PAL SYSTEM
Ingenious sample handling

Preview: PAL SPME Arrow

PAL SPME Arrow - New Dimension for SPME Analysis

Since its development by Belardi and Pawliszyn in 1989, Solid-Phase Microextraction (SPME) has become one of the most popular extraction technologies for environmental, food and health analyses. However, the technique remained almost unchanged with some significant drawbacks, such as the limited mechanical stability and small phase volumes of the fibers. All attempts to overcome these limitations have until now been a trade-off between versatility and labor-intense handling.

With the PAL SPME Arrow we present a new technology for micro-extraction, offering trace level sensitivity combined with high mechanical robustness.
The PAL SPME Arrow features an outer diameter of max. 1.5mm, which allows the enclosure of a large sorption phase volumes with a highly resistant and stabilizing inner rod.
The arrow-shaped tip allows smooth penetration of vial septa and injector. In contrast to traditional SPME fibers, the Arrow design fully protects the sorptive material, minimizing adverse influences and loss of analytes during transfer processes. With the PAL RTC and RSI the Arrow SPME microextraction is fully automated.

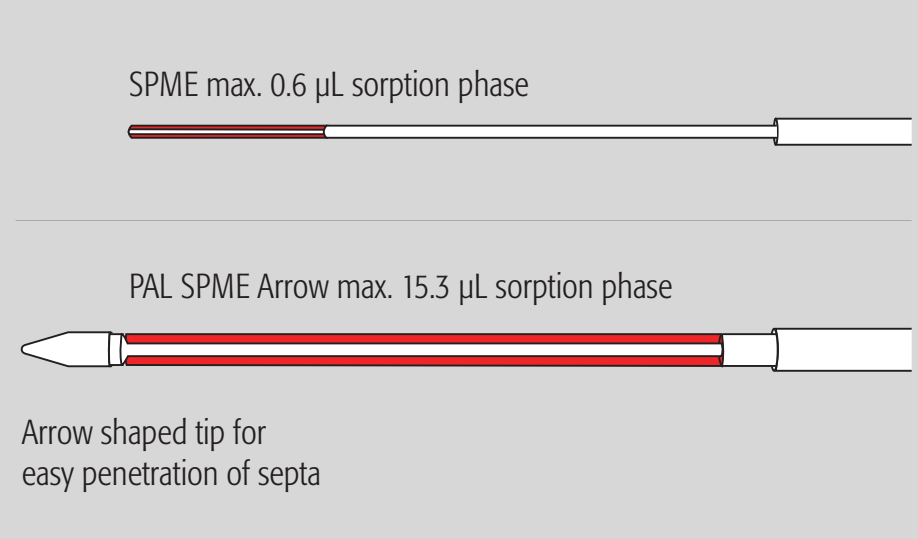

Figure 1: PAL SPME Arrow compared to a coventional SPME fiber: Size and position of the sorptive phases are shown in red.

The PAL SPME Arrow outperforms conventional SPME Fibers

SPME immersion extraction, detection limits

Limits of detection (DIN) (ng L^{-1})

	Naphthalene	Acenaphthylene	Acenaphthen	Anthracene	Pyrene	Benzo(ghi)perylene
Fiber 100/10	3.2	2.6	2.2	3.8	3.2	4.6
Arrow 250/15	0.03	0.04	0.05	0.02	0.02	0.5

Table 1: Limits of detection for six typical polyaromatic hydrocarbons (PAHs) in water, measured by immersion extraction with PAL SPME Arrow or a conventional SPME fiber. PAL SPME Arrow achieves a roughly 40 - 100 x better sensitivity compared to a conventional SPME fiber.

*Conditions:
PAL SPME Arrow, 250 µm PDMS, 15 mm length, 7.7 µL sorption phase
Commercially available SPME fiber, 100 µm PDMS, 10 mm length, 0.6 µL sorption phase
Determined according to German DIN 32645

Aroma analysis of white wines

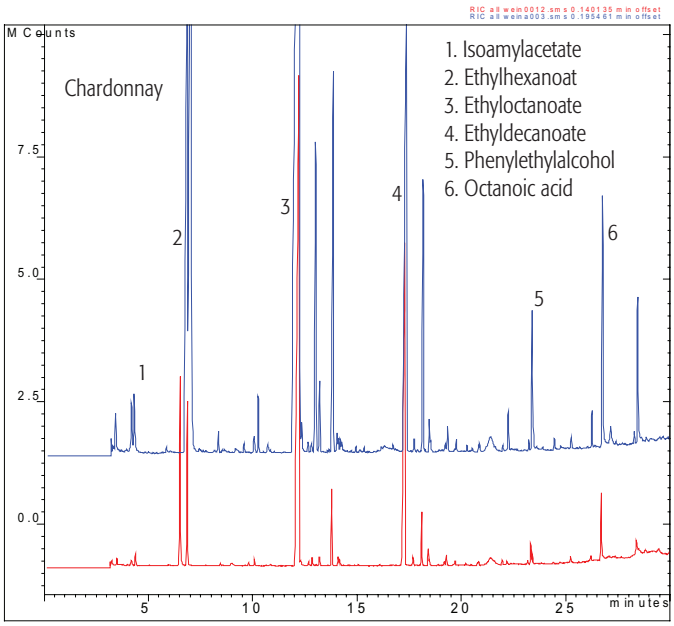

Figure 2: Analysis of Chardonnay aromas:
PAL SPME Arrow (blue 100 µm PDMS 20 mm 0.80 mm OD) compared to a **conventional SPME fiber** (red 100 µm PDMS 10 mm 0.30 mm OD)

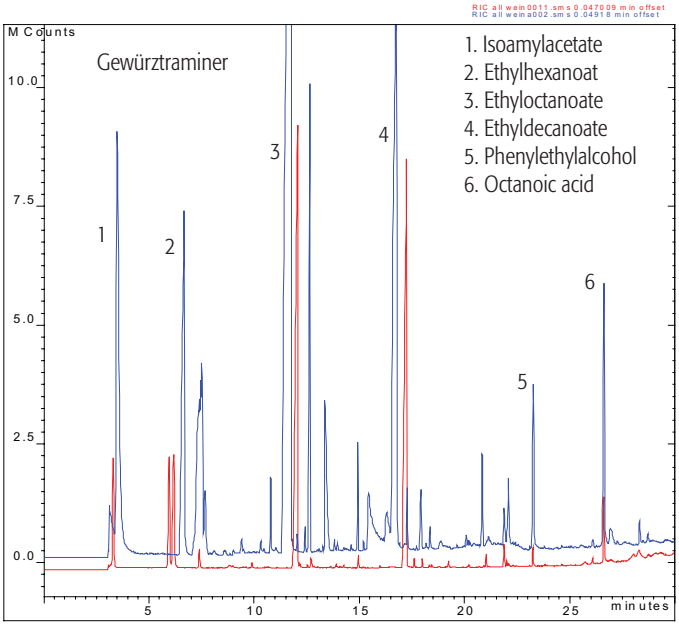

Figure 3: Analysis of Gewürztraminer aromas:
PAL SPME Arrow (blue 100 µm PDMS 20 mm 0.80 mm OD) compared to a **conventional SPME fiber** (red 100 µm PDMS 10 mm 0.30 mm OD)

Analysis of VOCs, EPA 502.2

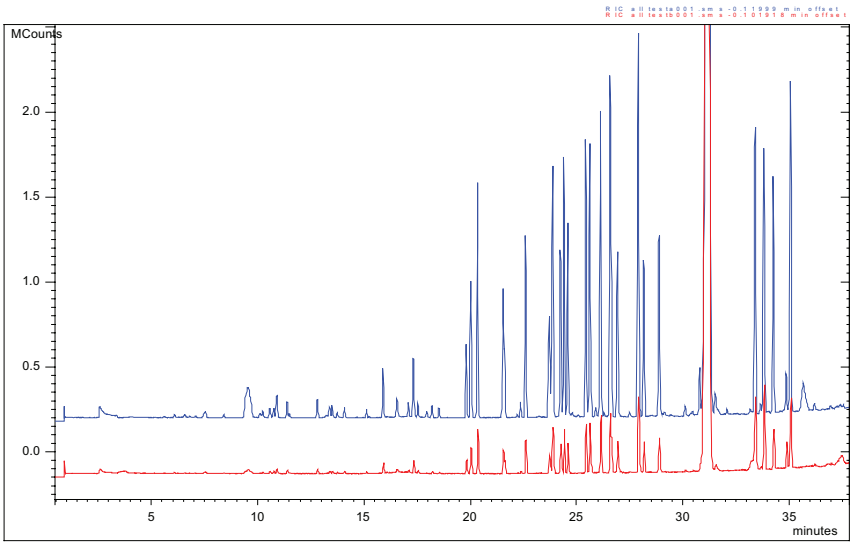

Figure 4:
Analysis of VOCs in water, analogue to EPA 502:
PAL SPME Arrow (blue 100 µm PDMS 20 mm 0.80 mm OD) compared to a **conventional SPME fiber** (red 100 µm PDMS 10 mm 0.30 mm OD)

PAL SPME Arrow sorption materials

currently PDMS, Carbon WR (further materials under development)

The PAL SPME Arrow offers

- Superior SPME sensitivity: typically a 5-fold increase compared to conventional SPME
- Excellent mechanical stability through patented design
- Full protection of sorption phase material
- Highest process safety due to a fully automated SPME process with PAL Systems

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CTC Analytics AG
Industriestrasse 20
CH-4222 Zwingen
Switzerland
T +41 61 765 81 00
F +41 61 765 81 99
Contact: info@ctc.ch