

# Extraction and quantification of Polycyclic Aromatic Hydrocarbons in HPLC

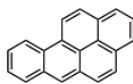
**Mathilde FONTAINE**

## Introduction

Polycyclic aromatic hydrocarbons (PAHs) analyses are very frequent in environmental analyses, especially for drinkable water. PAHs are classified as Persistent Organic Pollutants (POPs). So, they show toxic effects on human health and wildlife. As most pollutants, they are of concern because some compounds are identified as carcinogenic and mutagenic. Naphtalene is the simplest example of a PAH and Benzo(a)pyrene is considered as the most worrying.



Naphtalene M=128.07 g/mol



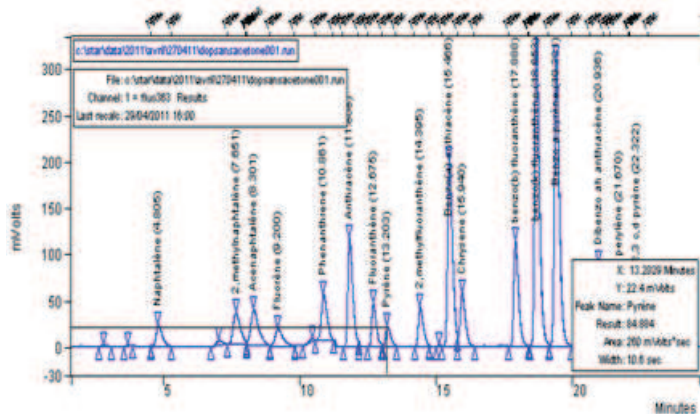
Benzo(a)pyrene M=252.31 g/mol

**Pictures:** examples of two molecules PAHs.

The laboratory analysis of Saint-Etienne participates in this cause and realizes the assay of 18 polycyclic aromatic hydrocarbons in different types of water, such as drinkable water.

## Experimental conditions

PAHs initially present in water, were extracted using an extraction agent: hexane. Then, the organic phase containing the molecules was concentrated by evaporation. Moreover, an appropriate solvent for HPLC analysis was added. The extract was analyzed by liquid chromatography using a non-polar stationary phase. Routinely, analyses were realized with Varian ProStar HPLC, the column used was a Varian Pursuit 3 PAH (10 cm and 0.3 mm). The mobile phase was a mixture of water and acetonitrile (HPLC slope). The flow rate was 0.7 mL/min. PAHs were quantified using a UV detector for acenaphthylene and using a fluorescence detector for the 17 other molecules.



**Fig.1.** Chromatograms of 17 PAHs observed in HPLC.

Naphtalene, 2-Methylnaphtalene, Acenaphptene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, 2-methylfluoranthene, Benzo(a)anthracene, Chrysene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene and Indeno (1,2,3-cd)perylene.

## Results and conclusion

Figure 1 shows a chromatogram of 17 PAHs with a fluorescence detector.

For drinkable water, the maximum concentration of PAHs authorized is 0.01 µg/L for the compound Benzo(a)pyrene and 0.1 µg/L for the other molecules.

Nowadays, in order to prevent contaminations, the drinkable water is analyzed regularly. If water is unusually concentrated, the laboratory must contact the French service DDASS (Departmental Direction of Health and Social Affairs) in order to take adequate precautions as quickly as possible.



IPL Environnement  
Laboratoire d'Analyses de Saint-Etienne  
2 rue Chanoine Ploton  
42000 Saint-Etienne