



Polycyclic aromatic hydrocarbons (PAH)

„PAH4“ and benzo[a]pyrene in the spotlight

PAH are a group of organic compounds consisting of at least two condensed aromatic rings. Many PAH are supposed to be cancerogenic and mutagenic. Due to their toxicity, persistence and distribution, PAH play a major role amongst harmful substances.

Since 2012 with Regulation (EU) No 1881/2006, maximum levels for the marker substance benzo[a]pyrene as well as maximum levels for the sum of the so-called „PAH4“ are in force for a broad range of food matrices.

Formation of PAH

PAH develop especially during incomplete combustion of organic materials. They are fat soluble, non-volatile, extremely persistent and occur in exhaust fumes from motor vehicles, coal furnaces and mineral oil heatings.

PAH in Food

Food may be contaminated via air, soil, water and sediments. The products mainly concerned are sea food as well as harvested goods depending on the environment (traffic, heat and power stations, industrial areas and others).

Additionally, PAH may form during food processing and preparation through smoking, drying, frying, grilling, roasting and baking. The contamination of vegetable oils with PAH may result from the contact of oil seeds with combustion fumes during the process of drying.

Food Law

Based on a statement of the earlier EU Scientific Committee on Food (SCF), benzo[a]pyrene was the sole marker substance for the occurrence of PAH in food.

In 2008, an expert's opinion from the European Food Safety Authority (EFSA) has questioned this statement and proposed the sum of the 4 PAH (benzo[a]pyrene, benz[a]anthracene, benzo[b]fluoranthene and chrysene) as a more suitable indicator for the occurrence of PAH in food.

Since 2012, maximum levels for both benzo[a]pyrene and PAH4 are in force (Regulation (EU) No 1881/2006). In 2015 the scope of matrices has been enlarged by Regulation (EU) 2015/1933.

The following food groups are regulated:

- Edible fats and oils
- Cocoa beans and derived products
- Smoked meat and meat products
- Smoked fish and fish products
- Smoked bivalve molluscs
- Processed cereal based foods and baby foods for infants and young children
- Infant formulae and follow-on formulae
- Special dietary foods

- Cocoa fibre and cocoa fibre products
- Banana chips
- Food supplements containing botanicals, propolis, royal jelly, spirulina and their preparations
- Dried herbs and dried spices (excl. cardamom and smoked *Capsicum* spp)

Furthermore for smoke flavourings, EU Regulation 2065/2003 fixes maximum levels for benzo[a]pyrene and benz[a]anthracene.

Analysis

Our experts from the Competence Centre for Organic Contaminants have longterm experience with the analysis of PAH in food. Our offer includes:

- Benzo[a]pyrene
- PAH4
- 16 EU-PAH
- 13 EPA-PAH
- 26 PAH

Even the separation of critical pairs such as chrysene/triphenylene and the benzo-fluoranthenes is ensured using a novel selective gas chromatographic phase. The combination of solid phase extraction and gas chromatography-mass spectrometry (online-SPE-GC-MS) renders short turn-around-times possible.

