

Questions and answers on naphthalene in consumer products

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Naphthalene belongs to the polycyclic aromatic hydrocarbons, or PAH for short. Naphthalene is obtained primarily through the refinement of aromatic crude oil fractions and - especially in bygone years - from coal tar as well. As a combustion product of organic materials, naphthalene occurs in low concentrations virtually everywhere in the environment.

Due to the current discussions about naphthalene in consumer products, the Federal Institute for Risk Assessment (BfR) has compiled some questions and answers on the subject in the following paragraphs.

What is naphthalene?

Naphthalene belongs to the compound group of polycyclic aromatic hydrocarbons (PAH), or more precisely: naphthalene is a bicyclic aromatic hydrocarbon and therefore the smallest PAH.

Naphthalene is obtained primarily through the refinement of aromatic crude oil fractions and - especially in bygone years - from coal tar as well. Most naphthalene is used in the plastics industry. Naphthalene is also further processed into insecticides to a small extent. Naphthalene is an essential component of creosote (tar oil) and is also contained in aircraft fuels. It used to be used to protect against moths and as an insecticide, but has been largely substituted for other substances. As a combustion product of organic materials, naphthalene is more or less ubiquitous in the environment.

Naphthalene can be contained as a contaminant in carbon black used for blackening, for example, and in extender oils used as plasticisers.

What is the hazard potential of naphthalene?

Naphthalene can be taken up via oral, inhalation and dermal routes. Poisoning incidents after inhalative, oral or dermal application (e.g. via pharmaceuticals containing naphthalene) have been described in humans. The reports here were of skin reactions after skin contact and haemolytic anaemia after inhaling naphthalene vapours. Clouding of the lens, corneal ulcers and cataracts were reported in workers who were exposed to naphthalene as dust or vapour. These observations were made after comparatively high naphthalene exposure, the likes of which is not to be expected with consumer products.

In animal experiments, naphthalene causes inflammations in the respiratory tract in particular. Even in low concentrations, repeated inhalative exposure to naphthalene results in local inflammations and damage to the upper respiratory tract, especially the nose, in experiments with animals. Tumours can develop as a result of chronic inflammations, but there are no reliable/conclusive indications of a possibly carcinogenic effect in humans through inhalative exposure. For this reason, naphthalene is classified as a Category 2 carcinogen ("Suspected of causing cancer") in line with the European regulation on the classification, labelling and packaging of substances and mixtures (CLP Regulation, EC No. 1272/2008). Naphthalene is also classified as Acutely Toxic of Category 4 ("Harmful if swallowed"). Acutely toxic substances are classified into four categories, whereby substances with a strong toxic effect are classified into Category 1 and substances with a weaker toxic effect into the subsequent categories. Naphthalene is also listed in Annex II of the EU cosmetics regulation No 1223/2009, which means that naphthalene is prohibited in cosmetic products.

Is naphthalene carcinogenic?

Although naphthalene is classified as a Category 2 carcinogen (“Can probably cause cancer”) in accordance with the CLP regulation, its carcinogenic potency is much lower compared to other PAH. In experiments with rodents, the carcinogenic effect occurred in the respiratory tract (nasal tissue, lungs) after inhalative intake. No meaningful epidemiological findings are available on the carcinogenic effect of inhalative naphthalene exposure in humans.

Based on the identification of a threshold mechanism for the carcinogenic effects in the nasal tissue of rats caused by cytotoxic-inflammatory processes, the Indoor Air Hygiene Commission at the German Federal Environment Agency established the provisional guideline values for naphthalene in indoor air in 2013. 0.01 mg of naphthalene per m³ of air was established as health precaution guide value (RW I) and 0.03 mg/m³ as health hazard guide value (RW II). According to the latest level of available knowledge, no health impairments are to be expected if RW I is not exceeded, even in the case of lifetime exposure by sensitive persons. Immediate action is required if RW II is reached or exceeded.

What should manufacturers/marketers watch out for with regard to naphthalene?

Although naphthalene is not deliberately added to any consumer product, it can sometimes be contained as a contaminant. This is due to the use of carbon Black as a blackening agent or of extender oils as plasticisers.

Naphthalene is prohibited in cosmetic products. However, the non-intended presence of a small quantity of a prohibited substance, stemming from impurities of natural or synthetic ingredients, the manufacturing process, storage, migration from packaging, which is technically unavoidable in good manufacturing practice, is permitted according to the EU Cosmetics Regulation, provided that the cosmetic product is safe to human health despite these technically unavoidable traces. The manufacturer must provide proof of this through a safety assessment.

Where consumer products are concerned, it is prohibited to manufacture or treat them in such a way that when used properly and for their intended or foreseeable purpose, they are capable of damaging health through their chemical composition, in particular through toxic substances or contamination. It is also prohibited to market consumer products of this kind. The BfR recommends that manufacturers reduce naphthalene levels in consumer products to the greatest technically achievable extent.

The limits for naphthalene determined for the GS product safety mark were not derived from a health point of view, they are taken from the naphthalene levels that can be reached and complied with nowadays in line with good manufacturing practice, which means that they follow the minimisation principle. Naphthalene levels which clearly exceed the limits determined for the GS mark are an indication that the principles of good manufacturing practice have not been complied with.

More information on polycyclic aromatic hydrocarbons (PAH) on the BfR website:
http://www.bfr.bund.de/en/a-z_index/polycyclic_aromatic_hydrocarbons_pah_-130109.html

About the BfR

The Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. It advises the Federal Government and Federal Laender on questions of food, chemical and product safety. The BfR conducts its own research on topics that are closely linked to its assessment tasks.

This text version is a translation of the original German text which is the only legally binding version.