

APPLICATIONS

Analysis of Dioxins and PCBs on ZB-Dioxin GC column by GC-HRMS

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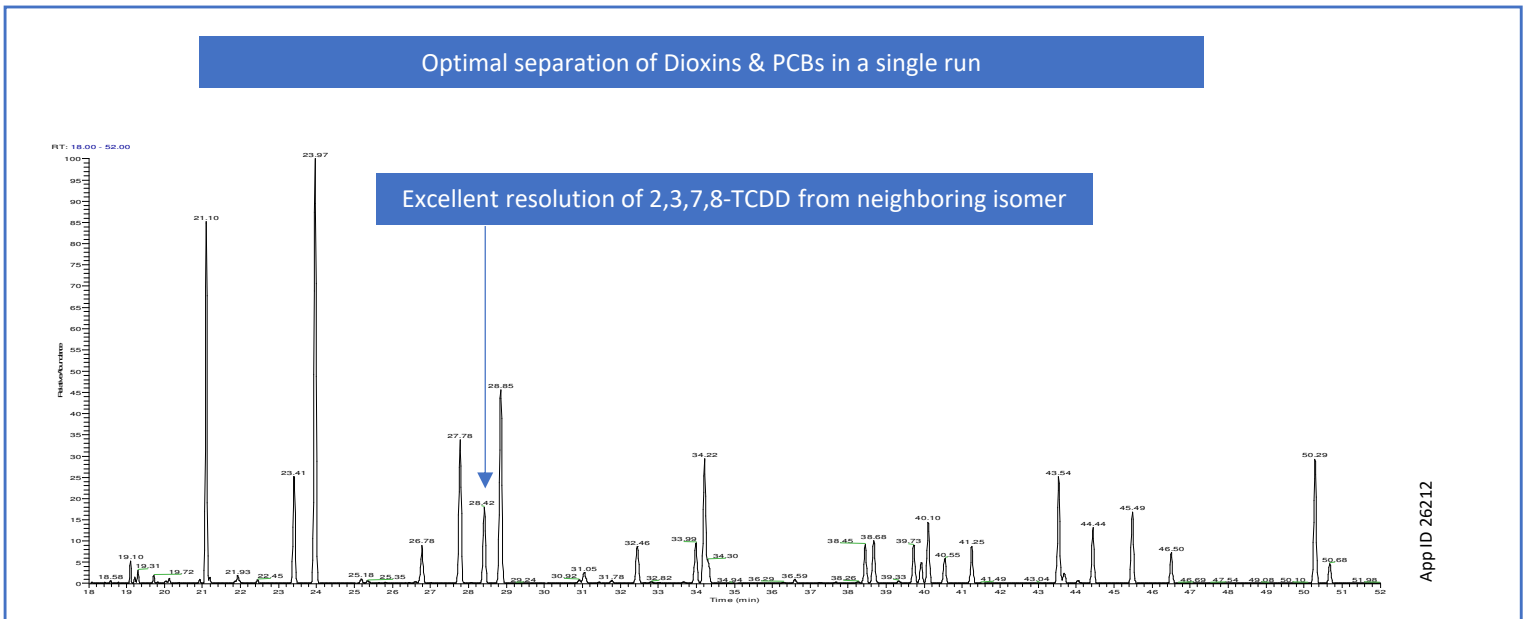
Overview

Polychlorinated Biphenyls (PCBs), Polychlorinated Dibenzodioxins (PCDD), and Polychlorinated Dibenzofurans (PCDF) are stable chemical structures that are classified under the Persistent Organic Pollutant (POPs) category. Presented in this study are the key PCBs, PCDD, and PCDF separation on a single ZebronTM ZB-Dioxin GC column. The proprietary stationary phase in ZB-Dioxin distinguishes even the smallest difference between aromatic analytes, thereby bringing optimal separation of PCDD, PCDF, and PCBs on a single column. In addition to the chromatographic separation, ZB-Dioxin GC columns are equipped with Engineered Self Cross-LinkingTM (ESC) that provides GC-MS compatible low bleed stationary phase that is stable up to 320/340 °C.

GC-HRMS Conditions

Column: Zebron ZB-Dioxin
Dimension: 60 meter x 0.25 mm x 0.20 µm
Part No.: [7KG-G045-10](#)
Recommended Z-GuardTM: [7AG-G000-00-GZK](#)
Injection: PTV-Splitless, 70 to 280 °C @14.5 °C/sec to 300 °C, for 3 min, 2 µL
Recommended Liner: Zebron PLUS Single Taper
Liner Part No.: [AG2-0A10-05](#) (for Agilent[®] systems)
Carrier Gas: Helium @ 1.1 mL/min (constant flow)
Oven Program: 100 °C for 4.2 min, 240 °C @ 13 °C/min for 10 min, 255 °C @ 2.8 °C/min for 2 min, 310°C @ 2.8 °C/min for 3 min
Detector: GC-HRMS
Transfer Line Temperature: 290 °C

Figure 1: Separation of TCDD, TCDF, and PCBs on ZB-Dioxin GC Column by GC-HRMS



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Figure 2: Separation of TCDD, TCDF, and PCBs on a 5% Phenyl Arylene Column by GC-HRMS

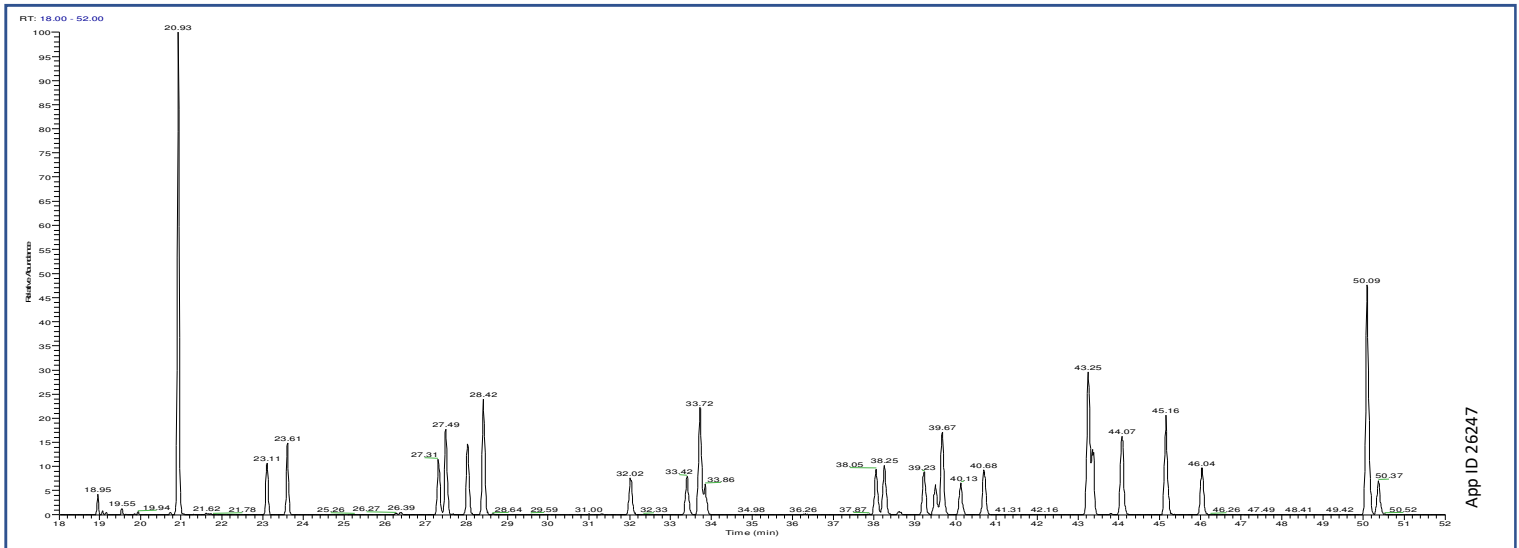


Table 1: Retention Time for Separation of Dioxins and PCBs on ZB-Dioxin

Retention Time (min)	Analyte
21.00	¹³ C PCB 80
23.31	PCB 81
23.85	PCB 77
27.69	2,3,7,8 TCDF + 1,2,3,4 TCDD (SS)
28.31	2,3,7,8 TCDD
28.74	2,3,7,8 TCDD ³⁷ Cl + PCB 126
32.34	1,2,3,7,8 PeCDF
33.86	2,3,4,7,8 PeCDF
34.11	PCB 169
34.21	1,2,3,7,8 PeCDD
38.33	1,2,3,4,7,8 HxCDF
38.55	1,2,3,6,7,8 HxCDF
39.60	2,3,4,6,7,8 HxCDF
39.98	1,2,3,4,7,8 HxCDD
40.40	1,2,3,6,7,8 HxCDD
41.14	1,2,3,7,8,9 HxCDD
43.40	1,2,3,4,6,7,8 HpCDF
44.32	1,2,3,4,6,8,9 HpCDF
45.36	1,2,3,4,6,7,8 HpCDF
46.38	1,2,3,4,7,8,9 HpCDF
50.18	OCDD
50.57	OCDF

Summary of Results

Represented in **Figure 1** is the separation of PCDD & PCDF after consecutive real sample injections. **Figure 2** represents the separation of the same analytes under identical method parameters on a 5% Phenyl arylene phase. As a plug in, the ZB-Dioxin GC column provides better separation of 2,3,7,8-TCDD, TCDF and PCBs in a single run compared to a traditional SMS column (5% Phenyl Arylene column). In addition, ZB-Dioxin maintains this resolution and peak symmetry even after consecutive injections of real sample matrix. **Table 1** is a summary of retention time of Tetra- through Octa-dioxins along with PCB-81, PCB-126, PCB-169. On ZB-Dioxin, 2,3,7,8 and 1,2,3,4 TCDD, 1,2,3,7,8 PeCDD and PCB 169, 2,3,7,8 TCDD ³⁷Cl and PCB-126 are chromatographic coelutions. However, they are spectrally resolved due to difference in fragmentation in the EI mass spectrometer.

Conclusion

ZB-Dioxin provides optimal separation of Dioxins, substituted Furans, and PCBs in a single run.

Our Customer Said Yes!

"The ZB-Dioxin column better resolution in all congeners and in the critical separations of the standard mixture compared to the one normally used (5% Phenyl Arylene)." **Dr. Fabio Busico, Istituto Zooprofilattico Sperimentale del Lazio e Toscana M.Aleandri**

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Data Courtesy: Istituto Zooprofilattico Sperimentale del Lazio e della Toscana M.Aleandri, Via Appia Nuova, 1411, 00178 Roma RM, Italy, Phenomenex is not associated with Istituto Zooprofilattico Sperimentale del Lazio e della Toscana M.Aleandri.

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