CONffIDENCE WP3 – Rapid and cost-effective test for heavy metals in the food chain

Sloth, Jens Jørgen

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

CONffIDENCE WP3

Rapid and cost-efficient tests for heavy metals in the food chain

Introduction

The CONffIDENCE project (Contaminants in Food and Feed; Inexpensive Detection for Control of Exposure) aims to further improve food safety in Europe by the development of fast and cost-efficient methods for the detection of a wide range of chemical contaminants in different food and feed commodities. The project is funded by the European Commission in the 7th Framework Programme, call identifier FP7-KBBE-2007-1, Grant Agreement number 211326.

Work package cluster 3 focuses on the development of detection methods for heavy metals that are able to discriminate between the organic and inorganic forms. By focusing on simplified methods that specifically detect the more toxic form, food and feed safety control becomes more effective. Methods will be developed for inorganic arsenic and methyl mercury in fish, and fish feed.

Inorganic arsenic

Objectives

- Development of a simplified method for the specific determination of inorganic arsenic (iAs) in seafood.

Arsenic *has a very complex chemistry illustrated by the more than fifty different naturally occurring arsenic containing chemical species that have been identified, mainly in samples from the marine environment. The toxicity of arsenic is highly dependent on its chemical form, with inorganic arsenic being most toxic, whereas organoarsenic compounds are considered to be of lower toxicity. Recently, EFSA established a* $BMDL_{01}$ *for inorganic arsenic at 0.3-8 µg/kg bw/day and emphasized the need for further specific data on inorganic arsenic in food and the need for fully validated, standardized methods (EFSA opinion on arsenic in food, 2009).*

Results so far

- Development of solid phase extraction (SPE) separation method based on anion-exchange to separate inorganic arsenic and organic-bound arsenic (organoAs)
- Full detection protocol developed involving microwave extraction, separation by SPE and selective detection by HG-AAS.
- In-house validation studies of the method performed at DTU Food

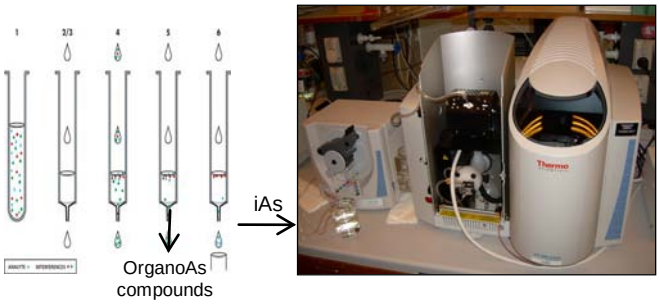

Figure: Steps in the SPE elution procedure for the separation of inorganic arsenic from organoarsenic compounds followed by element-specific detection by HG-AAS

Methyl mercury

Objectives

- Development of a simplified method for the determination of methyl mercury (MeHg) in marine based food and feed

Mercury *is generally considered to be among the highest priority environmental pollutants on the global scale and it causes continuously concern as a contaminant in both feed and food. Mercury is one of the most highly bioaccumulated elements in the food chain (especially aquatic). Marine animals can biomethylate mercury to methylmercury and compound is the most toxic mercury form found in food. A provisional tolerable weekly intake level (PTWI) has been set for methylmercury at as low as 1.6 µ/kg bodyweight (JECFA, 2003).Hence, specific analysis of the methylmercury content is important for correct assessment of the food and feed safety.*

Results so far

- Development of HPLC method for the separation of methyl mercury from inorganic mercury.
- Simplified extraction using ultrasonic bath for increased sample through-put.
- In-house validation studies are currently ongoing at DTU Food

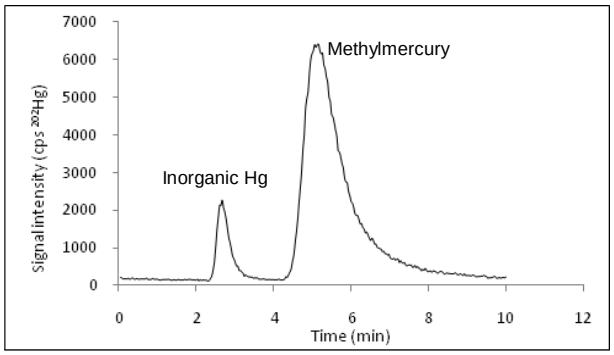

Figure: HPLC-IPCMS chromatogram of the mercury speciation analysis of the CRM DORM-3 (Dogfish muscle), illustrating a nice resolution between the two mercury compounds by the cation-exchange chromatography employed.

Contact: Work package leader: Jens J. Sloth (DTU Food, DK) E-mail: jjsl@food.dtu.dk