



Geel, October 2012

## Official methods for the determination of heavy metals in feed and food

---

### 1. CEN published standards

#### a) Foodstuffs

- **EN 13804:2002** Foodstuffs - Determination of trace elements - Performance criteria, general considerations and sample preparation
- **EN 13805:2002** Foodstuffs - Determination of trace elements - Pressure digestion
- **EN 13806:2002** Foodstuffs - Determination of trace elements - Determination of mercury by cold-vapour atomic absorption spectrometry. (CVAAS) after pressure digestion
- **EN 14082:2003** Foodstuffs - Determination of trace elements - Determination of lead, cadmium. Zinc, copper, iron and chromium by atomic absorption spectrometry (AAS) after dry ashing
- **EN 14083:2003** Foodstuffs - Determination of trace elements - Determination of lead, cadmium, chromium and molybdenum by graphite furnace atomic absorption spectrometry (GFAAS) after pressure digestion
- **EN 14084:2003** Foodstuffs - Determination of trace elements - Determination of lead, cadmium, zinc, copper and iron by atomic absorption spectrometry (AAS) after microwave digestion
- **EN 14332:2004** Foodstuffs - Determination of trace elements - Determination of arsenic in seafood by graphite furnace atomic absorption spectrometry (GFAAS) after microwave digestion
- **EN 14546:2005** Foodstuffs - Determination of trace elements - Determination of total arsenic by hydride generation atomic absorption spectrometry (HGAAS) after dry ashing
- **EN 14627:2005** Foodstuffs - Determination of trace elements - Determination of total arsenic and selenium by hydride generation atomic absorption spectrometry (HGAAS) after pressure digestion
- **CEN/TS 15506:2007** Foodstuffs - Determination of trace elements - Determination of tin in fruit and vegetables preserved in cans by flame atomic absorption spectrometry (AAS)
- **EN 15517:2008** Determination of trace elements – Determination of inorganic As in seaweed by hydride generation atomic absorption spectrometry (HGAAS) after acid extraction
- **EN ISO 12193:2004** Animal and vegetable fats and oils - Determination of lead by direct graphite furnace atomic absorption spectrometry (ISO 12193:2004)
- **EN ISO 15774:2001** Animal and vegetable fats and oils - Determination of cadmium content by direct graphite furnace atomic absorption spectrometry (ISO 15774:2000)

- **EN 16278: 2012** Animal feeding stuffs – Determination of inorganic arsenic by hydride generation atomic absorption spectrometry (HG-AAS) after microwave extraction and separation by solid phase extraction (SPE)
- **EN ISO 8294:1999** Animal and vegetable fats and oils - Determination of copper, iron and nickel contents - Graphite furnace atomic absorption method (ISO 8294:1994)

## **b) Animal feeding stuffs**

- **EN ISO 6869:2000** Animal feeding stuffs - Determination of the contents of calcium, copper, iron, magnesium, manganese, potassium, sodium and zinc - Method using atomic absorption spectrometry (ISO 6869:2000)
- **CEN/TS 15621:2007** Animal feeding stuffs - Determination of calcium, sodium, phosphorus, magnesium, potassium, sulphur, iron, zinc, copper, manganese, cobalt and molybdenum after pressure digestion by ICP-AES
- **EN 15510:2007** Animal feeding stuffs - Determination of calcium, sodium, phosphorus, magnesium, potassium, iron, zinc, copper, manganese, cobalt, molybdenum, arsenic, lead and cadmium by ICP-AES
- **EN 15550:2007** Animal feeding stuffs - Determination of cadmium and lead by graphite furnace atomic absorption spectrometry (GF-AAS) after pressure digestion
- **EN ISO 6869:2000** Animal feeding stuffs - Determination of the contents of calcium, copper, iron, magnesium, manganese, potassium, sodium and zinc - Method using atomic absorption spectrometry (ISO 9831:1998)

## **2. AOAC Official methods of analysis**

### **a) Food**

- **982.23** Cadmium and lead in food by anodic stripping voltammetry (ASV)
- **986.15** Arsenic, cadmium, lead, selenium, and zinc in human and pet foods by atomic absorption spectrometry (AAS) and anodic stripping voltammetry (ASV)
- **999.10** Lead, cadmium, zinc, copper, and iron in foods by glass furnace atomic absorption spectroscopy (GFAAS) and by flame atomic absorption spectroscopy (FAAS)
- **999.11** Determination of lead, cadmium, copper, iron, and zinc in foods by flame atomic absorption spectroscopy (FAAS) and by glass atomic absorption spectroscopy (GFAAS)
- **945.58** Cadmium in food (dithizone method-spectroscopy)
- **973.34** Cadmium in food by atomic absorption spectroscopy (AAS)
- **974.27** Cadmium, chromium, copper, iron, lead, magnesium, manganese, silver, zinc in food by atomic absorption spectroscopy (AAS)
- **971.21** Mercury in food by flame atomic absorption spectroscopy (FAAS)
- **977.15** Mercury in fish by flame atomic absorption spectroscopy (FAAS)
- **974.14** Mercury in fish by flame atomic absorption spectroscopy (FAAS)
- **952.14** Mercury in food (dithizone method-colorimetry)
- **983.20** Mercury (Methyl) in fish and shellfish by gas chromatography (GC)
- **988.11** Mercury (Methyl) in fish and shellfish by gas chromatography (GC)
- **990.04** Mercury (Methyl) in seafood by liquid chromatography-atomic absorption spectroscopy (LC-AAS)

### 3. ISO Methods

- **ISO 6561-1:2005** Fruits, vegetables and derived products -- Determination of cadmium content -- Part 1: Method using graphite furnace atomic absorption spectrometry
- **ISO 6561-2:2005** Fruits, vegetables and derived products -- Determination of cadmium content -- Part 2: Method using flame atomic absorption spectrometry
- **ISO 17239:2004** Fruits, vegetables and derived products -- Determination of arsenic content -- Method using hydride generation atomic absorption spectrometry
- **ISO 6634:1982** Fruits, vegetables and derived products -- Determination of arsenic content -- Silver diethyldithiocarbamate spectrophotometric method
- **ISO 6633:1984** Fruits, vegetables and derived products -- Determination of lead content -- Flameless atomic absorption spectrometric method
- **ISO 6637:1984** Fruits, vegetables and derived products -- Determination of mercury content -- Flameless atomic absorption method
- **ISO 15774:2000** Animal and vegetable fats and oils -- Determination of cadmium content by direct graphite furnace atomic absorption spectrometry
- **ISO 12193:2004** Animal and vegetable fats and oils -- Determination of lead by direct graphite furnace atomic absorption spectroscopy
- **ISO/TS 6733:2006** Milk and milk products -- Determination of lead content -- Graphite furnace atomic absorption spectrometric method

#### DISCLAIMER:

This list is published for information purposes only, therefore the listing should not be seen as any kind of endorsement by the EU-RL. The European Commission does not have any responsibility for any mistakes and errors contained in this list.

The EU-RL, the JRC, the European Commission or any person acting on their behalf, shall not be held responsible for any use third parties make of this information.

The list will be updated if appropriate. The list shall however not be considered an exhaustive list.