

PCB and Dioxin Analysis

LC Tech

# Automated Sample Clean-up



# Experts

## in the Automation of Sample Clean-up



LC  
*Tech*

- From 1998 on provider of products and technologies for automated sample preparation
- 2013 – First automated sample clean-up system for PCB and dioxin analysis
- 2018 – First fully automated sample clean-up system for PCB and dioxin analysis for sequential and unattended processing of samples
- Development and manufacturing made in Germany

### Advantages of automation

- More time for more important tasks
- Reliable, reproducible results
- Faster processing per sample
- Precise, standardised processing - sources of error eliminated

### Reliable and reproducible solution for different application



Feed samples



Food samples like fish, meat, fish oil, plant oils, egg



Biological matrices such as blood



Environmental samples like sludge, soil, sediments, and others



Samples, which harden at room temperature, for example vegetable fat

Subscribe us on YouTube or LinkedIn for product videos, news and more information.



## The DEXTech product family offers a suitable solution for everyone.

- For small laboratories with few samples but also for high volume laboratories.
- Single sample processing but also sequential processing for unattended operation around the clock.

### Advantages of the DEXTech product family

- Highest possible automation – manual handling minimized
- High quality, ready-to-use glass columns
- Simplest one-hand operation by „click-in“ the columns
- Pressure tight locking of columns
- Quantitative sample transfer by rinsing
- Reliable, reproducible results
- Pre-installed default methods – as well as free parametric methods
- Extensive safety features such as leakage sensors, pressure sensors, no mechanical movement when the system is open, and much more.
- Report function for documentation
- Method conformity to EPA-methods and other international regulations
- Shortest run time
- Proven no cross-contamination



### No cross-contamination

- Interchangeable columns
- Continuous rinsing of all parts that get in touch with the sample
- The sample and injection pump do not come into contact with each other
- No unrinsed dead volume in valves or tubings

# DEXTech Pure

Best Set-up for High Sample Throughput

*The most flexible system*



## The optimized solution for „pure“ fractions

- Clean-up of PCB and Dioxins in separate fractions
- 3 column set-up based on aluminium-oxide clean-up
- Further Methods: Fast “PCB-only” and „Dioxin-only” method for pure PCB or dioxin-analysis. This environmentally friendly technology saves time, solvent, and therefore money!

## All DEXTech systems impress with their simple operation

- 1 Place the sample vial into the sample holder.
- 2 Insert the 3 ready-to-use, high performance columns (see page 14) by the simple „click-in” system.
- 3 Electrically seal the column pressure-tight by pressing only one button.
- 4 Select either one of the default methods already stored in the system or freely parameterise your own method.
- 5 Start the system.

## Now the DEXTech system takes over your work:

- 1 The sample will be loaded automatically.
- 2 The sample vial will be rinsed for quantitative transfer and combined in the sample loop for loading.
- 3 According to the selected method, the system cleans-up the sample and collects the analytes in small fractions for further processing.



Rinsing of sample vial for quantitative transfer

# DEXTech Heat

„Causes Every Sample to Melt“

## Heated from sample introduction to the first column.

- Especially for samples, which get hard at room temperature, for example PFADs or Stearin
- Constant heating of all involved parts; from sample vial to loading onto the first column
- Homogenous distribution of quantification standards
- Assurance that the sample will be processed without clogging – „Walk away“ solution
- 3 freely selectable heating zones
  - Sample vial
  - Sample loop
  - Tubings
- Based on the DEXTech Pure Technology
- Also applicable for samples that do not harden at room temperature.
- Simultaneous to the fractionation of one sample, offline a heated sample can be stored.



Heating from sample vial via the sample loop and tubing to the first column.

# DEXTech 16



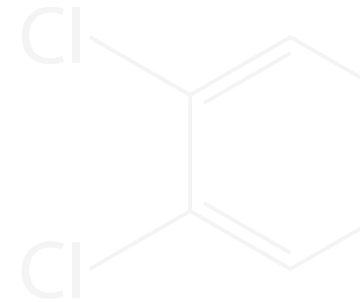
## The First Fully Automated System for Sequential PCB and Dioxin Analysis

### Advantages

- System for high-throughput laboratories for unattended processing of uncomplicated samples that passed the validation on DEXTech Pure.
- Serial processing of 16 samples in sequence without manual interaction.
- Unattended processing around the clock, 24/7
- Optimal capacity utilisation of the GC-MS systems due to overnight operation
- Fluidics of the DEXTech Pure as base for comparative excellent results and simple integration in the existing analysis
- Simple method transfer from DEXTech Pure to DEXTech 16
- Shorter „PCB only“ method for pure PCB analysis and „Dioxin only“ method for pure Dioxin analysis available.
- Automatic sampler from closed vials to closed fraction glasses to prevent any evaporation of the samples
- 3 column set-up using Aluminium-oxide columns
- Proven no cross-contamination



Autosampler



See how the system works on  YouTube

**Unattended  
Sample Clean-up  
Around the Clock**

# Beyond Comparison

## Automation Around the Clock

**Preparation time for a sequence – only 30 minutes!**

- 1 Load the system with the samples
- 2 Method selection and/or input
- 3 „Click-in“ the columns into the column carousel

### Comprehensive safety features

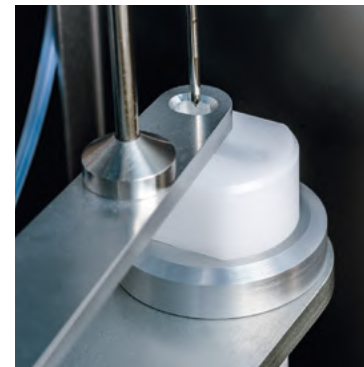
As with the other DEXTech systems, DEXTech 16 also includes many safety features to protect the user and to ensure smooth processing.



Placing samples into the autosampler



Insertion of columns - sensors check, if columns match with method input



Rinsing port for cleaning the needle inside and outside



Touchscreen for easy handling

1 System -  
1 Sequence -  
16 Samples

### No cross-contamination

- Rinsing steps of the needle and tubing
- Disposable columns
- The sample at no point comes into contact with the injection pump
- No unrinsed dead volume of valves or tubings



## Proven sample clean-up completed by clever technology

- With the help of the column carousel one column set per sample will be placed in the column tower and there automatically electrically pressure tight locked.
- The methods of DEXTech 16 are identical to DEXTech Pure. This allows a simple method transfer.
- As in DEXTech Pure, two approved standard methods, which are overwrite protected, are provided as default methods as well as 28 further freely selectable parameter driven methods.
- The columns and their composition are the same as used with DEXTech Pure.
- Sensors check whether the columns correspond with the method, which are overwrite protected, input in the system. The software indicates if the columns are not correctly clicked into the column tower.
- In addition, the volume of solvent required by the parametrised sequence will be shown on the touch screen.

## Ready for further processing

- After the unattended processing of the sequence, the samples are fully fractionated for further processing, for example for parallel concentration in the D-EVA device (*see page 14*).
- With the special design of the double walled needle, no over-pressure or vacuum occurs when pipetting in the closed fraction glassware.
- Evaporation will also be reliably prevented over longer period, due to the special needle shape the septum seals again after puncturing.

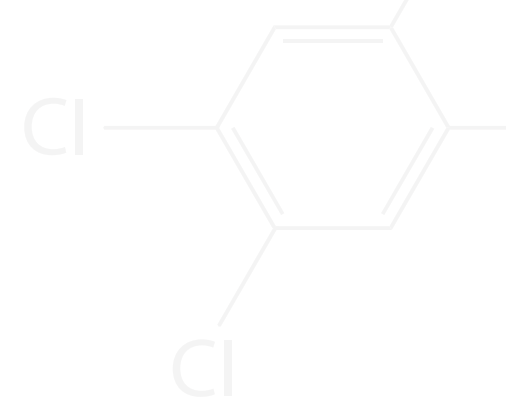


Column carousel is in the forward position for placing the column before processing.



Column carousel is in the rear position with locked columns in the column tower.

# Columns



Approved and Ready-to-Use

## As simple as that:

Take the columns out of the package and click them into the column tower with one hand operation – “just click it”! Without screwing, without any tools, or other manual working steps. Depending on your sample and the selected method, different columns can be inserted in the 3-column set-up.

### Acidic silica gel column

- SMART column for samples < 1.5 g fat
- Standard or Universal column for samples up to 5 g fat; no pre-cleaning step of the extract needed!  
(Silver nitrate layer in Universal column)

Quick change of columns by using an adapter

### Aluminium-oxide column

The acidic silica (Universal, Standard or SMART) and the aluminium-oxide columns are high quality, robust, and quality-tested columns made of glass to avoid any interactions.

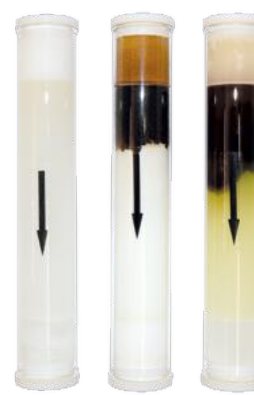
## Cost Saving

### Carbon column

- Reusable
- In “PCB only” method, this column is not needed and is replaced by a dummy column.



LC Tech columns for PCB and dioxin analysis with very high loading capacity



Universal columns after processing of: blank solvent, 3 g fish oil and 5 g maize oil



Easy insertion of columns in one hand operation

# Flexible

*Florisil or individual fraction required?  
Just contact us via [info@LCTech.de](mailto:info@LCTech.de) and  
we will find your solution.*

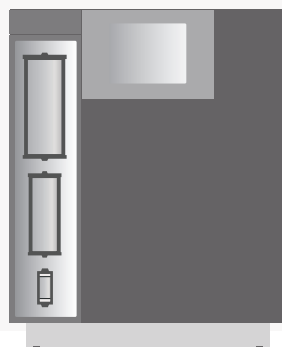
## Different Fractions – Different Systems – Same Technology

### Default Method 1 – „Alox Plus Method“

2 fractions

**Fraction 1:**  
Mono-ortho-PCB  
+ ndl-PCB + PBDE

**Fraction 2:**  
Non-ortho-PCB  
+ PCDD/F



### 2 Column – „Dioxin only Method“

Cost saving and  
DCM Free Method!

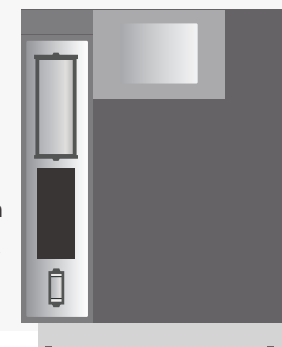
1 fraction

**Fraction 1:**  
-

**Fraction 2:**  
PCDD/F



No column  
required →

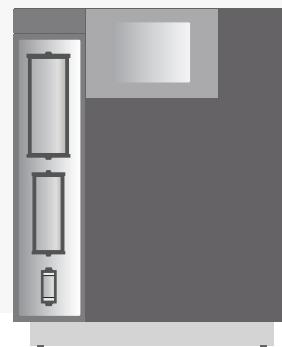


### Default Method 2 – „Alox Pure Method“

2 fractions

**Fraction 1:**  
Mono-ortho-PCB  
+ ndl-PCB + PBDE  
+ non-ortho-PCB

**Fraction 2:**  
PCDD/F



### 2 Column – „PCB only Method“

Cost saving Method!

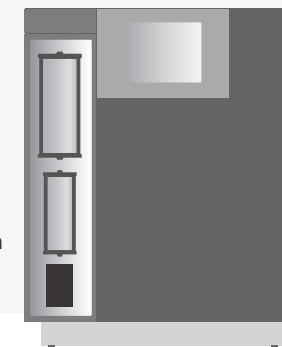
1 fraction

**Fraction 1:**  
Mono-ortho-PCB  
+ ndl-PCB + PBDE  
+ non-ortho-PCB

**Fraction 2:**  
-



No column  
required →



Toluene



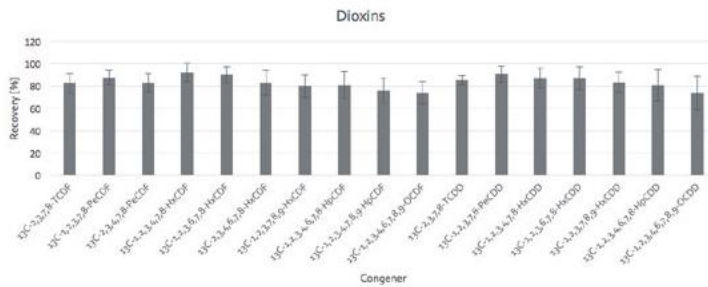
Dichloromethane / n-hexane



\*

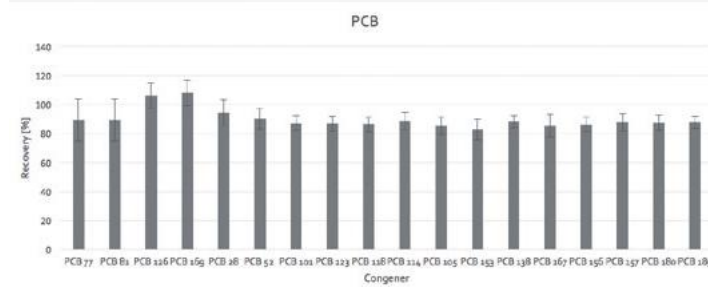
# Reliable

## Reproducible Results



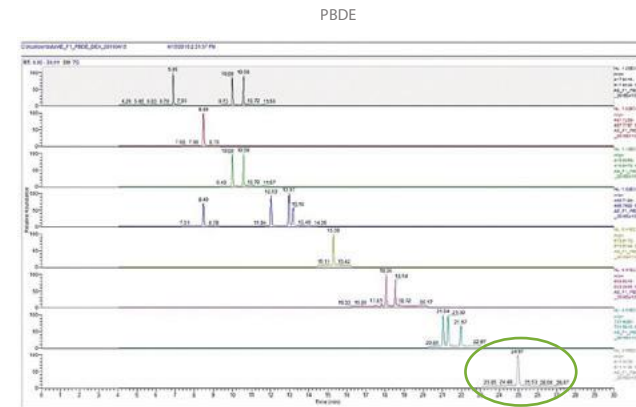
### Results Dioxin

Sources: Chemical and Veterinary Investigation Office Münsterland-Emscher-Lippe (governmental laboratory); LCTech Laboratory



### Results PCB

Sources: Chemical and Veterinary Investigation Office Münsterland-Emscher-Lippe (governmental laboratory); LCTech Laboratory






Clear signals, sharp separation, low background noise and excellent recoveries  
Sources: Bavarian Health and Food Safety Authority (LGL-Oberschleißheim, governmental laboratory); LCTech Laboratory

Excellent recovery BDE 209

# The Perfect System for Every User

## Which DEXTech is the best one for you?

			
Sample Loading	Single	Single	Sequential
Column 2 <sup>nd</sup> position	Aluminium-oxide	Aluminium-oxide	Aluminium-oxide
Default methods* ready to start (Each for Universal and SMART)			
<b>Fraction 1:</b> Mono-ortho-PCB + ndI-PCB + PBDE <b>Fraction 2:</b> Non-ortho-PCB + PCDD/F	✓	✓	✓
<b>Fraction 1:</b> Mono-ortho-PCB + ndI-PCB + PBDE + Non-ortho-PCB <b>Fraction 2:</b> PCDD/F	✓	✓	✓
<i>Dioxin only</i> <b>Fraction 1:</b> - <b>Fraction 2:</b> PCDD/F	✓	✓	✓
<i>PCB only</i> <b>Fraction 1:</b> Mono-ortho PCB + ndI-PCB + PBDE + non-ortho-PCB <b>Fraction 2:</b> -	✓	✓	✓
Heating	-	✓	-
PCB-only analysis	✓	✓	✓
Separation of PCBs and dioxins	✓	✓	✓
Compliant to US-EPA and European regulations	✓	✓	✓

\*If you desire other methods or chemistry, please contact us via [info@LCTech.de](mailto:info@LCTech.de).

# D-EVA

## Parallel and Fast Concentration

### Brilliant solution for concentrating the samples before and after the clean-up step

- Rotational vacuum concentration with automatic stop
- From 1- 26 samples parallel – independent of the sample position and amount in the rotor
- Different rotors for different containers
- Reliable evaporation nearly to dryness.  
Usually a final volume of 30 to 100  $\mu\text{L}$  for the PCDD/F-Fraction (F2) or a final volume of 300 to 500  $\mu\text{L}$  for the PCB-Fraction (F1) is possible.  
The direct transfer into an insert of a GC-vial is possible even without rinsing due to centrifugal forces.
- Moderate speed during centrifugation with related centrifugal force reliably prevents boiling retardation, avoids cross-contamination in the head space as well as sticking of analytes at the glass wall
- Cold trap for collection of solvents avoids vapour in the laboratory and enables easy disposal of waste
- Technology and design prevent continuing of evaporation after stopping the process
- No cleaning steps during the complete process
- Supply of energy via light
- Space saving in the laboratory due to parallel processing of larger numbers of samples using only one system
- No cross-contamination

**Unattended!**  
Automatic Stop  
Sensor Designed  
by LCTech



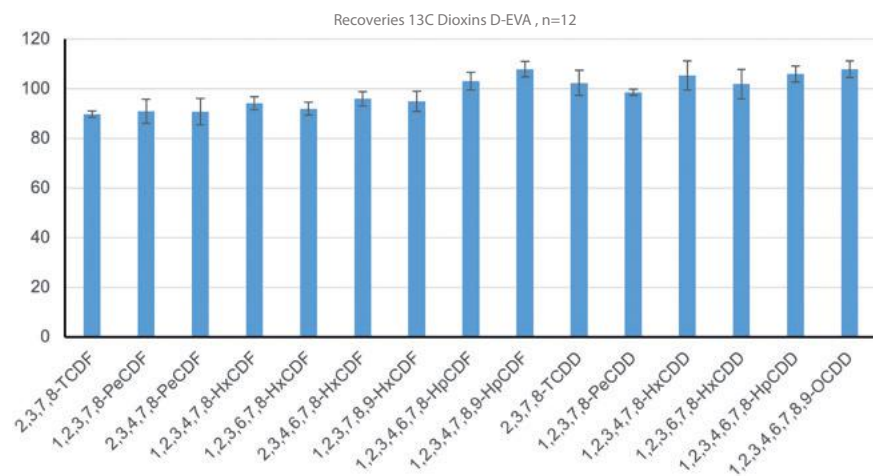


## D-EVA in the workflow of PCB and Dioxin analysis



## Reproducible results

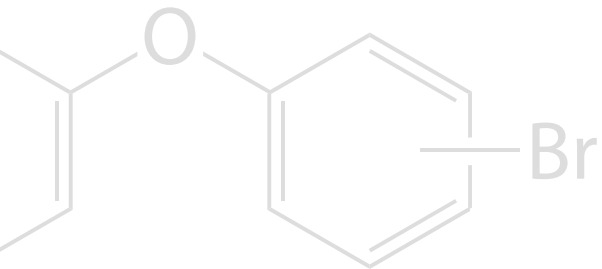
Results for vacuum concentration of dioxin samples with D-EVA; LCTech Laboratory



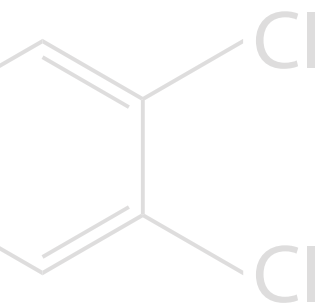
## The sensor stops for you

Special LCTech sensor (in different sizes available) developed for automatic stop.



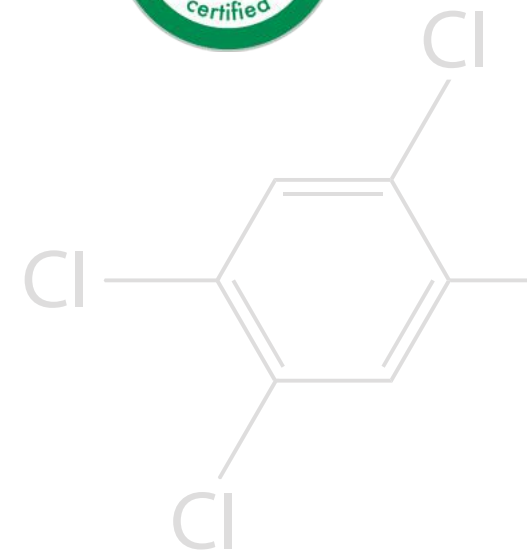


You can find detailed information regarding runtimes and volumes of all DEXTech systems at [www.LCTech.de](http://www.LCTech.de)



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