

1. Sources

Polycyclic aromatic hydrocarbons (PAHs) are a class of more than 100 organic compounds. They occur naturally in coal and crude oil, but are also formed as a by-product during the incomplete combustion from both natural (e.g. volcanic eruptions, burning of coal, oil and gas) or anthropogenic (e.g. vehicle emissions, industrial processes, food preparation) sources.



PAHs may also be present in consumer products (e.g. plastic components, footwear); however, they are never intentionally added during manufacturing. Plant-based foods may contain PAHs as a result of pollutant deposition before harvest.

2. Why is it relevant?

Multiple assessments have concluded that PAHs have no safe threshold below which no health risks exist. PAHs in products are identified by the Global Chemical Outlook II as an issue with emerging evidence of risks to human health.



A number of PAHs have been classified as carcinogenic, mutagenic and/or toxic for reproduction substances.

Benzo[a]pyrene (BaP) is a key PAH compound which is classified as a Group 1 carcinogen (carcinogenic to humans).

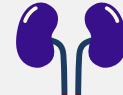


Fourteen other PAHs have been classified as Group 2A (probably carcinogenic) or Group 2B (possibly carcinogenic).

Many PAHs are genotoxic carcinogens, which cause gene mutations.



PAHs have been documented to activate mechanisms that further accelerate PAH metabolism. Repeated exposure to PAHs boosts their carcinogenic and mutagenic properties.



Some PAHs show long-range transport potential and are persistent, bioaccumulative and toxic to humans and other organisms.

Other documented risks include exposures that irritate the eyes, throat and lungs, and cause damage to the liver and kidneys.

PAHs are ubiquitous in the environment, and exposures are always to a mixture of PAHs simultaneously.



Human exposure may occur via multiple routes, including dermal and oral uptake, and such exposures may occur through both environmental media and consumer products.



PAHs can migrate and diffuse from consumer products through skin and migration and diffusion from packaging material into foodstuff may also occur.

Molecules with lower weights diffuse faster and migrate farther into both skin and foodstuff. Other factors responsible for the migration of PAHs into foodstuff are the exposure area of the packaging used and the fat content in the food.



3. Existing instruments and actions

At the international level, the Basel Convention addresses PAHs at the end of products' life cycles, but does not directly address consumer products that contain PAHs during their production and use.

The The Aarhus Protocol on Persistent Organic Pollutants to the Convention on Long-Range Transboundary Air Pollution obliges Parties to reduce their emissions of polycyclic aromatic hydrocarbons (PAHs) below their levels in 1990.

Current national and regional instruments and actions typically prioritise and group several PAHs according to environmental relevance, which may vary between countries and product categories.

Several major legally binding instruments restrict the levels of PAHs in consumer products, e.g. for cosmetics and foodstuffs, or in extender oils and consumer products containing rubber or plastics. Similarly, legally binding maximum permissible levels of selected PAHs have been set for cosmetics, foodstuffs, consumer products, packaging and waste asphalt that can be recycled.

These legally binding instruments are complemented by recommended guidelines developed by intergovernmental institutions, and by various voluntary actions initiated by the private sector, including voluntary standards. Some organisations have also developed different consumer education or public documents to raise awareness of PAH exposures.



4. Challenges and opportunities



Voluntary standards alone are unlikely to be able to address PAHs in consumer products due to their current limited scope in terms of geographic coverage or product categories.

BaP is used as a reference compound for the presence of PAHs in general. However, due to the large variety of PAH mixtures, some products may contain different PAHs but not BaP. In such cases, testing for the presence of PAHs using a single reference chemical will lead to false negatives.

It may be necessary to raise global awareness towards establishment and implementation of legally binding instruments for addressing PAHs in consumer products across different jurisdictions.

Although food items generally meet guideline values issued in legislation from multiple countries, food processing standards may be fostered to minimize PAH contamination.

The use of reference PAHs needs to be carefully considered, and expanded beyond the sole use of BaP.

