

## CHRONECT Workstation PAH



### Product information

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### PAH analytics according to the imPAHct method

Polycyclic aromatic hydrocarbons (PAHs) are among the most studied contaminants in different matrices. The reason for this is the sometimes very high carcinogenicity of this group of substances and its wide distribution. PAHs are formed by incomplete combustion and pyrolysis processes. They enter the environment through flue gases bound to dust particles or mineral oil residues. They enter food either through environmental input, e.g. dust particles on large-leaf vegetables, or through roasting and smoking processes.

The European directives prescribe limit values that vary from 1 to 10 µg/kg for the marker substance benzo[a]pyrene and cumulative maximum limits of 1-50 µg/kg for PAH4 (under this name benzo[a]pyrene, benzo[a]anthracene, chrysene and benzo[b]fluoranthene are summarized), depending on the foodstuff.

The determination of PAHs with the necessary sensitivity is a great challenge for the analytics in the multitude of possible food matrices. The analytical methods used are either HPLC with fluorescence detection or GC-MS. The sample preparation is often very extensive and time-consuming.

The current requirements for laboratories are to reduce sample processing time (turnaround time) and to increase sample throughput without compromising analytical parameters such as sensitivity, precision and accuracy. This requires highly automated analytical procedures for the analysis.

Axel Semrau's CHRONECT LC-GC technology, which has been established in the routine analysis of food for several years, forms an ideal basis for such an application system. Axel Semrau has developed an LC-LC-GC-MS(/MS) solution and the imPAHct method for the analysis of PAHs: innovative multidimensional **PAH** clean-up technology.

To determine PAHs, a simple and fast extraction of the sample is performed. After a short manual processing, the extract is purified in Axel Semrau's LC-GC system by a two-stage LC separation (LC-LC-Clean-Up) and then analyzed by GC-MS. Edible oils can be measured directly.

This intelligent matrix management makes it possible to determine the PAHs prescribed by the EFSA for analysis fully automatically. Depending on the detector, detection limits are achieved that are lower by a factor of 100 than the prescribed European limits for infant food.

Axel Semrau's LC-GC solutions are pre-installed in the application laboratory, tested and delivered to the user ready for use. This ensures the fastest possible start of routine measuring operations.

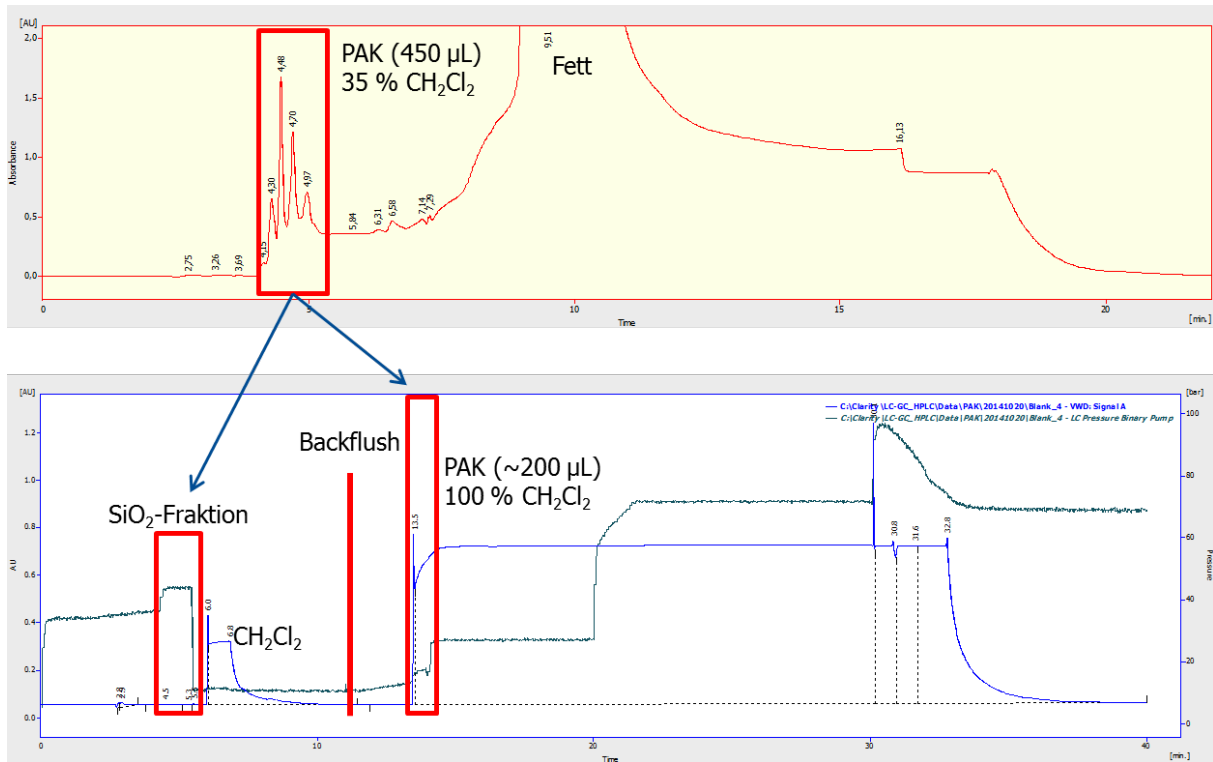
### Example chromatograms

The LC-GC coupling delivers two chromatograms simultaneously:

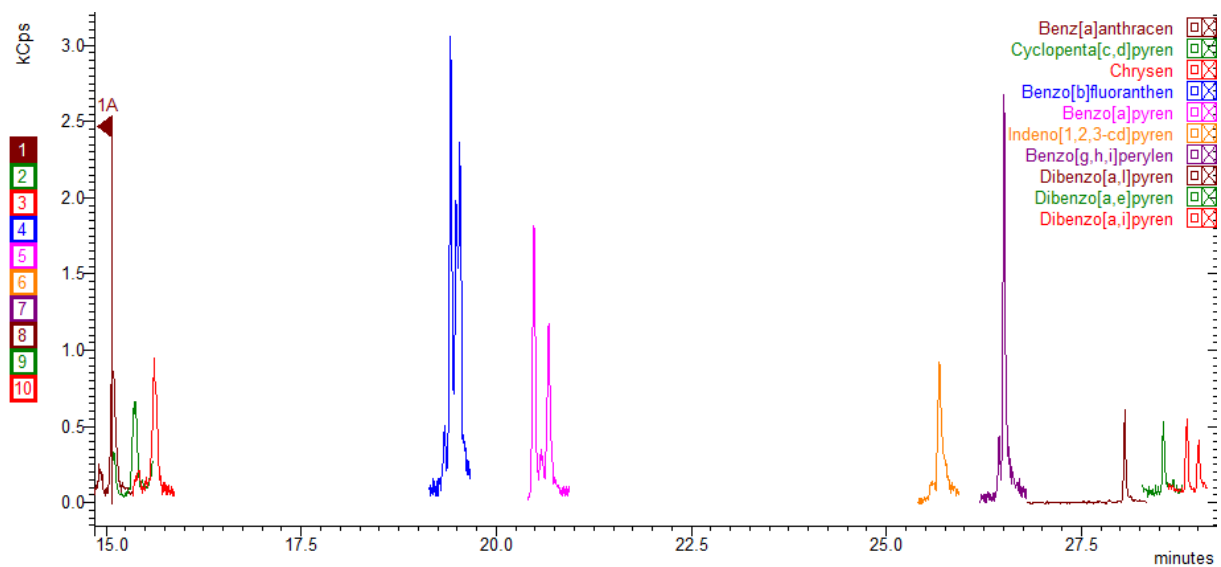
- the signal of the UV detector from the HPLC purification
- the signal of the GC-MS

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**Figure 1:** LC-LC-Clean-Up: HPLC chromatogram of the first purification (upper chromatogram) and HPLC chromatogram of the two-step HPLC purification (lower chromatogram).



**Figure 2:** LC-LC-GC-MS/MS measurement of a cocoa butter spiked to 0.04 µg/kg with PAHs.

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### Specifications

- LOD for all EFSA PAHs between 0.01 - 0.02 µg/kg
- LOQ for all EFSA PAHs < 0.06 µg/kg
- The sensitivities apply when using a current GC-MS system
- Repeatability <10 % for total procedures
- Analysis duration: 45 min

### Advantages imPAHct and CHRONECT Workstation PAH

- LOD 1/100 of the limit value for infant food (example substance: benzo[a]pyrene)
- no consumables like SPE cartridges due to the LC-LC-Clean-Up
- longer maintenance intervals due to Clean-Up-Technology
- fast results
- protection of the GC
- high degree of automation
- excellent reproducibility
- Investment security
- expandable to further applications

### System components

The application system consists of the following components:

- CHRONECT Robotic autosampler with 85 cm axis
- Software CHRONOS
- Agilent 1260 Infinity II HPLC pump with UV detector and degasser
- Bruker EVOQ GC-TQ or Agilent MSD 5977B
- Alternatively, a system can be set up using components from Shimadzu (LC-40 and GCMS-QP2020 NX)
- CHRONECT LC-GC-Interface for LC-GC coupling
- Data system with control and evaluation software
- Accessories and consumables
- Factory Acceptance Test
- Instruction and commissioning
- Site Acceptance Test
- Training, Support

imPAHct and the CHRONECT Workstation PAH are developments by Axel Semrau.

#### Subject to technical changes

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