# Extraction of micropollutants from contamined sediments after heavy rain events

*Lyovapor™ L-200Pro, SpeedExtractor E-916, Multivapor™ P-6:*
*Pressurized solvent extraction (PSE) of contamined sediments as a critical part of aquatic risk accessment*

## 1. Introduction

Although sediment-bound pollutants have previously been considered to be trapped within the sediment matrix, it has been shown that extreme weather events can cause remobilization and large-scale distribution of such pollutants [1]. With the increasing occurrence of extreme weather events, including sediment investigations in aquatic risk assessments is more important than ever. Investigation of these matrices, therefore, requires solubilization of the particle-bound pollutants [2]. Since sediments contain a complex mixture of polar and non-polar substances from a multitude of different chemical classes (e.g., PAHs, PCBs, PFAS), selecting the extraction solvent should always be tailored toward the research question in mind.

## 2. Experimental

**Sample:**

Three sediment samples from flooded areas flooded during the 2021 European heavy rain event.

**Equipment and procedure:**

Freeze drying of the sediment samples using the Lyovapor™ L-200 Pro
Pressurized Solvent Extraction (PSE) using the SpeedExtractor E-916 with 40 mL extraction cells
Parallel evaporation for solvent exchange using the Multivapor™ P-6 with Vacuum Pump V-300, Interface I-300Pro and Recirculating Chiller F-308

*Table 1: Parameters for Pressurized Solvent Extraction using the SpeedExtractor E-916.*

| Parameter | Value |
|---|---|
| Temperature | 100 °C |
| Pressure | 120 bar |
| Solvent | 50 % Acetone / 50 % n-Hexane |
| Cycles | 2 |
| Heat up<br>Hold<br>Discharge | 1 min / 1 min<br>10 min / 10 min<br>3 min / 3 min |
| Flush with solvent / gas | 2 min / 3 min |

*Figure 1:SpeedExtractor E-916 and Lyovapor L-200Pro.*

## 3. Results

Table 2 shows a selection of results for the determination of PAHs in three different sediment samples. For more results please refer to the Application Note No. 822/2023.

*Table 2: Selection of results for the determination of PAHs using the SpeedExtractor E-916.*

| PAH | Location 1 (mg/kg) | Location 2 (mg/kg) | Location 3 (mg/kg) |
|---|---|---|---|
| Naphthalene | 0.290 | 0.340 | 26.840 |
| 2-Methylnaphthalene | 0.290 | 0.280 | 7.890 |
| Acenaphthylene | 0.090 | 0.280 | 47.370 |
| Fluorene | 0.040 | 0.040 | 56.840 |
| 1-Methylfluorene | 0.030 | 0.010 | 5.680 |
| Phenanthrene | 0.260 | 0.270 | 217.890 |

## 4. Conclusion

This Application Note demonstrates the workflow for the determination of pollutants in river sediment samples by freeze-drying the sample, pressurized solvent extraction, and evaporation of the extract prior to analysis. The presented procedure for extracting sediment samples using the SpeedExtractor E-916 is a fast and reliable method for determining pollutants.

## 5. Acknowledgments

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## 6. References

Application Note No. 822/2023: Extraction of micropollutants from contamined sediments after heavy rain events
[1] Crawford, S.E., et. A., 2022. Remobilization of pollutants during extreme flood events poses severe risks to human and environmental health. Journal of Hazardous Materials 421, 126691. https://doi.org/10.1016/j.jhazmat.2021.126691
[2] Wollenweber, M. Standard Operating Protocol, Goethe University Frankfurt, Version 20210708
For more detailed information and safety considerations please refer to the Application Note No. 822/2023.