Contaminants & Taints

Contaminants

Process contaminants

Process contaminants are substances that can form as a result of chemical changes in foods brought about by the processes used during manufacture e.g. cooking, drying, fermentation and smoking. While the formation of undesirable substances in foods as a result of processing has been known for some time (e.g. chloropropanols in savoury flavours produced by acid hydrolysis, N-nitroso compounds in cured meats), the occurrence of other process contaminants in foods such as acrylamide, glycidyl fatty acid esters and fatty acid esters of monochloropropanediols (MCPDs) are relatively recent and significant developments that continue to challenge the food industry and regulators alike.

Premier Analytical Services is one of the leading food testing centres in Europe, providing routine and research analytical services in the areas of food characterisation, authenticity and safety.

A dedicated team with more than 30 years' experience in trace contaminants research and testing provides our Process Contaminants service. We have the capability to analyse a wide variety of food samples, including complex and often problematic food matrices and provide results quickly where required. Our clients include Food Regulators, Food retailers as well as blue chip food manufacturers from around the world. The majority of our process contaminant methods are UKAS accredited and we regularly participate in food Proficiency Testing Schemes such as FAPAS so you can be assured of the highest quality results. To obtain an information sheet or to request a quotation, please contact us.

Packaging Contaminants

Packaging is an indispensable element in the food manufacturing process utilising a wide range of virgin and recycled materials such as adhesives, ceramics, elastomers & rubbers, glass, inks & varnishes, metals and alloys, paper & board (including recycled), paraffin waxes and microcrystalline waxes, plastics (including recycled), regenerated cellulose, textiles & wood (including cork). Ingredients comprising plastics (e.g. monomers, catalysts, solvents and additives) comprise some 2000+ substances alone, many of which do not have a full toxicological evaluation. Hence the potential migration of substances from packaging into foods can represent a significant food safety (and quality) risk to consumers and brands.

Premier Analytical Services is one of the leading food testing centres in Europe, providing routine and research analytical services in the areas of food characterisation, authenticity and safety.

A dedicated team with more than 30 years' experience in trace contaminants testing provides our Packaging contaminants service. We have a wide range of sampling techniques available for different types of food contact materials and the foods contained therein as well as specific tests to assess the migration potential of printed packaging. Our clients include printers and converters as well as blue chip food manufacturers. To obtain an information sheet or to request a quotation, please contact us.

Process Contaminants

		UKAS Accredited	Limit of Detection	Limit of Quantification	Minimum Sample Size
Chloropropanols					
2-Chloro-propane-1,3-diol (2-MCPD) and 3-Chloro-propane 1,2-diol (3-MCPD)	All foods and flavourings by GC/MS	Yes	<0.003 mg/kg (typical)	<0.01 mg/kg (typical)	50g
2-Chloro-propane-1,3-diol (2-MCPD) and 3-Chloro-propane 1,2-diol (3-MCPD)	Packaging (in duplicate for both duplicates) by GC/MS	Yes	<0.003 mg/kg (typical)	<0.01 mg/kg (typical)	50g
1,3-Dichloro-Propan-2-ol (1,3-DCP)	All foods and flavourings by GC/MS	Yes	<0.003 mg/kg (typical)	<0.01 mg/kg (typical)	50g
Combined analyses for 2-MCPD, 3-MCPD, 1,3-DCP & 2,3-DCP	Fatty foods and flavourings by GC/MS	Yes	<0.003 mg/kg (typical)	<0.01 mg/kg (typical)	50g
3-MCPD Esters					
2-Chloro-propane-1,3-diol (2-MCPD) and 3-Chloro-propane 1,2-diol (3-MCPD) Esters		Yes	Foods of up to 35% fat content: 4 to 16 µg/kg (typical) Fats and Oils: 40 µg/kg (typical)	Foods of up to 35% fat content: 8 to 32 µg/kg (typical) Fats and Oils: 80 µg/kg (typical)	50g
Ethyl Carbamate					
	by GC/MS	Yes	<0.001 mg/kg (typical)	<0.003 mg/kg (typical)	50g
Acrylamide					
	by GC/MS/MS	Yes	<0.001 mg/kg (typical)	<0.003 mg/kg (typical)	50g
Furan					
	by GC/MS	Yes	<0.001 mg/kg (typical)	<0.003 mg/kg (typical)	50g

Please refer to the UKAS Schedule of Accreditation for the specific matrices.

Packaging Contaminants

		UKAS Accredited	Limit of Detection	Limit of Quantification	Minimum Sample Size
Benzophenone and 4-methyl benzophenone	In food products – by GCMS	No	<0.01 mg/kg (typical)		50g
Benzophenone and 4-methyl benzophenone	In packaging – by GCMS	No	<0.01 mg/kg (typical)		50g
Hydroxybenzophenones and related photoinitiators	In packaging – by HPLC	No	<0.1 mg/kg (typical)		50g
Bisphenol A in food products		No	3ppb		50g
Bisphenol A in packaging using simulants		No	1 to 2 ppb	2 to 4 ppb	50g

Toxic Metals

		UKAS Accredited	Limit of Detection	Limit of Quantification	Minimum Sample Size
Aluminium	by ICP-OES	Yes	0.2ppm	0.6ppm	50g
Arsenic	by ICP-OES	Yes	0.10ppm	0.24ppm	50g
Cadmium	by ICP-OES	Yes	0.04ppm	0.05ppm	50g
Lead	by ICP-OES	Yes	0.05ppm	0.09ppm	50g
Tin	by ICP-OES	Yes	0.20ppm	0.40ppm	50g
Chromium	by ICP-OES	No	0.02ppm	0.05ppm	50g
Mercury	by ICP-OES	Yes	0.001ppm	0.001ppm	50g

Please refer to the UKAS Schedule of Accreditation for the specific matrices.

Illegal Dyes & Colours

		UKAS Accredited	Limit of Detection	Minimum Sample Size
INCLUDES ALL 21 DYES ON THE LIST OF DYES FOUND IN FOOD IN THE EU AS FOLLOWS:		Yes		
Sudan I		Yes	10ppb	
Sudan II		Yes	10ppb	
Sudan III		Yes	10ppb	
Sudan IV		Yes	10ppb	
Sudan Red B		Yes	10ppb	
Sudan Red 7B		Yes	10ppb	
Butter Yellow		Yes	10ppb	
Sudan Orange G		Yes	10ppb	
Auramine-O		Yes	10ppb	
Metanil Yellow		Yes	10ppb	
Rhodamine B	By LC/MS-MS	Yes	10ppb	50g
Para Red		Yes	10ppb	
Sudan Red G		Yes	10ppb	
Fast Garnet		Yes	10ppb	
Nitroaniline		Yes	200ppb	
Toluidine Red		Yes	10ppb	
Sudan Black		Yes	10ppb	
Orange II		Yes	10ppb	
Bixin		No	100ppb	
Norbixin		No	100ppb	
Orange OT (AKA Solvent Orange 2)		No	10ppb	

Please refer to the UKAS Schedule of Accreditation for the specific matrices.

Melamine

			UKAS Accredited	Limit of Detection	Limit of Quantification	Minimum Sample Size
Melamine	By LC/MS-MS An isotopically labelled internal standard (Melamine 3C13.3N15) is added to the sample prior to extraction with acidified aqueous acetonitrile. The extract is cleaned up on a cation-exchange cartridge prior to analysis by LC/MS-MS. Two transitions are monitored for melamine detection together with a third transition for the internal standard. Quantification is by the internal standard method.		Yes	50ppb	100ppb	50g

Please refer to the UKAS Schedule of Accreditation for the specific matrices.

Other Contaminants

		UKAS Accredited	Limit of Detection	Limit of Quantification	Minimum Sample Size
Ethylene and propylene glycol	GC	No			50g
Propylene glycol in baked goods	GC.MS	No	1ppm		50g

Taints

Off flavours and taints may arise from many sources: flooring materials, adjacent production areas, cleaning agents, building and maintenance procedures, microbial contamination, migration from packaging, raw material contamination, inappropriate shipping and storage, incompatible process design. Food products are at risk from exposure to causative agents of taints and off-flavours throughout the supply chain. A serious incident can lead, at best, to costly wastage or, at worst, loss of consumer confidence and brand damage. Even with the most careful control systems taints may still occur through human error or other unforeseen circumstances.

Premier Analytical Services is one of the leading food testing centres in Europe, providing routine and research analytical services in the areas of authenticity, food characterisation, food quality and safety. Within our laboratories we use organoleptic assessment, in conjunction with odour port gas chromatography and mass spectrometry, for taint isolation and identification. We also have methods to assess the tainting potential of food contact materials for a wide range of food packaging applications. These techniques, combined with 40+ years experience, have allowed our clients to make scientifically valid claims recovering many £100,000's.

These services are now available to you on a confidential contract basis. To obtain an information sheet or to request a quotation, please contact us.

Fat Rancidity Determination

Test / Phase / Option	Description	Explanation	UKAS Accredited	Limit of Detection	Minimum Sample Size
Peroxide value	Initial indicator of oxidative rancidity		Yes	0.1 meq O_2 / Kg of Fat	50g
Free fatty acids	Indicator of Hydrolytic rancidity		Yes	0.1 g / 100g of Fat as Oleic acid	50g

Please refer to the UKAS Schedule of Accreditation for the specific matrices.

Taint Identification

Test / Phase / Option	Description	Explanation
Phase 1	Initial Assessment	Involves organoleptic assessment by a small panel of Taint experts utilising various techniques, if necessary, to accentuate the Taint e.g. under hot & cold conditions etc.
Phase 2 – Option 1	Steam solvent extraction & GC Odour Port assessment	Likens & Nickerson Steam solvent extraction with odour port gas chromotography of the extract by an experienced taint expert to isolate most likely causative agent.
Phase 2 – Option 2	Cold solvent extraction & GC assessment	Faster & more economical method than Option 1. For use as confirmation when the Taint is recognised before commencing the second phase and quantification is not required.
Phase 2 – Option 3	Cold solvent extraction & GC Odour Port assessment	Faster & more economical method than Option 1. For use when quantification is not required but a tentative identification is needed
Phase 2 – Option 4	Solid phase micro extraction of Head Space volatiles and analysis by GC Odour Port	Faster & more economical method than Option1. For use when a solvent extraction and quantification are not required but a tentative identification is needed
Phase 3	Gas Chromotography and Mass Spectrometry	GCMS analysis to unequivocally determine the identity of the previously isolated causative agent and quantify if required.
COMBINATIONS		
1	Cold Extraction + GC Odour Port + GC Mass Spectrometry	
2	Steam Solvent Extraction + GC Odour Port +GC Mass Spectrometry	

Taint Migration

Test / Phase / Option	Description	Explanation
Taint transfer assessment for food contact materials	Isolation Tank Test	Assessment of individual packaging components against food products to determine which element is responsible for causing a taint.

Illegal Dyes/Colours

The colours permitted for use in food are defined in the Colours in Food Regulations 1995 and in subsequent amendments. Therefore the presence, at any level, of any other colours is illegal.

There were two incidents in 2008 involving illegal Sudan dyes in imported spices form India. Sudan dyes are synthetic, industrial dyes traditionally used for colouring waxes, plastics, oils and shoe & floor polishes and therefore not permitted in food at any level. However, the deep red colour was perceived to enhance the aesthetic qualities of some foods for example, spices (such as chilli powder and paprika) and palm oil.

More recently, several ingredients have been implicated in food scares involving illegal colours, for example Methyl Yellow in curry powder in Belgium, France & Germany and safflower (natural colour) from China containing Orange II. It is vital therefore that food manufacturers remain alert to the potential use of illegal dyes in their supply chains.

In late June 2006 the FSA circulated details of the adoption of a harmonised Europe-wide approach for dealing with incidents of contamination of spices and other food ingredients with illegal dyes. This is based upon the "As Low as Reasonably Practicable" approach, recognising adventitious rather than deliberate contamination may be present at very low levels. As such an action limit of 0.5ppm has been established, such that detection at levels below 0.5ppm should not trigger removal of products from the market.

Acrylamide Testing

PAS offers a UKAS accredited acrylamide testing service using GC-MS-MS.

With over 10 years experience in acrylamide testing, our clients include the UK Food Standards Agency, of which we are the preferred analytical testing service provider, as well as blue chip food manufacturers and retailers.

Our acrylamide method is **UKAS accredited** and we regularly participate in the FAPAS Proficiency Testing Scheme so you can be assured of the highest quality results.

We have the capability to analyse a wide variety of food samples, including complex and often problematic food matrices such as coffee, cocoa powder and malt, and provide results quickly.

To obtain an acrylamide information sheet or to request a quotation,

please **contact us**.

2- and 3- MCPD, MCPD Esters & Glycidol Esters

In May 2016 the European Food Safety Authority (EFSA) Scientific Opinion on the risk for human health related to the presence of 2 and 3-MCPD Esters and Glycidyl Esters (GE) in food was published. The Opinion concluded that the glycerol-based process contaminants found in palm oil, but also in other vegetable oils, margarines and some processed foods, raise potential health concerns for average consumers of these foods in all young age groups, and for high consumers in all age groups. The highest levels of GE, as well as 3-MCPD and 2-MCPD (including esters) were found in palm oils and palm fats, followed by other oils and fats

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PAS currently offer UKAS accredited analysis for both 2- and 3- MCPD and MCPD Esters, as well as being the only UK laboratory currently taking part in the European JRC inter-laboratory comparison of methods for Glycidol esters.