



# Food Safety and Food Quality Science Services

---

## Contents

Food Chemistry Services .....	4
Acrylamide .....	4
Aflatoxins (B <sub>1</sub> , B <sub>2</sub> , G <sub>1</sub> , G <sub>2</sub> ) .....	4
Allergens .....	4
Artificial Sweeteners .....	4
Bisphenol A .....	4
Caffeine .....	4
Ceramic ware for Porosity .....	4
Colours .....	4
Fat Soluble Colours .....	4
Permitted Food Colours .....	5
Fatty Acid Profile (including trans fats) .....	5
Free Available Chlorine Meter (FAC Meter) .....	5
Histamine in Fish .....	5
Hydrogen Cyanide .....	5
3-MCPD and/or 1,3-DCP .....	5
Meat Pies .....	5
Percentage filling content & percentage protein from filling .....	5
Meat Species DNA Identification .....	5
Melamine and/or Cyanuric Acid .....	5
Metals .....	6
Mycotoxins .....	6
Mycotoxins Trichothecene Suite .....	6
Ochratoxin A .....	6
Patulin .....	6
Nitrate and Nitrite .....	6
Odour and Taste Profiles .....	6
Plastic Films .....	7
Preservatives .....	7
Acetic Acid .....	7
Propionic Acid .....	7



Sorbic Acid and Benzoic Acid.....	7
Proximate Analysis.....	7
Ash, carbohydrate and energy, fat, moisture and protein content.....	7
Scoville Heat Value .....	7
Skatole in milk .....	7
Soluble Solids.....	7
Sugars (glucose, fructose, sucrose, and lactose).....	7
Sulphur Dioxide (Total) .....	7
Tallow - Insoluble Impurities.....	7
Titrateable Acidity .....	7
Theobromine and/or Theophylline .....	7
Total Volatile Nitrogen (TVN) in fish.....	8
Vinyl Chloride .....	8
Volatile Acidity.....	8
Volatile Wine Taints .....	8
Water Activity.....	8
Microbiology Services .....	9
Food .....	9
Water .....	9
Super 6/7, Top 6/7, STEC Confirmation.....	10
E. coli O157.....	10
Super 6 .....	10
Super 7 .....	10
Molecular Biology Services .....	10
Pulsed field gel electrophoresis (PFGE) .....	10
Virology Services -Food .....	11
Shellfish .....	11
Enteric virus detection by qPCR .....	11
Other samples (environmental and food) .....	11
Enteric virus detection by qPCR (environmental and food samples) .....	11
Human enterovirus & adenovirus detection by culture (environmental samples only) .....	11
Environmental Radioactivity Services - Low-Level Measurements.....	12
Food Radioactivity.....	12
Drinking Water Radioactivity.....	12
Environmental Radioactivity .....	13
Soil erosion studies .....	13
Sedimentation studies.....	13



Other Environmental samples .....	13
Industrial Radioactivity .....	14
Other Radionuclides .....	14
Stable Isotopes .....	14



---

## Food Chemistry Services

Enquiries to: [chemistry@esr.cri.nz](mailto:chemistry@esr.cri.nz)

### Acrylamide

A toxic chemical and possible carcinogen formed in starchy food cooked at high temperatures.

### Aflatoxins (B<sub>1</sub>, B<sub>2</sub>, G<sub>1</sub>, G<sub>2</sub>)

Aflatoxins are naturally occurring and produced by fungi. They are toxic and among the most carcinogenic compounds known. We are able to analyse peanuts, peanut butter, pistachios and nut bars.

### Allergens

ELISA analysis of allergen proteins in samples provided. Suitable for either presence and/or absence information or quantitative data.

- Wheat (gluten)

Depending on the availability of ELISA kits, we may be able to test for the following allergens:

- Peanut
- Soy
- Egg
- Milk (casein)
- Milk (beta-lactoglobulin)
- Hazelnut
- Sesame
- Crustaceans & Fish

### Artificial Sweeteners

Aspartame, Saccharin, Cyclamate suite.

Other artificial sweeteners may be available, please enquire.

### Bisphenol A

A chemical compound used in the manufacture of plastics and epoxy resins that exhibits hormone-like properties.

### Caffeine

Matrices currently available: alcoholic beverages, energy drinks, fruit juices, coffee, teas, sports drinks, energy supplements, weight loss supplements, and sports supplements. Please discuss with us any matrices not listed as we are likely to be able to accommodate you.

### Ceramic ware for Porosity

To determine whether the ceramic ware is suitable for use. The leachate can also be analysed for heavy metals that may have leached from the glaze.

### Colours

#### *Fat Soluble Colours*

Auramine-O, Orange II, Mentanil yellow, Dimethyl yellow, Para red, Toluidine Red, Orange SS, Sudan I, Sudan II, Sudan III, Sudan IV.



#### *Permitted Food Colours*

Tartrazine, Sunset yellow FCF, Cochineal, Carmosine, Amaranth, Ponceau 4R, Erythrosine, Allura red AC, Indigotine (Indigo Carmine), Brilliant blue FCF, Greens, Fast green FCF, Brilliant blank PN, Quinoline yellow.

#### **Fatty Acid Profile (including trans fats)**

Determination of the quality and composition of fats and oils. Depending on the matrix, fat extraction may need to take place.

#### **Free Available Chlorine Meter (FAC Meter)**

The standardisation of portable meters used in the determination of free-available chlorine (FAC) in drinking water is mandated (Drinking Water Standards for New Zealand 2005 (Revised 2008) sections A2.1 and A2.6 and Draft Guidelines for Drinking-water Quality Management in New Zealand, October 2005).

ESR performs FAC Meter performance checks every six months. We are likely to be able to offer a discount on the setup price with one meter if the performance check coincides with our six monthly timetable. Please enquire.

#### **Histamine in Fish**

Toxic fish poisoning symptoms develop rapidly and can take the form of an oral burning or tingling sensation, localised inflammation headaches and flushing.

#### **Hydrogen Cyanide**

Enzymatic degradation, with  $\beta$ -glucosidase, in plant-based foods has the potential to toxic cyanogenic glycosides. This may result in acute cyanide poisoning. Cyanogenic glycoside content in plant-based foods is determined by HPLC. It is measured as total hydrocyanic acid or HCN.

#### **3-MCPD and/or 1,3-DCP**

3-monochloropropane-1,2-diol (3-MCPD) is a contaminant which occurs through food processing and was first detected in various foods such as hydrolysed vegetable proteins and soy sauce. Often found in imported foods, especially soya sauce. 1,3-dichloropropane-2-ol (1,3-DCP) which experts advise should not be present at any levels in food is also found in imported foods, especially soya sauce.

#### **Meat Pies**

*Percentage filling content & percentage protein from filling.*

#### **Meat Species DNA Identification**

PCR-based qualitative meat species DNA identification of raw meat, meat patties, cheese and bone meal. We are able to report the presence or absence (to a specified detection limit) of cattle, pig, sheep, poultry, goat and horse meat. Most matrices are IANZ accredited and we may be able to accommodate other matrices (e.g. blood meal), please enquire.

#### **Melamine and/or Cyanuric Acid**

Melamine is an industrial chemical which came to public attention when it was found adulterated in milk powder and infant formula in order to increase the apparent protein content when analysed using common but basic methods. Melamine and cyanuric acid combine in the body to form crystals and cause kidney failure.



## Metals

Sodium, potassium, calcium, lead, and cadmium.

Other metals also available but may require extra quality assurance work Fe, please enquire.

## Mycotoxins

### *Mycotoxins Trichothecene Suite*

Trichothecene mycotoxins are a very large group of chemically related toxins formed from various different species of moulds. The ESR trichothecene suite tests for nine type A and type B trichothecenes that are either extremely toxic, or more likely to be found in the New Zealand food chain. Trichothecenes are powerful inhibitors of protein synthesis and can be particularly dangerous as they are able to be absorbed through the skin. They are of particular concern in cereal crops, both for animal feed and human consumption.

NIV (nivalenol), DON (deoxynivalenol), 15-ADON (15-acetyldeoxynivalenol), FX (Fusarenon X), T-2 (T-2 toxin), HT-2 (HT-2 toxin), DAS (Diacetoxyscirpenol), 3-ADON (3-acetyldeoxynivalenol), NEO (Neosolaniol).

### *Ochratoxin A*

Is one of the most common food-borne mycotoxins and is considered possibly carcinogenic and weakly mutagenic.

### *Patulin*

A mycotoxin found predominantly in apple products.

## Nitrate and Nitrite

Occur naturally in plant foods, but can also be added to foods such as cheese and cured meat as a preservative.

## Odour and Taste Profiles

Suite of key volatile compounds linked to tainting of liquids and foods, for example, beverages and olive oils. Qualitative or quantitative results available.

Volatile Compound	Odour or Taste	Volatile Compound	Odour or Taste
t,t,-2,4-decandienal	deep-fried	trans-2-hexenal	green, astringent
ethanol	fermented, musty	cis-2-hexenylacetate	End point of fatty acid oxidation/breakdown
ethyl butyrate	sweet, fruity, cheesy	trans-2-hexenylacetate	
ethyl-2-methylbutyrate	fruity	isoamylacetate	pear, banana
ethyl-3-methylbutyrate	fruity	3-methylbutanol	woody, whiskey, malty
methyl salicylate	medicinal	nonanal	fatty, waxy, pungent
2-heptanone	sweet, fruity	2-nonanone	musty
hexanal	green	trans-2-nonenal	paper-like, fatty
hexanol	grassy	penten-3-one	green
cis-3-hexenol	leaf-like	2-phenylethanol	sweet, wine, fusty
trans-2-hexenol	grassy, green		



## Plastic Films

Suite of standard tests for all plastic films, including caprolactam (for nylon containing films), germanium & antimony (for polyethylene terephthalate (PET) containing films).

Suitable for Japanese and European Regulatory Requirements.

## Preservatives

### *Acetic Acid*

Sodium acetate (E262) is used as a food additive.

### *Propionic Acid*

Food additives calcium propionate (E282) and sodium propionate (E282) are used as a preservatives, but have a pungent smell resembling body odour.

### *Sorbic Acid and Benzoic Acid*

Sodium sorbate, potassium sorbate, potassium benzoate and sodium benzoate are commonly used food preservatives.

## Proximate Analysis

*Ash, carbohydrate and energy, fat, moisture and protein content.*

## Scoville Heat Value

The concentration of capsaicinoid compounds (specifically capsaicin and dihydrocapsaicin) are considered primarily responsible for imparting pungency of heat to foodstuffs such as chillies. The concentration of these compounds is converted to equivalent Scoville Heat Units (SHU).

## Skatole in milk

Skatole is naturally occurring in faeces and had a strongly unpleasant odour.

## Soluble Solids

Dissolved solids in fruit juices and jams. Results are expressed as sucrose equivalents.

## Sugars (glucose, fructose, sucrose, and lactose)

Naturally occurring sugars. Comparing profiles may be able to confirm whether sugar has been added to the product.

We may be able to accommodate other sugars. Please enquire.

## Sulphur Dioxide (Total)

A measure of total sulphite preservatives in a food product.

## Tallow - Insoluble Impurities

Used to determine the amount of dirt, meal and other foreign substances contained in tallow that is insoluble in kerosene and petroleum ether.

## Titrateable Acidity

The acid content of different types of fruit juice.

## Theobromine and/or Theophylline

Caffeine related compounds.



### Total Volatile Nitrogen (TVN) in fish

This result is used as marker of freshness in fish and other meats.

### Vinyl Chloride

For occupational health analysis.

### Volatile Acidity

The steam distillable acids present in wine.

### Volatile Wine Taints

4-ethylphenol (4-EP) and 4-ethylguaiacol (4-EG) are products of metabolism by *Brettanomyces* yeast. 4-ethylphenol is responsible for the 'sweaty saddle/band-aid' aroma of red wines when present in high concentration. 4-ethylguaiacol can contribute a 'bacon, spicy, or smoky' aroma to the wine when present above the sensory threshold. The presence of these compounds often signify a wine fault.

### Water Activity

Water activity is a measure of the energy status of water in a system, and is a far better indicator of food perishability than water content.





---

## Microbiology Services

Enquiries to: [chemistry@esr.cri.nz](mailto:chemistry@esr.cri.nz)

### Food

- *Salmonella*
- *Shigella*
- *Campylobacter*
- *Staphylococcus aureus*
- *Bacillus cereus*
- *Clostridium perfringens*
- Coliforms and *E. coli*
- *E. coli* O157 and Non O157/Unknown STEC
- *Listeria monocytogenes* and *Listeria* species
- *Yersinia enterocolitica* and *pseudotuberculosis*
- *Vibrio* species
- Plate counts
- Yeast and Mould
- Shellfish

### Water

- Colilert
- Enterolert
- Coliforms and *E. coli*
- *Campylobacter*
- *Salmonella*
- *Shigella*
- *E. coli* O157 and Non O157/Unknown STEC
- Pool Waters
- Plate Counts



## Super 6/7, Top 6/7, STEC Confirmation

ESR contact for the Super 6/7, Top 6/7, STEC Confirmation Services, enquiries to: Jackie Wright, Enteric Reference Laboratory, [jackie.wright@esr.cri.nz](mailto:jackie.wright@esr.cri.nz)

Test	<i>E. coli</i> O157	Super 6	Super 7
qPCR Screening	N/A	✓	✓
IMS procedure	✓	✓	✓
<i>E. coli</i> confirmation includes: <ul style="list-style-type: none"><li>• Identification</li><li>• Multiplex VTEC PCR</li><li>• H7 PCR (for <i>E. coli</i> O157 only)</li><li>• Serotyping of single O serotype</li></ul>	✓	✓	✓
PFGE double enzymes for <i>E. coli</i> O157	✓	N/A	✓

\*If *E. coli* O157 is isolated.

The following vials from Thermo Fisher Scientific are strongly recommended to avoid samples leaking and to ensure the safety of staff handling the samples: 30 ml PC (Poly-carbonate) flat base, Natural screw cap, cat# LBS3688.

Please make sure that the samples are clearly labelled and if necessary seal the lid with Parafilm (not sellotape).

We require a minimum of 15 ml for Super 6/7 testing.

If leaking vials are delivered to ESR, we will NOT be able to process them, as this exposes our staff to an unacceptable health and safety risk.

---

## Molecular Biology Services

Enquiries to: Brent Gilpin, [brent.gilpin@esr.cri.nz](mailto:brent.gilpin@esr.cri.nz)

### Pulsed field gel electrophoresis (PFGE)

PFGE is a molecular fingerprinting method which allows the comparison of strains of a bacterial species. Isolates with indistinguishable PFGE profile may have a common source whereas isolates with different profiles are less likely to be closely related. Applications in public health include the identification of outbreaks and confirmation of likely sources of infection. In repeat contamination events in a food preparation facility or clinical setting, isolates with a different PFGE type may indicate new contamination events as opposed to isolates with the same PFGE type which may indicate insufficient decontamination of previous event. PFGE can be applied to most bacteria.

We have undertaken PFGE on a range of different bacteria including *Listeria*, *Campylobacter*, *Yersinia*, *E. coli* O157, STEC, *Salmonella*, Enterococci, *E. sakazakii*, and *Shigella*.



---

## Virology Services -Food

Enquiries to: Joanne Hewitt, [joanne.hewitt@esr.cri.nz](mailto:joanne.hewitt@esr.cri.nz)

Detection of enteric viruses from shellfish and selected foods such as soft fruits and salad greens. Also detection of enteric viruses from wastewater, sludge/biosolids, environmental water (e.g., river, estuarine), swimming pool water, drinking water, environmental swabs can be performed. In addition to the virus groups listed below, a 'human & animal viral tool box' is also available for faecal source tracking applications. Please enquire for more details.

### Shellfish

#### *Enteric virus detection by qPCR*

Virus recovery & detection by qPCR assay of 1 enteric virus type (e.g. norovirus GI & GII, hepatitis A virus), or F-RNA bacteriophage genotyping. The detection of norovirus GI & GII and hepatitis A virus from shellfish is IANZ accredited.

### Other samples (environmental and food)

#### *Enteric virus detection by qPCR (environmental and food samples)*

Virus recovery & detection by qPCR assay of 1 enteric virus type (e.g. norovirus GI & GII, adenovirus, hepatitis A virus, hepatitis E virus, enterovirus, sapovirus, astrovirus, rotavirus, human polyomavirus), or F-RNA bacteriophage genotyping.

Human enterovirus & adenovirus detection by culture (environmental samples *only*)

Recovery and culture based assay for presence & quantitation of human enterovirus & human adenovirus.



---

## Environmental Radioactivity Services - Low-Level Measurements

Enquiries to: Nikolaus Hermanspahn, [NCRS.Environmental@esr.cri.nz](mailto:NCRS.Environmental@esr.cri.nz)

Quality assurance is an essential component of our laboratory. We are accredited to international standard ISO 17025 by International Accreditation New Zealand (IANZ). The scope of accreditation includes test methods based on alpha spectroscopy, gamma spectroscopy and low-background liquid scintillation counting.

We ensure our quality by regular inter-comparisons with analytical laboratories of other well-respected organisations, such as (i) Comprehensive Nuclear-Test Ban Treaty Organisation (CTBTO), (ii) United Kingdom National Physical Laboratory (NPL), (iii) International Atomic Energy Agency (IAEA), and (iv) US Department of Energy (DoE).

### Food Radioactivity

Food testing and Food export certification

Radioanalysis	Turn-around time	Sample size
Gamma Spectroscopy Caesium-137	3 working days	500 g
Gamma Spectroscopy Iodine-131 Caesium-134 Caesium-137	3 working days	500 g
Strontium-90	10 working days	50 g
Americium-241 Plutonium-238 Plutonium-239 Plutonium-240	10 working days	50 g

### Drinking Water Radioactivity

Testing against Drinking Water Standards for New Zealand (DWSNZ) and testing against overseas drinking water standards (including bottled water regulations)

Radioanalysis	Turn-around time	Sample size
Drinking Water Standards for NZ (DWSNZ)	5 working days	1 L
Tritium	5 working days	0.1 L
Gross alpha & beta	5 working days	0.5 L
Radon-222	5 working days	0.1 L
Gamma Spectroscopy (23 hour counting time)	5 working days	1 L
Strontium-90	10 working days	0.5 L



Lead-210	35 days	0.5 L
Polonium-210	10 working days	0.5 L
Radium-226 Radium-228	35 days	0.5 L
<i>Thorium Isotopes</i> Thorium-227 Thorium-228 Thorium-230 Thorium-232	10 working days	0.5 L
<i>Uranium Isotopes</i> Uranium-234 Uranium-235 Uranium-238	10 working days	0.5 L

## Environmental Radioactivity

### *Soil erosion studies*

Radioanalysis	Turn-around time	Sample
Gamma Spectroscopy Caesium-137 (detection limit 0.2 Bq/kg)	50 days (for 100 samples)	700 g

### *Sedimentation studies*

Additional analyses for Lead-210 or Radium-226 by radiochemical separation is available. Please enquire for details.

Radioanalysis	Turn-around time	Sample size
Gamma Spectroscopy Lead-210 Radium-226 Radium-228 (23 hour counting time)	90 days (for 100 samples)	60 g

### *Other Environmental samples*

For example, mineral sands, biological materials, industrial process samples, environmental waters, process waters, air filter samples

Radioanalysis	Turn-around time	Sample
Gamma Spectroscopy	*	*
Strontium-90	*	*
Lead-210	*	*



Radioanalysis	Turn-around time	Sample
Polonium-210	*	*
Radium-226 Radium-228	*	*
<i>Thorium Isotopes</i> Thorium-227 Thorium-228 Thorium-230 Thorium-232	*	*
<i>Uranium Isotopes</i> Uranium-234 Uranium-235 Uranium-238	*	*

\* Batch dependent - please enquire for details

## Industrial Radioactivity

Wipe tests

Wipe test kit for owners of sealed sources

Testing of wipe samples for radioactivity content

Testing of wipe samples for tritium

Radioanalysis	Turn-around time
ESR wipe test kit	5 working days
Analysis of non-ESR kit swipe	5 working days

## Other Radionuclides

We can test for a wide spectrum of radionuclides, including those that are not listed above. Please enquire for details.

## Stable Isotopes

In addition to our own radioisotope analysis, our existing partnerships also allow us to offer stable isotope analysis if required.

Please enquire about details before shipping samples.