

List of methods

European Union reference laboratory for metals and nitrogenous compounds in feed and food (EURL-MN)

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Disclaimer: This list is for information purposes only. It is not an endorsement of the methods by the EURL-MN. The list will be updated occasionally and it is not an exhaustive list.

Metals, feed

CEN

Reference	Title
EN 17374:2020 (Approved)	Animal feeding stuffs: Methods of sampling and analysis - Determination of inorganic arsenic in animal feed by anion-exchange HPLC-ICP-MS
EN 17053:2018	Animal feeding stuffs: Methods of sampling and analysis - Determination of trace elements, heavy metals and other elements in feed by ICP-MS (multi-method)
CEN/TS 17174:2018	Animal feeding stuffs: Methods of sampling and analysis - Performance criteria for single laboratory validated and ring-trial validated methods of analysis for the determination of heavy metals
EN 15510:2017	Animal feeding stuffs: Methods of sampling and analysis - Determination of calcium, sodium, phosphorus, magnesium, potassium, iron, zinc, copper, manganese, cobalt, molybdenum and lead by ICP-AES
EN 15550:2017	Animal feeding stuffs: Methods of sampling and analysis - Determination of cadmium and lead by graphite furnace atomic absorption spectrometry (GF-AAS) after pressure digestion
EN 15621:2017	Animal feeding stuffs: Methods of sampling and analysis - Determination of calcium, sodium, phosphorus, magnesium, potassium, sulphur, iron, zinc, copper, manganese and cobalt after pressure digestion by ICP-AES
EN 17050:2017	Animal feeding stuffs: Methods of sampling and analysis - Determination of iodine in animal feed by ICP-MS
EN ISO 6498:2012	Animal feeding stuffs - Guidelines for sample preparation (ISO 6498:2012)
EN 16159:2012	Animal feeding stuffs - Determination of selenium by hydride generation atomic absorption spectrometry (HGAAS) after microwave digestion (digestion with 65 % nitric acid and 30 % hydrogen peroxide)

EN 16206:2012	Animal feeding stuffs - Determination of arsenic by hydride generation atomic absorption spectrometry (HGAAS) after microwave pressure digestion (digestion with 65 % nitric acid and 30 % hydrogen peroxide)
EN 16277:2012	Animal feeding stuffs - Determination of mercury by cold-vapour atomic absorption spectrometry (CVAAS) after microwave pressure digestion (extraction with 65 % nitric acid and 30 % hydrogen peroxide)
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 16279:2012	Animal feeding stuffs - Determination of fluoride content after hydrochloric acid treatment by ion-sensitive electrode method (ISE)
EN 15765:2009	Foodstuffs - Determination of trace elements - Determination of tin by inductively coupled plasma mass spectrometry (ICP-MS) after pressure digestion
EN ISO 6497:2005	Animal feeding stuffs - Sampling (ISO 6497:2002)
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)
EN 17374:2000	Animal feeding stuffs: Methods of sampling and analysis - Determination of inorganic arsenic in animal feed by anion-exchange HPLC-ICP-MS

Metals, food

CEN

Reference	Title
EN 17264:2019	Foodstuffs - Determination of elements and their chemical species - Determination of aluminium by inductively coupled plasma mass spectrometry (ICP-MS)
EN 17265:2019	Foodstuffs - Determination of elements and their chemical species - Determination of aluminium by inductively coupled plasma optical emission spectrometry (ICP-OES)
EN 17266:2019	Foodstuffs - Determination elements and their chemical species - Determination of organomercury in seafood by elemental mercury analysis
EN 16943:2017	Foodstuffs - Determination of calcium, copper, iron, magnesium, manganese, phosphorus, potassium, sodium, sulfur and zinc by ICP-OES
EN 16801:2016	Foodstuffs - Determination of elements and their chemical species - Determination of methylmercury in foodstuffs of marine origin by isotope dilution GC-ICP-MS
EN 16802:2016	Foodstuffs - Determination of elements and their chemical species - Determination of inorganic arsenic in foodstuffs of marine and plant origin by anion-exchange HPLC-ICP-MS
EN 13805:2014	Foodstuffs - Determination of trace elements - Pressure digestion
CEN/TS 16731:2014	Foodstuffs - Determination of hydride-reactive arsenic compounds in rice by atomic absorption spectrometry (Hydride-AAS) following acid extraction
EN 13804:2013	Foodstuffs - Determination of elements and their chemical species - General considerations and specific requirements
EN 15764:2009	Foodstuffs - Determination of trace elements - Determination of tin by flame and graphite furnace atomic absorption spectrometry (FAAS and GFAAS) after pressure digestion

EN 15505:2008	Foodstuffs - Determination of trace elements - Determination of sodium and magnesium by flame atomic absorption spectrometry (AAS) after microwave digestion
EN 15517:2008	Foodstuffs - Determination of trace elements - Determination of inorganic arsenic in seaweed by hydride generation atomic absorption spectrometry (HGAAS) after acid extraction
EN 15111:2007	Foodstuffs - Determination of trace elements - Determination of iodine by ICP-MS (inductively coupled plasma mass spectrometry)
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
EN 14332:2004	Foodstuffs - Determination of trace elements - Determination of arsenic in seafood by graphite furnace atomic absorption spectrometry (GFAAS) after microwave 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 13806:2002	Foodstuffs - Determination of trace elements - Determination of mercury by cold-vapour atomic absorption spectrometry (CVAAS) after pressure digestion

AOAC

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

ISO

Reference	Title
ISO/TS 6733:2006	Milk and milk products -- Determination of lead content -- Graphite furnace atomic absorption spectrometric method
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 12193:2004	Animal and vegetable fats and oils -- Determination of lead by direct graphite furnace atomic absorption spectroscopy
ISO 17239:2004	Fruits, vegetables and derived products -- Determination of arsenic content -- Method using hydride generation atomic absorption spectrometry
ISO 15774:2000	Animal and vegetable fats and oils -- Determination of cadmium content by direct graphite furnace atomic absorption spectrometry
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 6634:1982	Fruits, vegetables and derived products -- Determination of arsenic content -- Silver diethyldithiocarbamate spectrophotometric method

Nitrogenous compounds

Colorimetric methods

Reference	Sample preparation	Clean up	Analytical method	Reduction column	Matrices
AOAC 1995	Extraction with CdCl, BaCl	Alkaline precipitation	diazo reaction (Griess) reaction) Colorimetric 540 nm	Cadmium (Cd) reduces nitrate to nitrite	Animal feed
EN 12014-3	Hot water heating bath	Carrez I, II filter	diazo reaction (Griess) reaction) Colorimetric 540 nm	Nitrate reductase	Meat
EN 12014-5	Extracted with water 60°C	Carrez I, II filter	NADPH absorption 340 nm	Difference before and after NADPH reaction	Vegetables
EN 12014-7	Extracted with water	Filter, dialyse into FIA	FIA, Colorimetric 520-540 nm	Cadmium (Cd) reduces nitrate to nitrite	Vegetables

Ion chromatographic or ion pair chromatographic methods

Reference	Sample preparation	Clean up	Analytical method	Separation column	Matrices
EN 12014-4	Homogenized with 50-60°C water	Acetonitrile, (SPE-C ₁₈), Filter	IC-UV 205 nm	40 µl injection	Meat
EN 12014-2	Mixed with 80°C water	Filter	IC-conductivity /UV 205-220 nm or Ion pair HPLC UV 205-210 nm	Ion Pac AS14A/AS11 MetrosepASupp5 10-100 µl inj. Luna C18 or other C18 column 10-50 µl inj.	Vegetable