



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, maximum levels for both benzo[a]-pyrene and PAH4 are in force (Regulation (EU) 2023/915). The list of food groups is constantly enlarged.

Formation of PAH

PAH develop especially during incomplete combustion of organic materials. They are fat soluble, non-volatile and are found in flue gases from natural or industrial combustion processes.

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.

Regulation (EU) 2023/915 sets maximum levels for both benzo[a]pyrene and PAH4.

The following food groups are regulated:

- Banana chips
- Powders of food of plant origin for the preparation of beverages (excl. instant and soluble coffee)
- Dried herbs
- Cocoa beans and derived products
- Cocoa fibre and cocoa fibre products
- Smoked meat and meat products
- Smoked fish and fish products
- Smoked bivalve molluscs
- Dried spices (excl. cardamom and smoked *Capsicum spp*)
- Edible fats and oils
- Coconut oil
- Infant formulae and follow-on formulae
- Processed cereal based foods and baby foods for infants and young children
- Dietetic foods for infants
- Food supplements containing botanicals, propolis, royal jelly, spirulina and their preparations

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 long-term experience with the analysis of PAH in food. Our offer includes:

- Benzo[a]pyrene
- PAH4
- 16 EU-PAH
- 12 EPA-PAH
- 25 PAH

Even the separation of critical pairs such as chrysene/triphenylene and the benzo-fluoranthenes is ensured using a novel selective gas chromatographic phase.

In addition to the analysis of anhydrous fats/oils with online LC-GC-MS, all other relevant food and feed matrices can also be analysed for the above-mentioned PAH spectra by means of online coupling of solid phase extraction with gas chromatography-mass spectrometry (online SPE-GC-MS/MS). We also offer all analyses with low limits of quantification.

