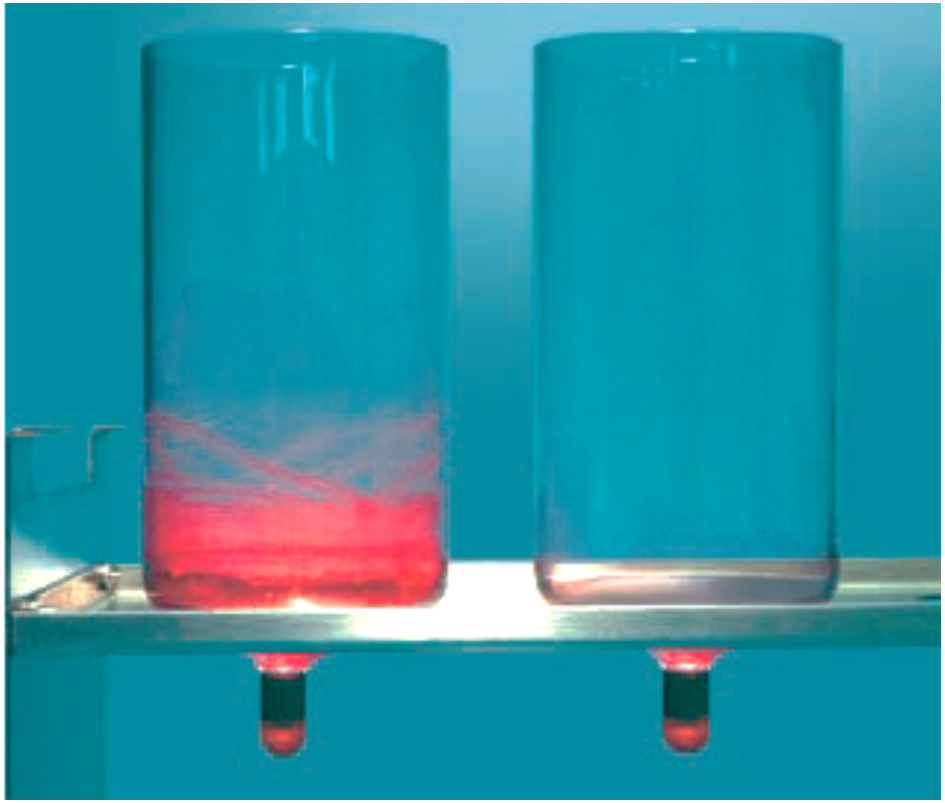
How it works



US EPA SW 846-8270 results

Improved recoveries

Left:
without Flushback
Right:
with Flushback

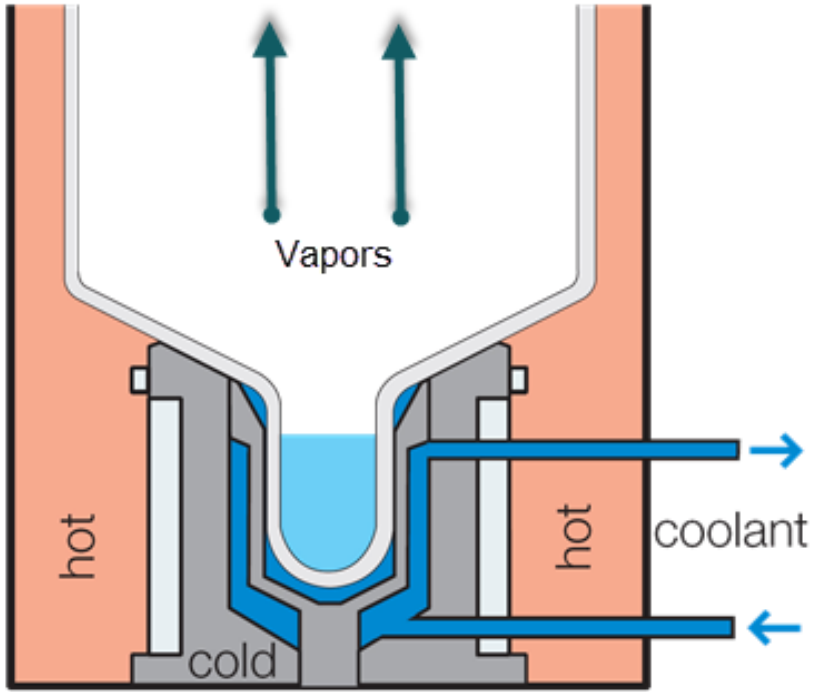


US EPA SW 846-8270 results

Reproducibility

Chilled appendage technology

- Less supervision
- High reproducibility
- Low risk of losing sample
- Optical sensor not required



US EPA SW 846-8270 results

Reproducibility

- Gradient function
- Reproducible conditions
- Environment friendly

Vacuum pump V-700

+

Vacuum controller V-855

Chiller F-108

Summary

- Elimination of N_2 cost
- > 95 % solvent recovery
- High analyte recovery
- Essential reproducibility
- Advanced automation

Thank you

Questions and answers

Download environmental Application Notes:
http://www.mybuchi.com/Environmental-applications.11348.0.html

Additional “Thank You” to:
Greg Lawrence
Lab Manager
Phoenix Environmental Laboratories