Inorganic Arsenic

Inorganic Arsenic

Rice, fish and other food in the spotlight

Arsenic is a naturally occurring element, present in soil, ground water and plants. In food, arsenic is found as organic as well as inorganic compounds. Inorganic arsenic compounds are classified as carcino-genic. The intake of inorganic arsenic should be minimised.

Rice and rice products may contain relatively high amounts of inorganic arsenic depending on their geographical origin. Maximum levels for inorganic arsenic in rice and rice products came into force in January 2016. Additionally, with its Recommendation 2015/1381 the EU requests the monitoring of arsenic and arsenic species in a range of additional food matrices.

Occurrence

Seafood and fish have been identified as major source of arsenic in the human diet and in animal feed. In seafood and fish, arsenic is present predominantly in the organic forms of arsenobetaine and arsenocholine, compounds being less toxic.

The main sources of inorganic arsenic intake are cereals and cereal based products (mainly rice), food for special dietary uses (e.g. algae), bottled water, coffee, beer and vegetables. The reason for higher contents of inorganic arsenic in rice cakes, and other rice products compared to white rice, is currently unclear.

Legal Foundation

In June 2015, with Regulation (EC) No. 2015/1006 amending Regulation (EC) No. 1881/2006 maximum levels for arsenic in food were published. Maximum levels are defined for inorganic arsenic in polished white rice (0.20 mg/kg), in husked rice and parboiled rice (0.25 mg/kg), in rice products (0.30 mg/kg) and rice intended for baby food (0.10 mg/kg).

The Recommendation (EU) 2015/1381 requests member states to monitor arsenic and arsenic species in cereals, fruit and vegetable juices, drinking water, coffee, tea, beer, fish and sea food, vegetables, algae products, milk and dairy products, baby food and food supplements.

Analysis

Eurofins offers the determination of total arsenic in food and feed using different techniques, such as Graphite-Furnace-Atomic-Absorption-Spectrometry (GFAAS), Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) or ICP-MS/MS.

In addition to the determination of total arsenic it is also possible to specifically determine the appropriate toxic part of inorganic arsenic in algae, fish, fish meal, fish oil, fish feed, rice, baby food, milk and beer.

Within this analytical procedure arsenic compounds are extracted from the sample and the extracted arsenic is determined by Hydride Generation-Atomic Absorption Spectroscopy (HG-AAS) or High Performance Liquid Chromatography-Inductively Coupled Plasma-Mass Spectrometry (HPLC-ICP-MS). Stable organic arsenic compounds like arseno sugars, arsenobetain and arsenocholine are not detected under these conditions.

Eurofins now offers a new and especially sensitive method for the analysis of inorganic arsenic and total arsenic in rice and infant food. While the total arsenic is analysed using ICP-MS/MS the inorganic arsenic is determined via an HPLC-ICP-MS coupling technique after acidic extraction.

The arsenic species are separated chromatographically and detected via ICP-MS. The limit of quantification for the sum of the inorganic arsenic is 0.02 mg/kg.