DETECT AND REPORT
TRACE-LEVEL DIOXINS AND DIOXIN-LIKE PCBs

The Measure of Confidence

Agilent GC/MS/MS Dioxins in Feed and Food Analyzer

Dioxin and dioxin-like PCBs are environmental pollutants and persistent organic pollutants (POPs) that originate as by-products of industrial processes such as paper bleaching, pesticide manufacturing, and waste incineration. These compounds accumulate in the food chain, mainly in the fatty tissue of animals. Humans can ingest these highly toxic compounds from eating meat, dairy, fish, and other animal products.

Regulatory agencies, particularly the European Union (EU) Commission, have imposed strict limits on dioxin levels in feed and food. As of June 2014, gas chromatography/tandem mass spectrometry (GC/MS/MS) has become an accepted confirmatory method for EU regulations 589/2014 and 709/2014.

Reliably detect and confirm low levels of dioxins and furans – from *day one*

The NEW Agilent 7010 Triple Quadrupole GC/MS Dioxins in Feed and Food Analyzer is based on the Agilent 7010 GC/MS/MS system. With up to *ten times* more sensitivity than competitive tandem quad analyzers, it allows you to observe ***below*** EU regulated levels of dioxins for ultimate confidence in your results.

In addition, the Analyzer software streamlines reporting by combining the results of two sample fractions: dioxins/furans and PCBs. It also automatically performs complex calculations, including individual and summed concentrations, and consolidates the data into a single report that conforms to EU regulations. This report organizes the compounds into four groups: dioxins, furans, dioxin-like PCBs, and non-dioxin-like PCBs.

The Agilent Dioxins in Feed and Food Analyzer leverages the latest GC and MS/MS innovations and reflects our focus on quality and performance and includes:

Factory

- System setup and leak testing
- Instrument checkout
- Installation of validated DB-5ms UI GC column
- Factory-run checkout method using a custom Dioxin Analyzer checkout mix

Delivery

- User's manual for running the method
- Supplemental software to automate reporting
- CD-ROM with method parameters and checkout data files for easy out-of-the-box operation
- Application-related consumables included – no separate ordering required
- Easy consumables re-ordering information

Installation

- Duplicate factory checkout with checkout sample – onsite by factory-trained support engineer
- Optional application consulting available

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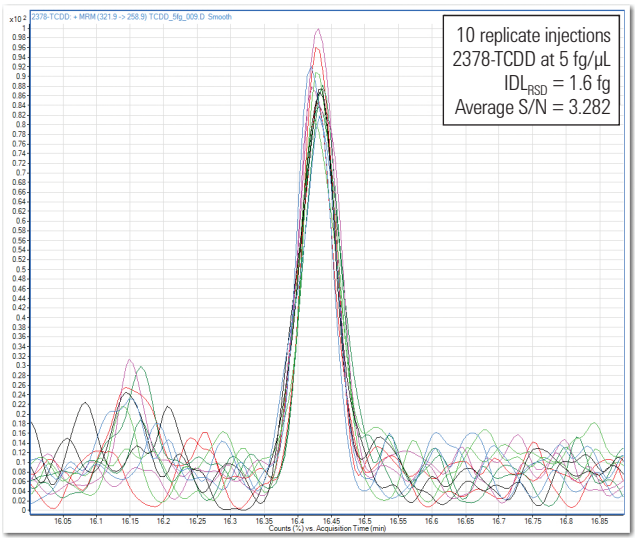
Follow strict maximum-level dioxin regulations

Built around the Agilent 7010 Triple Quadropole GC/MS, the Dioxins in Feed and Food Analyzer is configured and chemically tested for this application in the Agilent factory. This ensures that your team can reduce start-up time and deliver results quickly after delivery.

Advanced features include:

- Configured with the Multi Mode Inlet (MMI)
- The *same* GC parameters for dioxin and dioxin-like PCB fractions for easy operation and higher productivity
- Retention time locking to PCB 105
- Heated quadrupoles for improved sensitivity
- Automatic performance of complex calculations required by EU regulations
- Leading-edge reporting that combines results from dioxin/furan and PCB fractions

Excellent repeatability and femtogram-level sensitivity

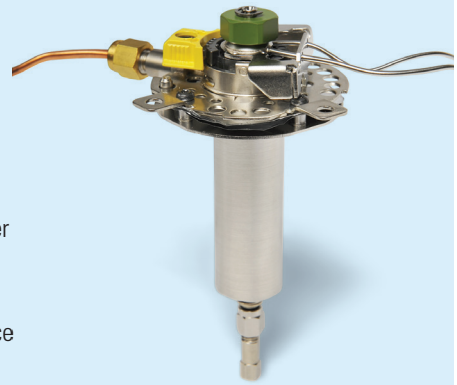


Here, ten 1 µL injections of 2,3,7,8-TCDD were performed at 5 fg/µL. The average signal-to-noise was 3.282 with an RMS multiplier of 5.

Inlet Flexibility with The Multimode Inlet (MMI)

The MMI allows for flexibility with injection techniques and volumes. The injection modes that the MMI offers includes: hot and cold split and splitless, pulsed split and splitless, solvent vent, and direct inject mode.

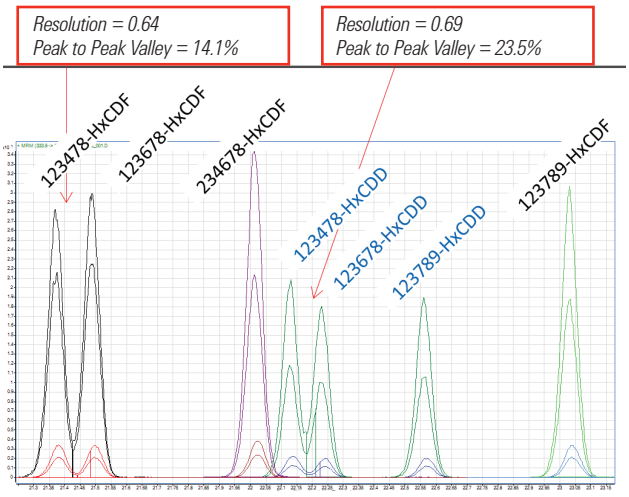
In dioxin analysis, some users might be accustomed to using larger injection volumes due to its recognized benefit of signal-to-noise improvement and lower system detection limits. One significant benefit of this dioxin analyzer system, and the 7010 MS/MS, is the ability to inject and introduce a small sample volume onto the column (1 µL) and maintain the ability to quantitate these trace compounds at low concentrations. Using the Solvent Vent Mode, the user has the option of larger injection volumes.



Reliable separation of hexa-PCDD/F isomers per EU regulations

The separation of PCDD/PCDFs from interfering substances and coelutions is a monitored criteria in the EU Regulations. Each congener can be confirmed and individually quantified by GC/MS/MS.

Agilent offers a factory checkout of two customized standard mixes that display the analytes found in each sample fraction (Dioxin/Furan/DL-PCB and DL/NDL-PCB) and their separations.



Chromatogram of the hexa-PCDD/F isomers (2 transitions for both native and C13 labeled compounds; at a mid-point calibration level) and their separations, compliant with EU regulations.

Simplify customized reporting

Data review and mandatory reporting requirements are time consuming and complicated.

The EU regulations state that the reporting of the results shall include maximum information, thereby enabling their interpretation. This includes factoring in blank subtraction, determining the limit of quantitation (LOQ), and calculating the lower/upper/medium-bound limits of the individual PCDD/PCDF and dioxin-like PCB congeners.

Agilent has developed specific software scripts and a customized report for the analysis of dioxin and dioxin-like PCBs in feed and food, in compliance with EU regulations.

Dioxin Quantitative Analysis Sample Report

Agilent Technologies

Batch Path	D:\MassHunter\Data\Dioxin_Joerg_2DataFiles\QuantResults\B0701_newMethod.batch.bin		
Analysis Time	9/26/2014 12:21:16 PM	**Analyst Name**	AGILENT\suezhan1
Report Time	1/14/2015 2:53:04 PM	**Reporter Name**	suezhan1
Last Calib Update	5/30/2014 1:08:47 AM	**Batch State**	Processed
Data File	1000A_01_PCDD.D + 1000A_01_PCB.D		

Compound	RT [min]	LOQ	Conc [ng/ml]	TEF Conc	Upper Bound [ng/ml]	Medium Bound [ng/ml]	Lower Bound [ng/ml]	WHO-TEF 2005
Dioxins								
2378-TCDD	20.73	0.020	2.98	2.9801	2.98012	2.98012	2.98012	1
12378-PeCDD	24.32	0.030	0.86	0.8580	0.85796	0.85796	0.85796	1
123478-HxCDD	27.98	0.020	0.75	0.0752	0.07520	0.07520	0.07520	0.1
123678-HxCDD	28.10	0.140	2.02	0.2021	0.20208	0.20208	0.20208	0.1
123789-HxCDD	28.46	0.060	4.21	0.4210	0.42103	0.42103	0.42103	0.1
1234678-HpCDD	32.93	0.440	10.33	0.1033	0.10327	0.10327	0.10327	0.01
OCDD	39.34	1.990	129.32	0.0388	0.03880	0.03880	0.03880	0.0003
Furans								
2378-TCDF	20.30	0.100	0.86	0.0857	0.08570	0.08570	0.08570	0.1
12378-PeCDF	23.27	0.560	0.84	0.0252	0.02524	0.02524	0.02524	0.03
23478-PeCDF	24.06	0.080	0.88	0.2625	0.26254	0.26254	0.26254	0.3
123478-HxCDF	27.02	0.070	0.79	0.0786	0.07858	0.07858	0.07858	0.1
123678-HxCDF	27.15	0.060	0.82	0.0821	0.08205	0.08205	0.08205	0.1
234678-HxCDF	27.79	0.080	0.80	0.0796	0.07963	0.07963	0.07963	0.1
123789-HxCDF	28.94	0.180	0.80	0.0800	0.08003	0.08003	0.08003	0.1
1234678-HpCDF	31.09	0.550	4.24	0.0424	0.04242	0.04242	0.04242	0.01
1234789-HpCDF	33.92	0.020	0.81	0.0081	0.00813	0.00813	0.00813	0.01
OCDF	39.77	0.600	0.74	0.0002	0.00022	0.00022	0.00022	0.0003
PCDD/Fs Sum			**162.04**	**5.42**	**5.42**	**5.42**	**5.42**	
PCBs Dioxin Like								
PCB 81	17.71	3.670	8.49	0.0025	0.00255	0.00255	0.00255	0.0003
PCB 77	18.02	49.660	8.46 *	0.0008	0.00497	0.00248		0.0001
PCB 126	20.92	1.370	8.59	0.8585	0.85852	0.85852	0.85852	0.1
PCB 169	24.17	0.070	8.46	0.2539	0.25387	0.25387	0.25387	0.03
PCB-123(MO)	18.73	9.100	1470.13	0.4410	0.44104	0.44104	0.44104	0.0003
PCB-118(MO)	18.73	601.100	517.57 *	0.1553	0.18033	0.09017		0.0003
PCB-114(MO)	19.42	15.200	1482.45	0.4447	0.44473	0.44473	0.44473	0.0003
PCB-105(MO)	19.42	187.600	1703.27	0.5110	0.51098	0.51098	0.51098	0.0003
PCB-167(MO)	21.54	40.900	127.23	0.0382	0.03817	0.03817	0.03817	0.0003
PCB-156(MO)	22.50	14.000	45.03	0.0135	0.01351	0.01351	0.01351	0.0003
PCB-157(MO)	22.71	3.300	145.29	0.0436	0.04359	0.04359	0.04359	0.0003
PCB-189(MO)	25.74	1.200	36.69	0.0110	0.01101	0.01101	0.01101	0.0003
DLPCBs Sum			**5561.65**	**2.77**	**2.80**	**2.71**	**2.62**	
PCBs Non Dioxin Like								
PCB-28(ind)	14.19	994.600	982.47 *		994.60000	497.30000	0	
PCB-52(ind)	14.78	1909.200	917.99 *		1909.20000	954.60000	0	
PCB-101(ind)	16.80	1303.300	919.96 *		1303.30000	651.65000	0	
PCB-153(ind)	19.42	171.700	1045.04		1045.04204	1045.04204	1045.04204	
PCB-138(ind)	20.44	161.700	1095.32		1095.32241	1095.32241	1095.32241	
PCB-180(ind)	23.13	34.900	2430.77		2430.76682	2430.76682	2430.76682	
NDL-PCBs Sum			**7391.55**		**8778.23**	**6674.68**	**4571.13**	

Note: * and Font Color Red: [Conc] < LOQ or [TEF Conc] < LOQ

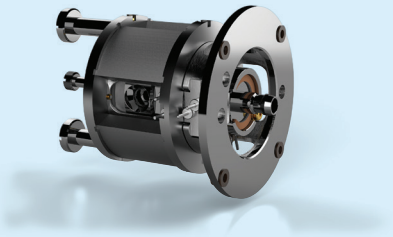
The reporting software combines the measurements of dioxins, furans, and PCBs (both dioxin-like and non-dioxin-like) into one report in compliance with EU regulations.

To find out more about this analyzer, visit **agilent.com/chem/dioxins_analyzer**

Greater sensitivity... not just lower noise

MS sensitivity depends on the number of ions measured. The 7010 Triple Quadrupole GC/MS system's ultra-efficient EI source maximizes the number of ions that are created and transferred out of the source body and into the quadrupole analyzer – giving you the advantages of:

- Increased response and better precision at all levels
- Lower detection limits
- More precise ion ratios and better qualitative information



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Agilent Analyzers significantly reduce your time from system arrival to final validation. With pre-configured hardware and method-specific separation tools, analysts can focus on calibration and validation per your laboratory's SOPs.

Best-in-class technology to support your lab

Let Agilent help you meet your most challenging demands with specialized technologies. Our 7890 GC, for example, is the world's most widely used GC system. It features versatile high-performance injection systems – plus enhanced Electronic Pneumatic Control (EPC) for precise flow/pressure, leading to reproducible retention times.

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Agilent-engineered GC columns and supplies deliver what your food and environmental applications demand – including:

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Ordering information:

Part Number	Analyzer Description
G3445 Series #422	GC/MS/MS Dioxins in Feed and Food Analyzer

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