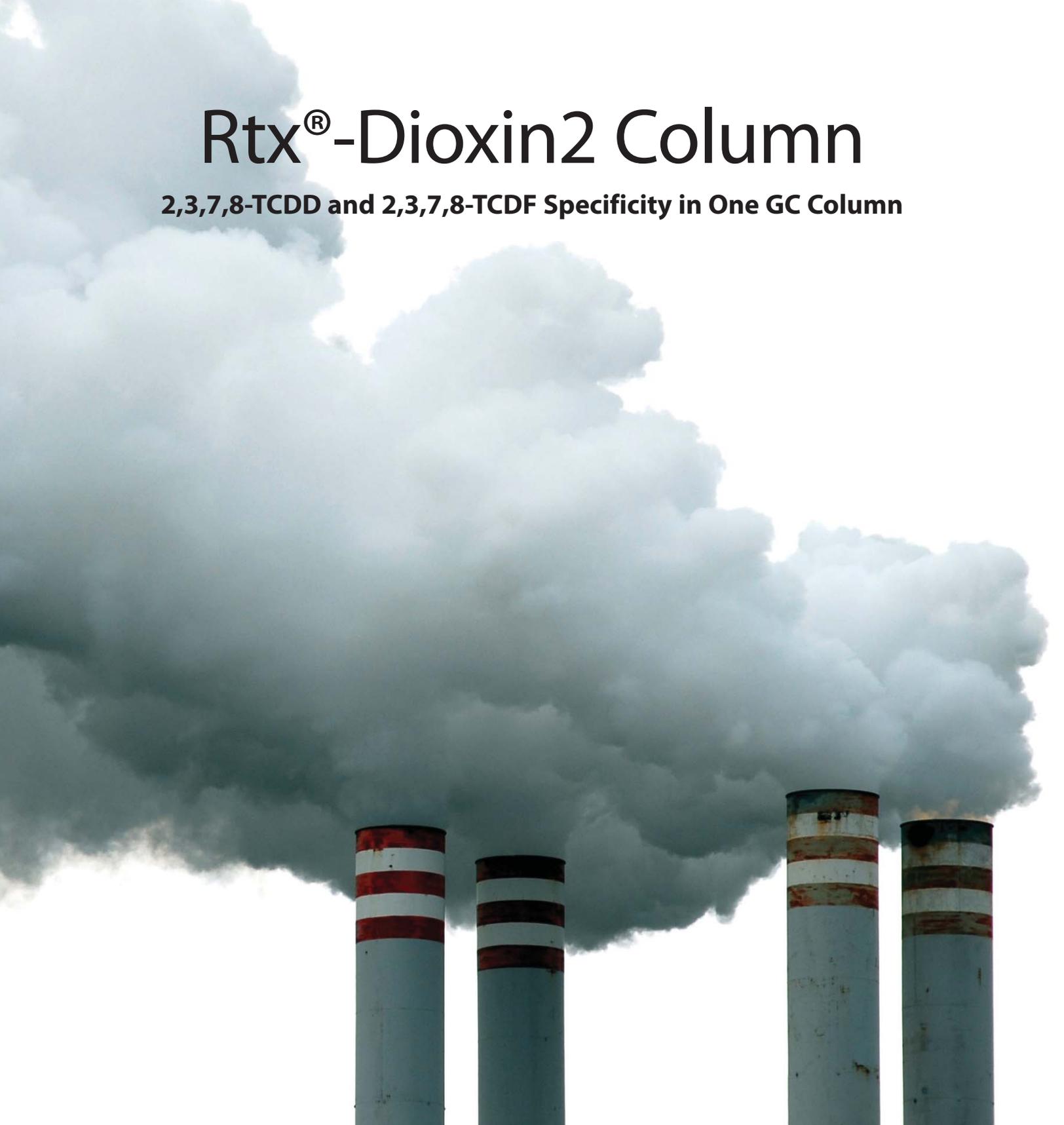


Rtx[®]-Dioxin2 Column

2,3,7,8-TCDD and 2,3,7,8-TCDF Specificity in One GC Column



HRMalytic Chromatography
Australian Distributors **ECH**nology Products '08

www.chromtech.net.au E-mail : info@chromtech.net.au Tel : +61 3 9762 2034 Fax : +61 3 9761 1169

RESTEK

RESTEK

Chromatography Products

www.restek.com 800-356-1688 • 814-353-1300

Rtx[®]-Dioxin2 Column

- Isomer specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF achieved with one GC column.
- Thermally stable to 340°C for longer lifetime.
- Unique selectivity for toxic dioxin and furan congeners allow use as a primary or confirmation GC column.

Accurate GC analysis of polychlorinated dibenzodioxin (PCDD) and polychlorinated dibenzofuran (PCDF) congeners is a challenge, even when using a high resolution mass spectrometer. Separation of the toxic congeners (substitutions at the 2, 3, 7, and 8 positions) from the nontoxic congeners proves difficult on almost all stationary phases. Most laboratories perform an initial analysis using a 5% diphenyl/95% dimethyl polysiloxane column (e.g., an Rxi[™]-5ms column) to obtain reasonable estimates of concentrations for the 2,3,7,8-substituted congeners. For some of the target congeners, this quantification is biased toward high values, due to coelution with non-toxic congeners. For example, as many as five nontoxic TCDFs can coelute with 2,3,7,8-tetrachlorodibenzofuran in an analysis on a 5% diphenyl or equivalent column. The coelution issue has resulted in the need for confirmation columns, most commonly high cyanopropyl stationary phases (e.g., Rtx[®]-225 and Rtx[®]-2330 columns), in order to more accurately quantify the toxic congeners. Unfortunately, cyanopropyl columns exhibit poor thermal stability, and therefore offer poor lifetime. To address these issues Restek designed the Rtx[®]-Dioxin2 column, a column with unique selectivity for both 2,3,7,8 substituted dioxins and furans that also has excellent thermal stability.

Resolution of 2,3,7,8-TCDD and 2,3,7,8-TCDF

The Rtx[®]-Dioxin2 column is specific for both 2,3,7,8-TCDD and 2,3,7,8-TCDF, something that usually requires the use of at least two GC columns. The column is stable to 340°C, and is available in the dimensions commonly used for this analysis. Figure 1 shows a chromatogram of tetrachlorodibenzodioxins in lake sediment extract (certified reference material WMS-01) on a 60m, 0.25mm, 0.25µm Rtx[®]-Dioxin2 column. 2,3,7,8-TCDD is well-resolved from the other congeners in this group and can be quantified accurately in WMS-01 and other samples (Table 1). The data in Figure 2 illustrate resolution of the 2,3,7,8-TCDF congener from the nontoxic congeners in the same sediment extract analyzed on an Rtx[®]-Dioxin2 column. Values for 2,3,7,8-TCDF in a variety of sample types obtained with an Rtx[®]-Dioxin2 column compare favorably with values obtained on a cyanopropyl-type column (the column typically used for TCDF specificity) and with the certified values (Table 2). However, the quantified values from the 5% diphenyl column are biased high due to other TCDF interferences.

Table 1 Comparative results (pg/g) for 2378-TCDD in certified reference materials.

Sample	5% diphenyl	Rtx [®] -Dioxin2	Certified Value
Sediment (WMS-01)	21	14	17.7 ± 5.6
Sediment	8.5	9	6
Flyash	5.6	4.4	5
Flyash-2	< 3	4.4	4

WMS-01 was obtained from Wellington Laboratories, Inc., Guelph, Ontario, Canada.

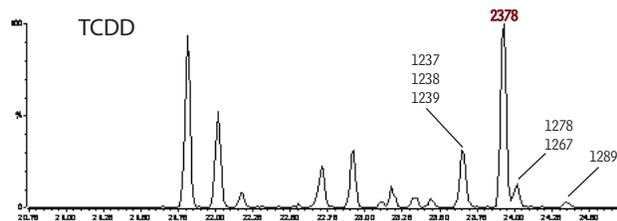
Table 2 Comparative results (pg/g) for 2378-TCDF in certified reference materials.

Note the quantitative bias for the 5% diphenyl results due to other TCDF interferences.

Sample	5% diphenyl	225	Rtx [®] -Dioxin2	Certified Value
Sediment (WMS-01)	78	46	47	52.5 ± 16
Sediment	37	19	19	23
Flyash	240	38	32	31
Flyash-2	250	40	32	28

WMS-01 was obtained from Wellington Laboratories, Inc., Guelph, Ontario, Canada.

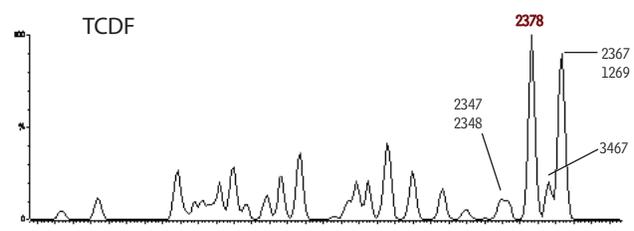
Figure 1 2,3,7,8-Tetrachlorodibenzodioxin resolved from other TCDD congeners, using an Rtx®-Dioxin2 column..



Other peak identifications available upon request.

Column: Rtx-Dioxin®2, 60m, 0.25mm ID, 0.25µm (cat.# 10758)
 Sample: WMS-01 Reference Material, Wellington Laboratories
 Inj.: Splitless
 Inj. temp.: 250°C
 Carrier gas: helium, constant flow
 Flow rate: 1.5mL/min.
 Oven temp.: 130°C (hold 1.0 min.) to 200°C @ 40°C/min. to 235°C @ 3.0°C/min. to 300°C @ 5°C/min. (hold 10 min.).
 Det.: Micromass Ultima high-resolution mass spectrometer
 Ionization: EI
 Mode: SIR

Figure 2 Tetrachlorodibenzofuran congeners on an Rtx®-Dioxin2 column.



Other peak identifications available upon request.

Column: Rtx-Dioxin®2, 60m, 0.25mm ID, 0.25µm (cat.# 10758)
 Sample: WMS-01 Reference Material, Wellington Laboratories
 Inj.: Splitless
 Inj. temp.: 250°C
 Carrier gas: helium, constant flow
 Flow rate: 1.5mL/min.
 Oven temp.: 130°C (hold 1.0 min.) to 200°C @ 40°C/min. to 235°C @ 3.0°C/min. to 300°C @ 5°C/min. (hold 10 min.).
 Det.: Micromass Ultima high-resolution mass spectrometer
 Ionization: EI
 Mode: SIR

also **available**

Rtx™-5ms GC Columns!

These new industry-leading low bleed and inert columns have the selectivity and life-time required by chemists using the 5% diphenyl / 95% dimethyl polysiloxane phase. Request lit. cat.# 580086 for more information.

Resolution of PCDDs and PCDFs by Chlorination Level

Extracted ion profiles of quantitative native PCDDs and PCDFs, and window definer compounds are shown in Figure 3 and Figure 4. The tetra- through octachlorodibenzodioxin compounds are chromatographically separated by chlorination level. The tetrachlorodibenzofurans are chromatographically separated by chlorination level, except for 1,2,8,9-tetrachlorodibenzofuran and 1,3,4,6,8-pentachlorodibenzofuran, which exhibit a slight window overlap.

Conclusion

The Rtx®-Dioxin2 column is an excellent column for the analysis of dioxin and furan congeners. It has a unique selectivity for the toxic PCDDs and PCDFs, including specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF.

Acknowledgment

Chromatograms and data courtesy of Karen MacPherson and Eric Reiner, Ontario Ministry of the Environment, Toronto, Ontario, Canada.

Product Listing

Rtx®-Dioxin2 (proprietary Crossbond® phase)

- Isomer specificity for 2,3,7,8-TCDD and 2,3,7,8-TCDF achieved with one GC column.
- Thermally stable to 340°C for longer lifetime.
- Unique selectivity for toxic dioxin and furan congeners allow use as a primary or confirmation GC column.



ID	df (μm)	temp. limits	40-Meter	60-Meter
0.18mm	0.18	20°C to 340°C	10759	—
0.25mm	0.25	20°C to 340°C	—	10758

GET YOUR MIX

Time-Saving MegaMix™ Environmental Reference Mixes.

- Largest number of target analytes in one mix, formulated for maximum stability.
- Available for US EPA methods 8260, 8270, 502.2, 524.2, 525.2, 624, 625, SOM01.1, OLC 03.2, OLM 04.2, Skinner List volatiles, Skinner List semivolatiles.

MegaMix™ mixes simplify preparation of calibration mixes, and shorten preparation time, because they include a maximum numbers of compatible target analytes. In some applications a second calibration analysis has been required for coeluting target compounds, but the MegaMix™ formulation ensures all included analytes can be calibrated in one analysis (e.g., 3- and 4- methylphenol with other components in OLC 03.2 semivolatiles mix; *m*- & *p*- xylene with other components in OLC 03.2 volatiles mix).

Save time, save effort, minimize potential for preparation problems – use MegaMix™ reference mixes, only from Restek or authorized distributors.



Restek Trademarks:
Crossbond, Rtx, Rxi, Uniliner,
Restek logo.



Lit. Cat.# 580119A

© 2007 Restek Corporation.



www.chromtech.net.au E-mail : info@chromtech.net.au Tel : +61 3 9762 2034 Fax : +61 3 9761 1169

