

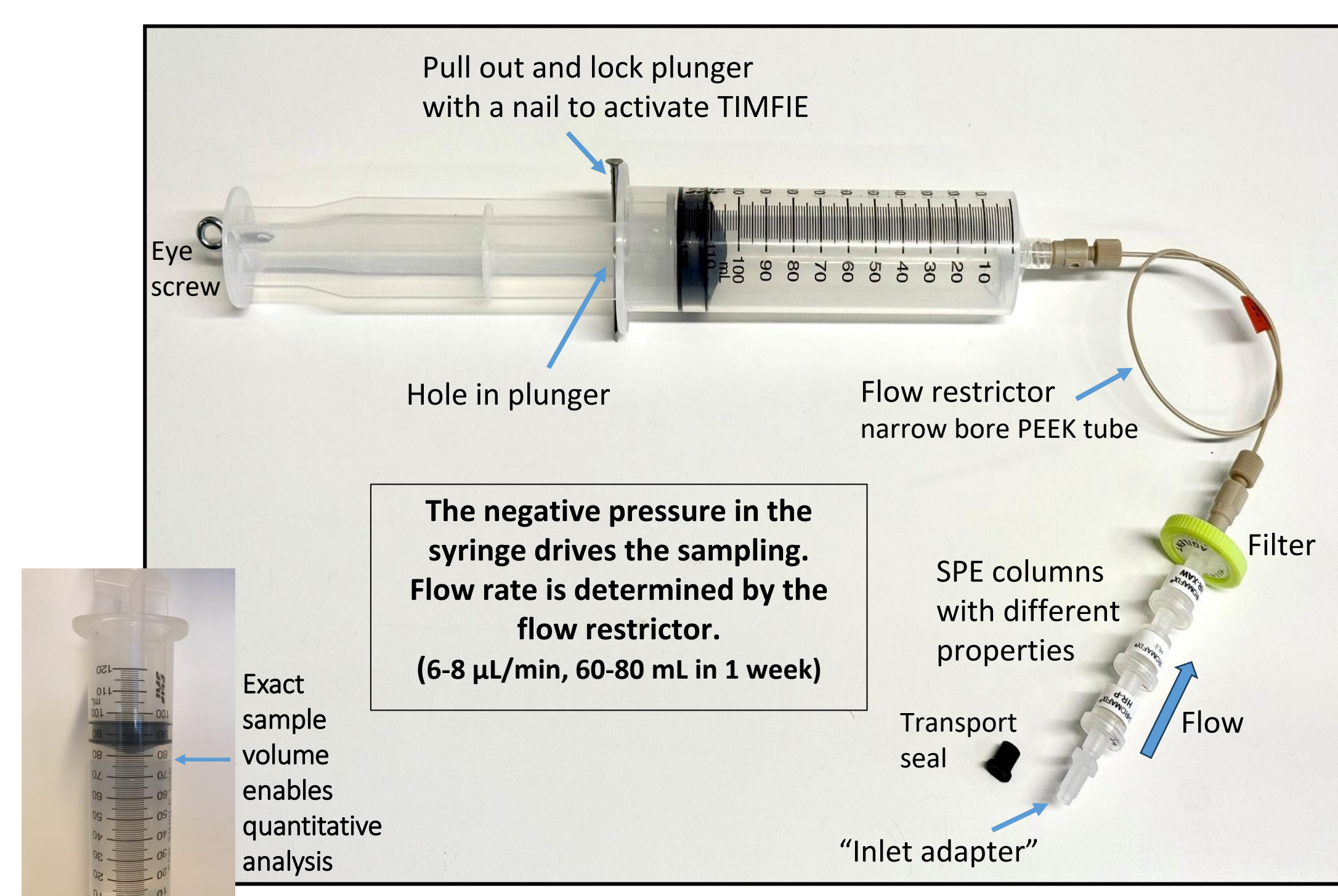
TIMFIE Sampling Offers Time-Integrated and Quantitative Determination of Multiclass Organic Micropollutants in Whole Water

THE NEEDS

- Time integrated sampling is preferred over grab sampling to estimate average exposure to chemicals in water bodies for status classification
- Method must be quantitative and possible to validate in a relevant way
- Sample must reflect whole water, including suspended particles
- Sampling needs to be robust, flexible and inexpensive

THE TOOL

TIMFIE (Time-Integrated, Micro Flow, In situ Extraction)



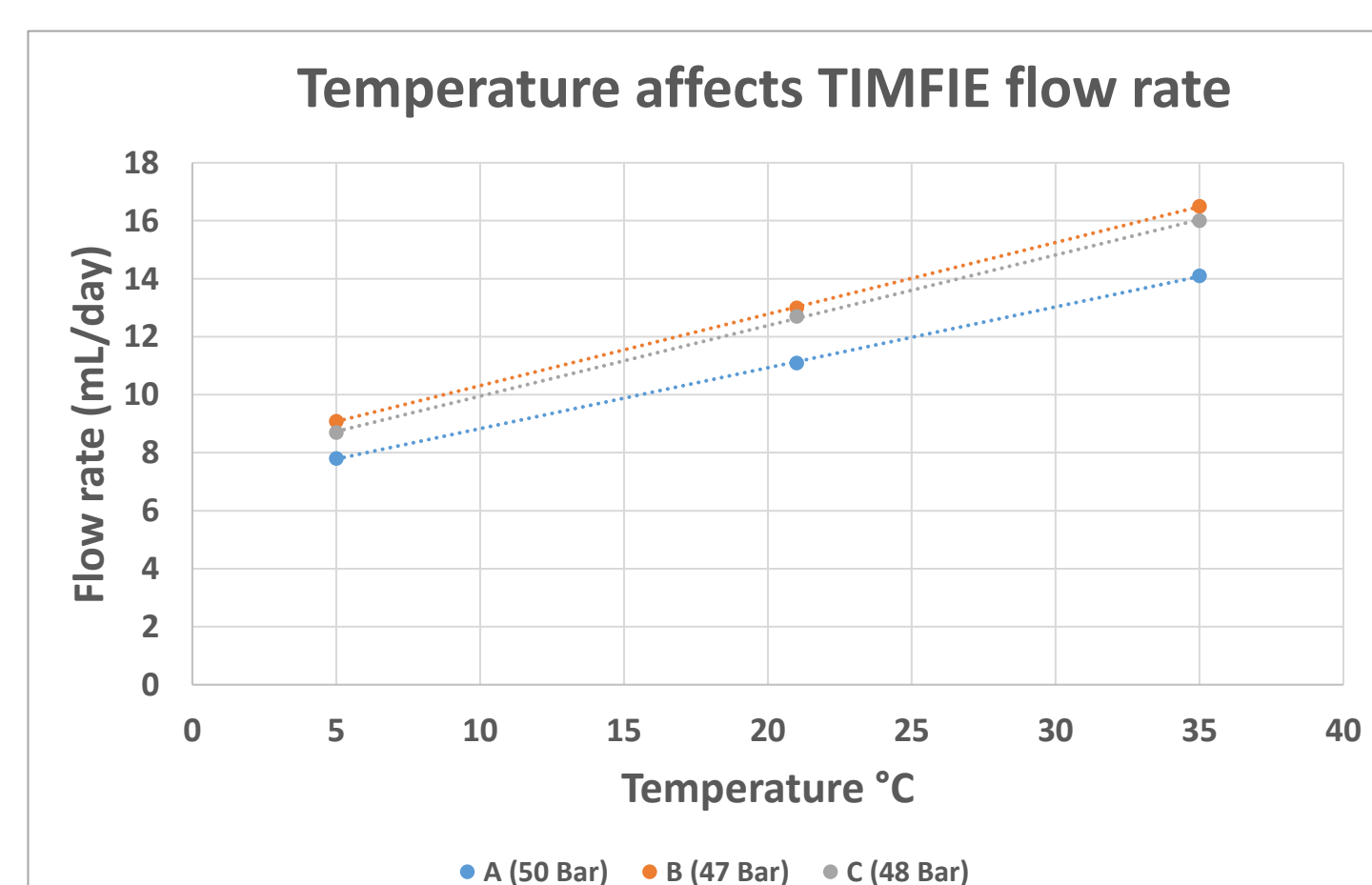
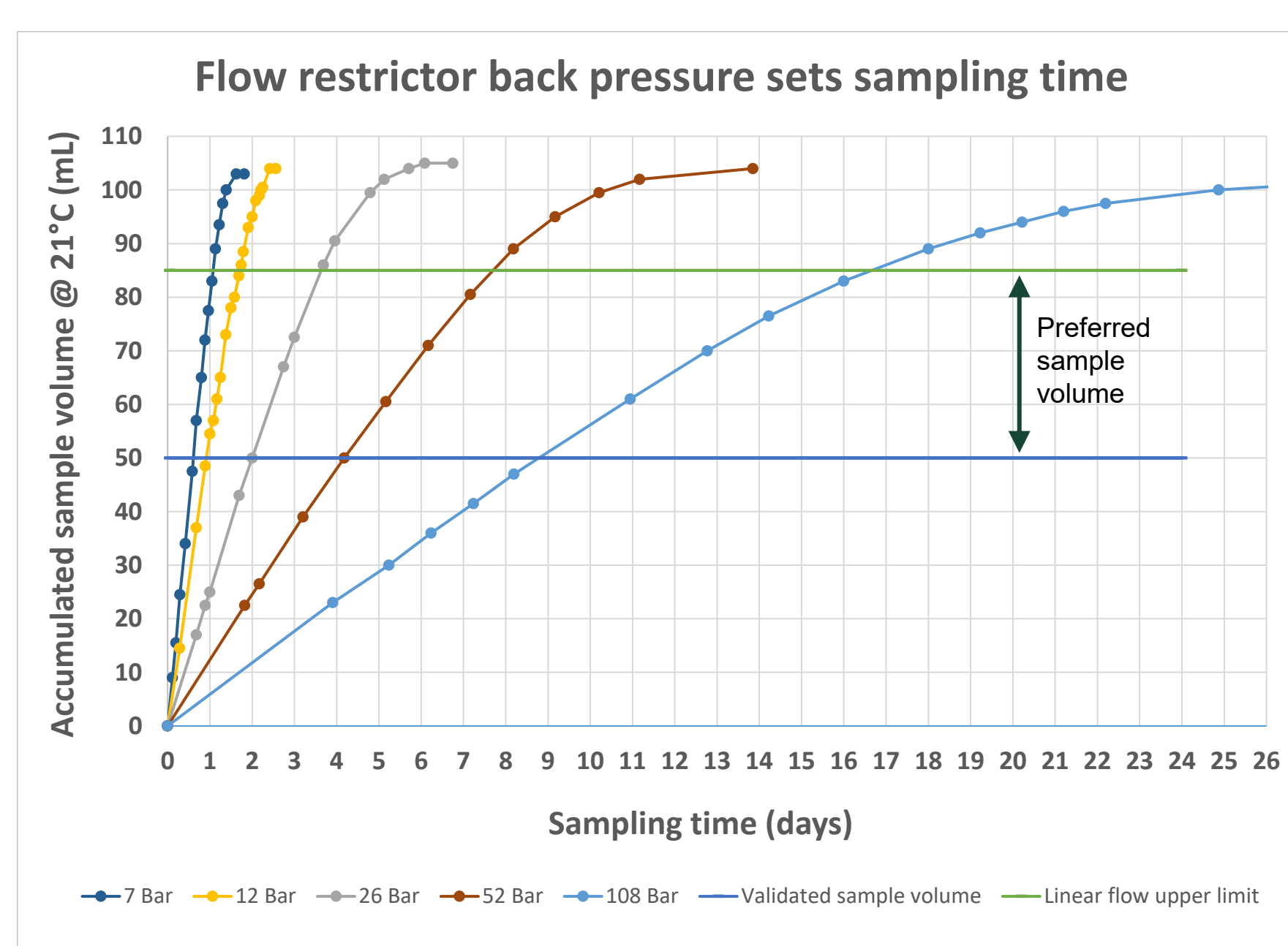
THE PROS

- Time-integrated, e.g. 1-2 weeks
 - Quantitative, known volume
 - Whole water including particles
 - Active sampling without electricity
 - Method development and validation
 - Automation of lab procedures
 - Flexible, different SPE adsorbents
 - Robust, easy and safe field sampling
 - Low tech. and low cost
- ## THE CONS
- Volume restricted to 85 mL (max 105 mL)
 - No pH adjustment before SPE (in situ)

SAMPLING TIME

Flow rate and sampling time is mainly set by the dimensions of the flow restrictor but also the ambient temperature (water viscosity)

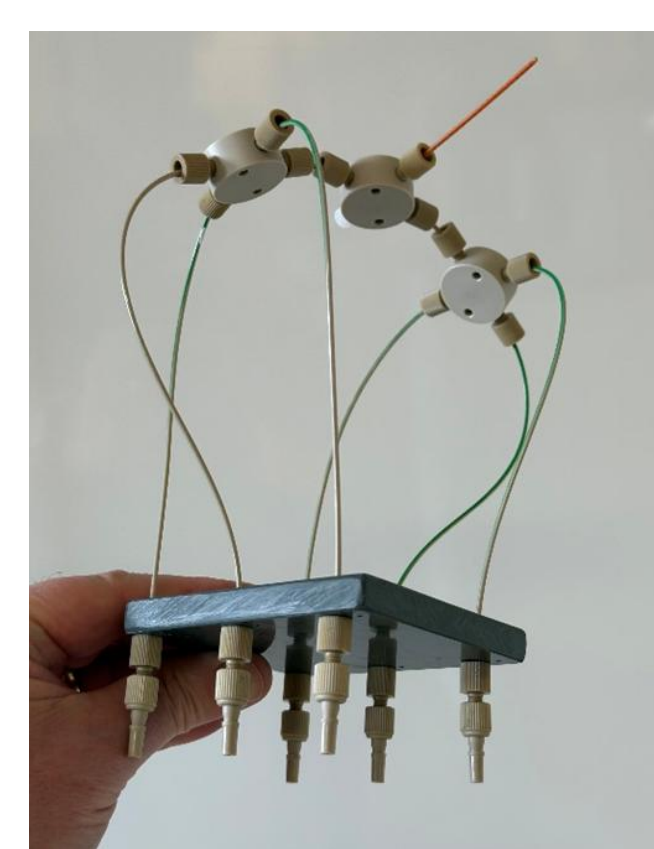
Flow restrictor back pressure is defined by pumping water through at 0.5 mL/min using an LC-pump



FIELD DEPLOYMENT

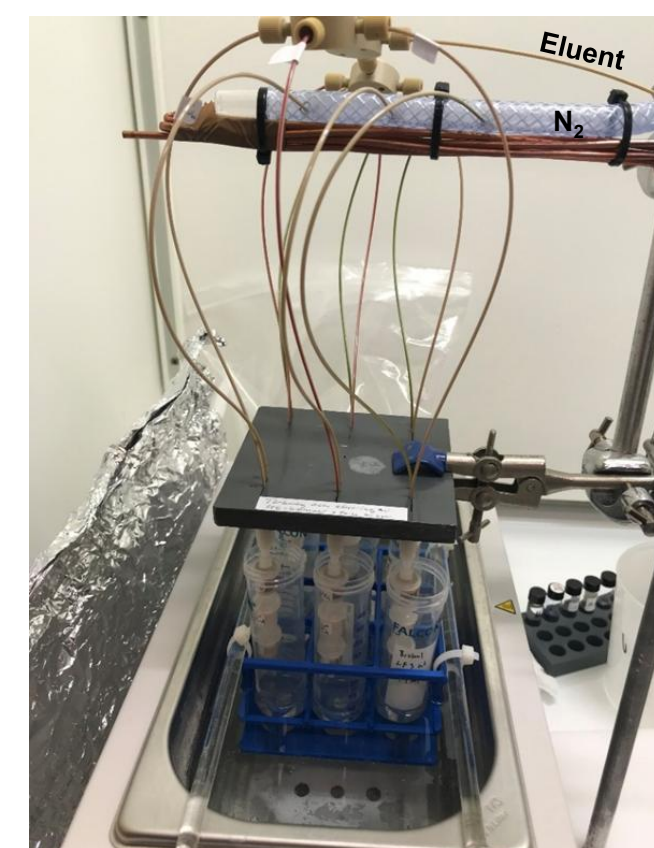


LAB AUTOMATION



SPE cartridge format (Luer in both ends) enables automation.

6-port manifold (made in-house) connected to a quaternary LC-pump is used for SPE conditioning and elution.



Simultaneous elution of SPEs and evaporation of extracts in 40°C water bath and N₂ gas flow.

Here, elution with 5 ml MeOH and 5 ml 0.1 mol/L NH₃ in MeOH.

LC-MS/MS MULTIMETHODS

Three columns in series (HR-P, HLB, HR-XAW, Chromafix (s), from Macherey-Nagel) were chosen to enable broad extraction capability.

The SPE assembly was handled as one unit during conditioning and elution steps.

Final extract was split for subsequent analysis with four LC-MS/MS multimethods in positive and negative ESI mode.

Target compounds covered 119 pesticides, 66 pharmaceuticals, stimulants, industrial chemicals and personal care products, and 30 PFAS.

Methods were validated with a 50 mL sample volume and a final extract volume of 0.5 mL.

In a field study in 12 sites in Sweden 32 pesticides, 52 pharmaceuticals and 15 PFAS were found in surface water using 1-week and 2-week TIMFIE sampling.