

Determination of Polycyclic Aromatic Hydrocarbons in water

SyncorePlus Analyst: Determination of Polycyclic Aromatic Hydrocarbons in water using SyncorePlus with Solid Phase Extraction (SPE) cover

1. Introduction

PAHs are molecules based on aromatic rings containing only carbon and hydrogen atoms. PAHs are natural components of fossil fuels; they are released to the environment during incomplete combustion of organic matter. [1] Oxidized PAHs (epoxides) can act as carcinogens, mutagens, impair fertility, etc. [2] Thus, the determination of PAHs is of great importance. In the presented application, a sample, spiked with PAHs, is extracted using a Solid Phase Extraction (SPE) cartridge on the SyncorePlus SPE cover. After elution, the solvent is concentrated to a residual volume for GC-MS analysis.

2. Experimental

Equipment: SyncorePlus Analyst R-12 Flushback module with Solid Phase Extraction (SPE) advanced cover

- Water sample, spiked with certified PAH mix. PAHs included: Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Pyrene, Phenanthrene

Table 1: Parameters for the concentration of acetonitrile: toluene (3:1 v/v).

Procedure: The SPE cartridge was installed on the SyncorePlus R-12 SPE advanced cover and conditioned. 100 mL water sample was added. After sample loading, the cartridge was dried, then the PAHs were eluted with a acetonitrile:toluene 3:1 v/v solution. The extract was concentrated to 1 mL with the parameters listed in Table 1. The sample was extracted in triplicates. A blank was prepared with the same procedure, but without the adding of the spike solution.

Parameter	Step 1	Step 2	Step 3
Vacuum start	600 mbar	200 mbar	140 mbar
Vacuum end	200 mbar	140 mbar	140 mbar
Timer	5 min	10 min	5 min
Temperature SyncorePlus base	60 °C	60 °C	60 °C
Temperature SyncorePlus cover	60 °C	60 °C	60 °C
Recirculating Chiller	10 °C	10 °C	10 °C
Rotation	200 rpm	200 rpm	200 rpm
Aeration	Off	Off	On

The extracts were sent to Labor Veritas AG for the analysis with GC-MS.

3. Results

The recovery of each PAH is shown in Figure 1 as a mean value of three samples. The measurement uncertainty of each measurement was added in quadrature. A blank and its uncertainty was taken into consideration.

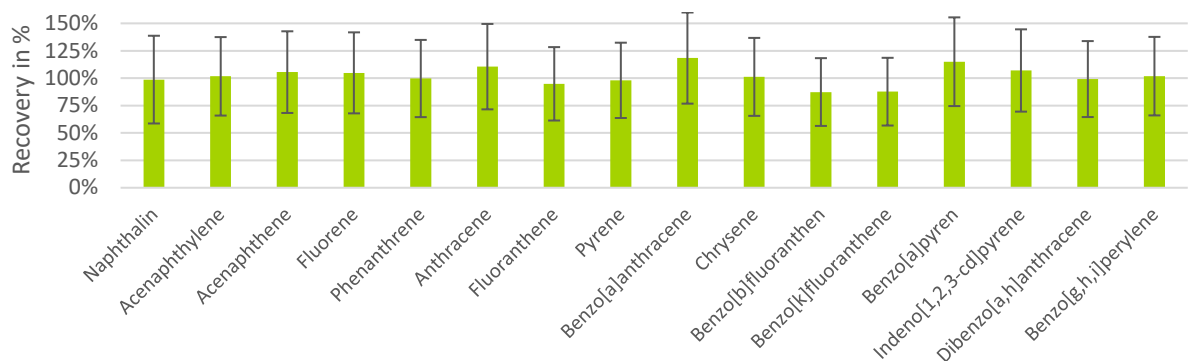


Figure 1: Mean values (n=3) for the recoveries of each PAH. The blank and its uncertainty was taken into consideration. The confidence interval is 95%.

4. Conclusion

The determination of PAH components in water by use of the SyncorePlus with the SPE advanced cover provides reliable and reproducible results. No crosscontamination occurred.

5. References

- Henner P. et al – Polycyclic aromatic hydrocarbons (PAH) occurrence and remediation methods, *Analisis*, 25, 1997.
 - Kim K.-H. et al - A review of airborne polycyclic aromatic hydrocarbons (PAHs) and their human health effects, *Environment International*, 60, 71-80, 2013.
- For more information, please refer to Application Note 782/2022.