



Restek GC

# DiatoSorb-W Diatomaceous Earth:

*Great Chromatography Millions of Years in the Making*

- Officially listed USP S1A and S1NS support material.
- Ideal for USP and ASTM methods that use white diatomaceous earth.
- Rigorous QC testing assures consistent quality and improved packed column performance.
- Always available—avoid costly back order delays.



**RESTEK**<sup>®</sup>

Pure Chromatography

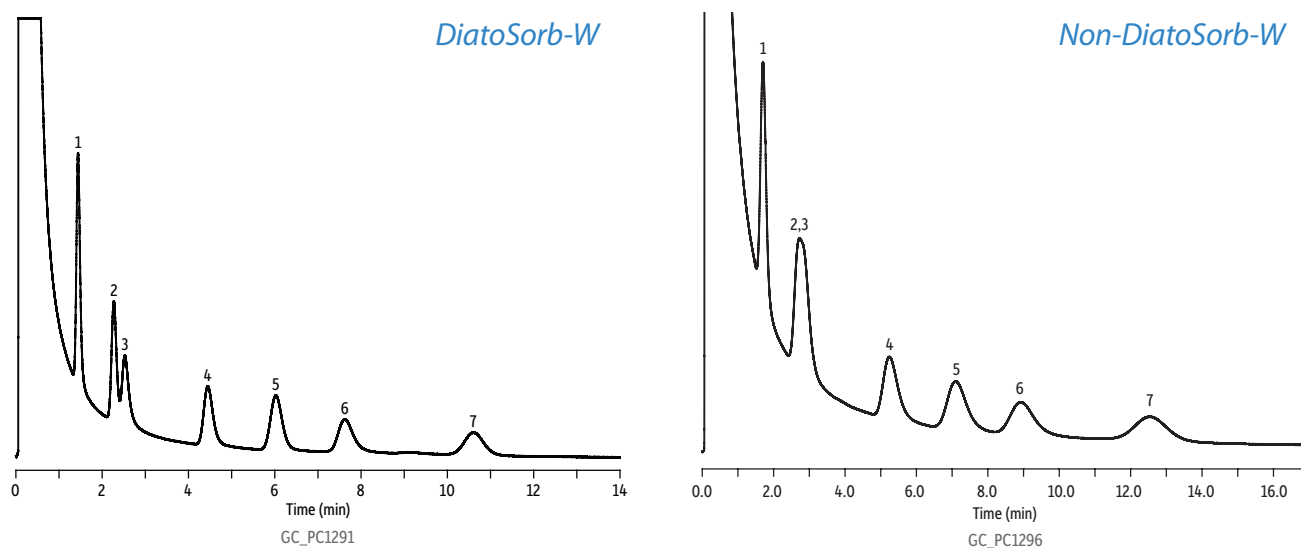
[www.restek.com](http://www.restek.com)

# Consistent in Quality and Supply— Finally, a Reliable Source for Diatomaceous Earth

Virtually unlimited in supply—but only available from Restek—new DiatoSorb-W offers a reliable alternative for packed column users. After years of dealing with diatomaceous earth being in short supply, users of chromatographic grade material now have a reliable new source. Whether you need diatomaceous earth columns or custom packing materials, DiatoSorb-W products from Restek are always available and consistent in quality.

As a leader in packed column technology, Restek has engineered an improved, saltwater-based diatomaceous earth product called DiatoSorb-W, which is available in acid-washed (WAW), nonacid-washed (WNAW), and high-performance (WHP) varieties. Based on its superior performance, DiatoSorb-W solid support has replaced the commercially available white diatomaceous earth brand that was previously used in Restek GC packed columns and Silcoport W columns. We now pair DiatoSorb-W solid support with our stationary phases and inert tubing types to ensure our white diatomaceous earth columns provide the inertness and stability you need for your challenging separations. We also offer a wide variety of stationary phases on DiatoSorb-W solid support in 60/80, 80/100, and 100/120 mesh sizes for those who pack their own columns.

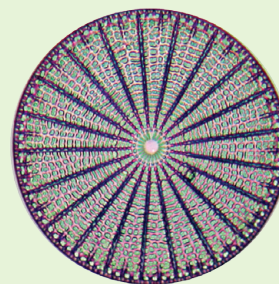
**Figure 1:** Tight QC specifications for DiatoSorb-W particle size distribution result in high-efficiency, narrow peaks, and better separation of closely eluting compounds.



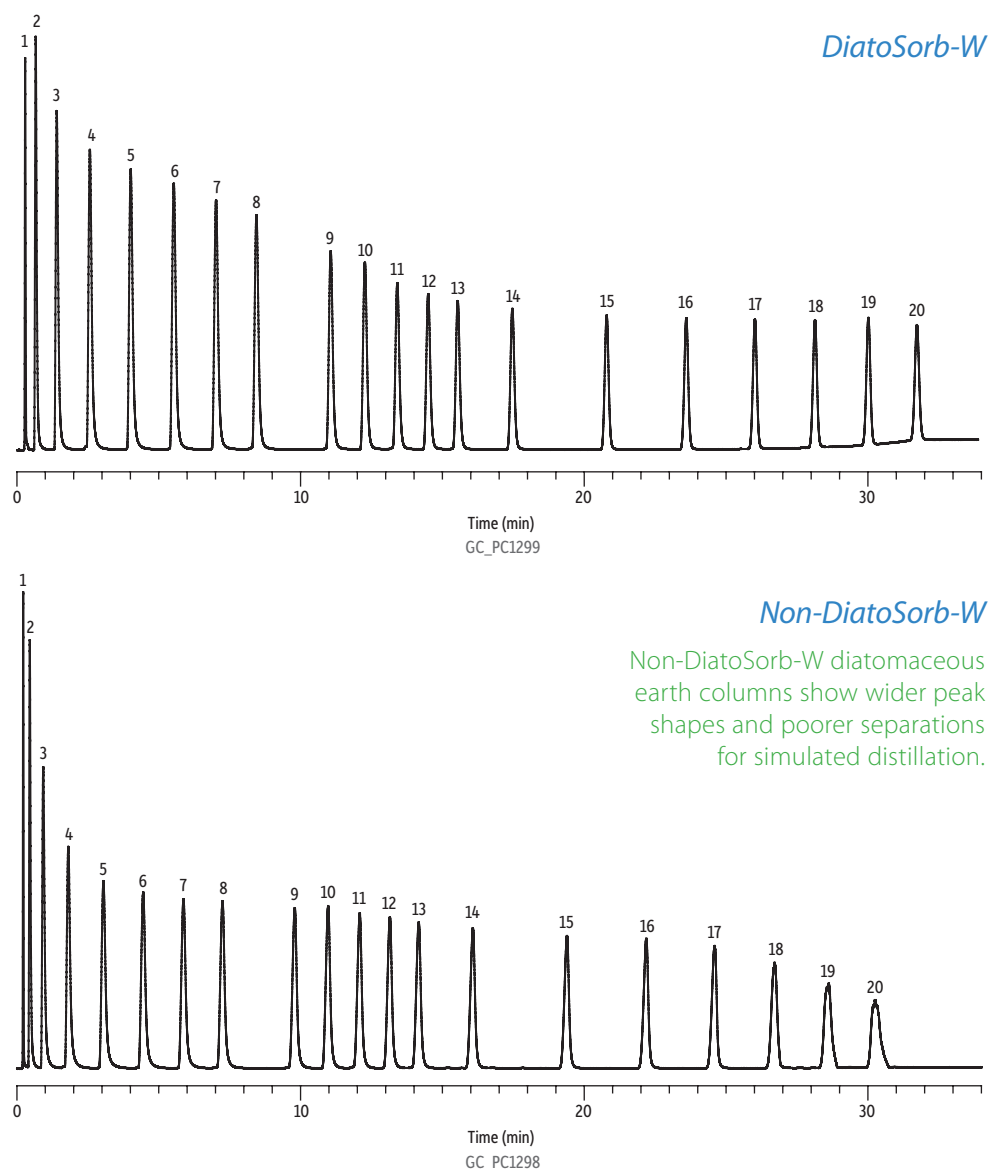
**Column:** 3% OV-17, 0.1% Versamid 900, 100/120 mesh on diatomaceous earth, SilcoSmooth tubing, 1 m, 1/8 in OD, 2 mm ID; **Sample:** Methadone (cat.# 34005), Cocaine (cat.# 34015), Codeine (cat.# 34000), Morphine (cat.# 34006); **Conc.:** 140 µg/mL; **Inj. Vol.:** 1 µL on-column; **Inj. Temp.:** 250 °C; **Oven Temp.:** 230 °C (hold 15 min); **Carrier Gas:** He, constant flow at 40 mL/min; **Detector:** FID @ 275 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. Cocaine, 2. Codeine, 3. Methadone, 4. Heroin, 5. Oxycodone, 6. Desomorphine, 7. Hydrocodone.

All DiatoSorb-W solid support undergoes rigorous quality testing to ensure high purity and dependable performance. QC testing includes particle size distribution, density control, and chromatographic analysis to ensure inertness and reproducibility. Every mesh size of DiatoSorb-W raw material is QC tested for particle size distribution and density to ensure it meets our stringent quality control specifications. The particle size distribution of DiatoSorb-W is extremely narrow, resulting in higher efficiencies and narrower peaks than were obtained on a similar column packed with a non-DiatoSorb-W support (Figure 1). The basic compounds shown in this comparison clearly show much better resolution and peak shape on the DiatoSorb-W diatomaceous earth column than on the non-DiatoSorb column made with the same tubing and stationary phase.

Along with particle size distribution, small pore size and high density and surface area also contribute to packed column efficiency, compound resolution, retention time reproducibility, and overall data quality. These characteristics accommodate higher stationary phase loading, resulting in higher efficiency and improved resolution, as well as consistent retention time reproducibility. The D2887 chromatograms in Figure 2 illustrate the excellent separation of closely eluting hydrocarbons that is achieved using a high-efficiency DiatoSorb-W packed column. The same analysis on a non-DiatoSorb diatomaceous earth column results in broader peak widths and poorer resolution.



**Figure 2:** Highly efficient DiatoSorb-W packed columns provide excellent results for simulated distillation.



**Column:** Rtx-1 SimDist 2887, 100/120 mesh on diatomaceous earth, SilcoSmooth tubing, 25 in, 1/8 in OD, 2.0 mm ID; **Sample:** 1% w/w ASTM D2887-12 calibration standard (cat.# 31674) in carbon disulfide; **Inj. Vol.:** 0.1 µL on-column; **Inj. Temp.:** 350 °C; **Oven Temp.:** 35 °C to 350 °C at 10 °C/min (hold 5 min); **Carrier Gas:** He, constant flow at 25 mL/min; **Detector:** FID @ 350 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. *n*-Pentane, 2. *n*-Hexane, 3. *n*-Heptane, 4. *n*-Octane, 5. *n*-Nonane, 6. *n*-Decane, 7. *n*-Undecane, 8. *n*-Dodecane, 9. *n*-Tetradecane, 10. *n*-Pentadecane, 11. *n*-Hexadecane, 12. *n*-Heptadecane, 13. *n*-Octadecane, 14. *n*-Eicosane, 15. *n*-Tetracosane, 16. *n*-Octacosane, 17. *n*-Dotriacontane, 18. *n*-Hexatriacontane, 19. *n*-Tetracontane, 20. *n*-Tetratetracontane.



# Rigorous DiatoSorb-W QC Standards Ensure Accurate, Reproducible Results

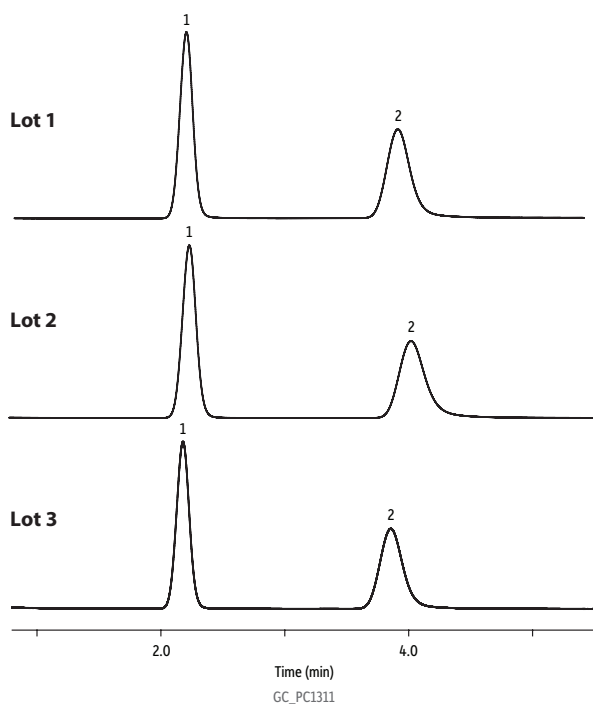
In addition to high efficiency, reproducibility and inertness are key requirements for consistent, high-quality packed column performance. The lot-to-lot comparison in Figure 3 demonstrates the excellent retention time reproducibility that results from Restek's rigorous quality standards and specifications.

Because inertness is critical for obtaining accurate data, each batch of DiatoSorb-W is QC analyzed so consistently superior chromatographic performance can be assured. Figure 4 compares results for diatomaceous earth columns from different suppliers (all columns are packed with white diatomaceous earth supports coated with 3% OV-101 polymer). The packed columns made with DiatoSorb-WHP support and SilcoSmooth tubing are highly inert and clearly outperform competitor columns as demonstrated by the 5 $\alpha$ -cholestane/cholesterol area ratios. The DiatoSorb-W column produces a ratio of nearly 1.0; whereas, scores of 1.3 and 1.6 on columns from other vendors indicate that compound adsorption is occurring due to poor deactivation and active sites in the column.

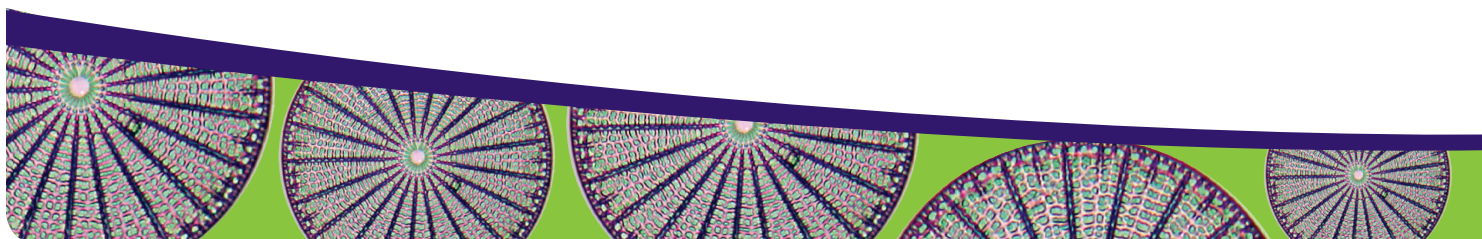
**Table I:** Each lot of DiatoSorb-W diatomaceous earth solid support is QC analyzed to ensure superior chromatographic performance.

Quality Parameters	Average (n = 9)	Standard Deviation (n = 9)	%RSD (n = 9)
Retention time, min (cholesterol)	3.92	0.13	3.4
Efficiency (cholesterol)	1,893	207	11
Peak area ratio (5 $\alpha$ -cholestane/cholesterol)	1.15	0.01	0.48

**Figure 3:** Excellent retention time reproducibility of DiatoSorb-W diatomaceous earth is ensured by tightly controlled manufacturing and strict QC testing.



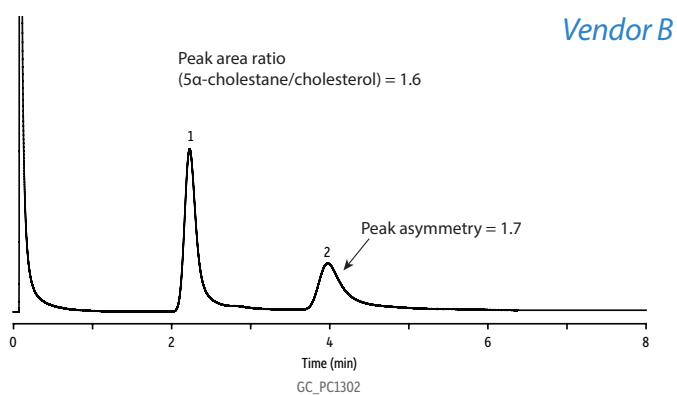
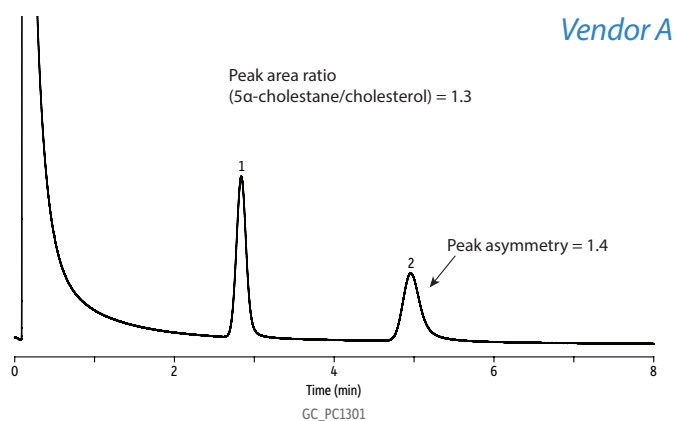
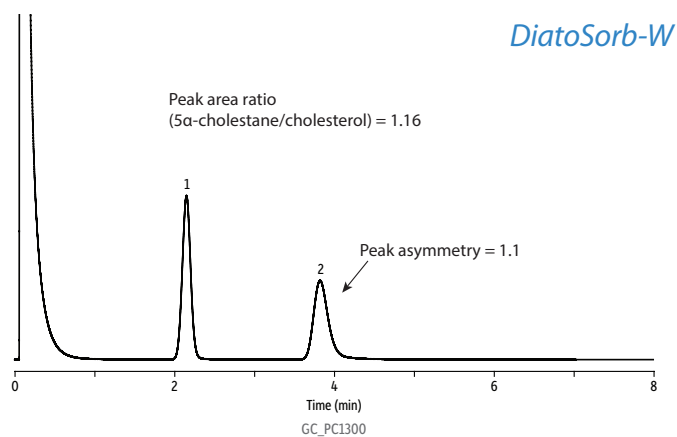
**Column:** 3% OV-101, 100/120 mesh on DiatoSorb-WHP, SilcoSmooth tubing, 3 ft., 1/8 in OD, 2.0 mm ID; **Sample:** 1,000 µg/mL 5 $\alpha$ -Cholestane and cholesterol in dichloromethane; **Inj. Vol.:** 1 µL packed on-column; **Inj. Temp.:** 220 °C; **Oven Temp.:** 250 °C (hold 6 min); **Carrier Gas:** He, constant flow at 40 mL/min @ 250 °C; **Detector:** FID @ 275 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. 5 $\alpha$ -Cholestane, 2. Cholesterol.





**Figure 4:** All DiatoSorb-W material undergoes rigorous quality testing to ensure high purity and dependable performance.

DiatoSorb-W columns are highly inert, ensuring excellent peak shape and response.

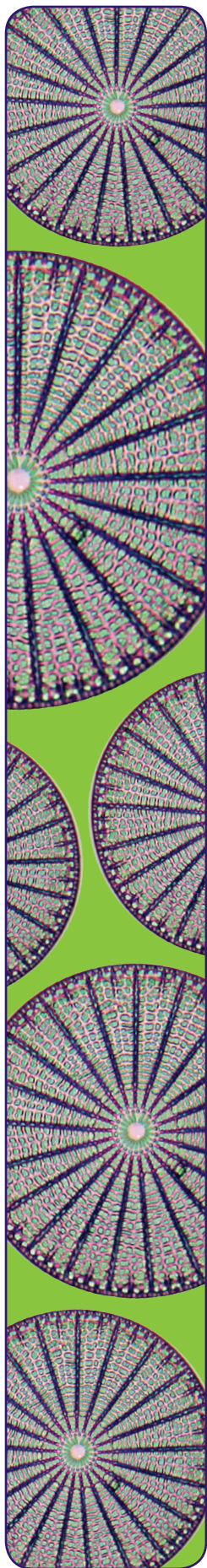


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**Instrument Conditions for Figure 4:**

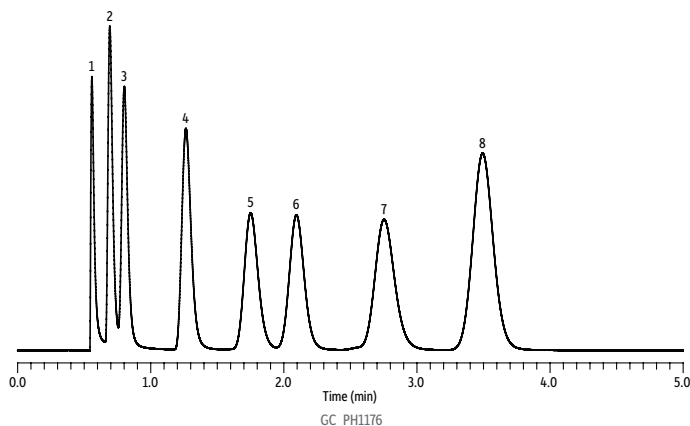
**Columns:** 3% OV-101, 100/120 mesh on diatomaceous earth solid support; Tubing: SilcoSmooth tubing, 1 m, 1/8 in OD, 2 mm ID (DiatoSorb-WHP) and glass column, 1 m, 1/4 in OD, 2 mm ID (Vendors A and B); **Sample:** 1,000 µg/mL cholesterol and 5α-cholestane in chloroform; Inj. Vol.: 1.0 µL on-column; Inj. Temp.: 220 °C; Oven Temp.: 250 °C (hold 8 min); **Carrier Gas:** He, constant flow at 40 mL/min; **Detector:** FID @ 260 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. 5α-Cholestane, 2. Cholesterol.



## Consistent Performance Means Results You Can Trust for Critical Applications

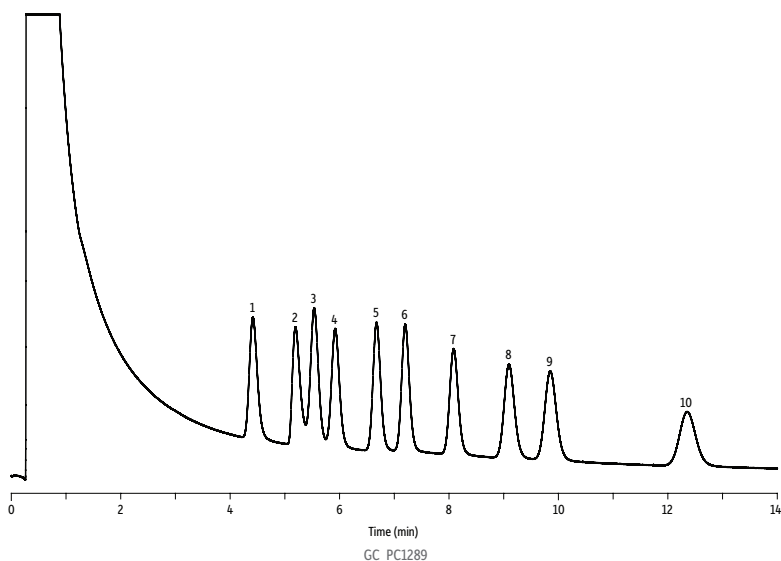
All characteristics of DiatoSorb-W solid support are tightly controlled and rigorously tested, which ensures that DiatoSorb-W packed columns will work dependably for vital applications. For example, accurate solvent analysis is critical for ensuring the safety of finished pharmaceutical products as well as for controlling solvent content in waste streams. As shown in Figure 5, DiatoSorb-W diatomaceous earth columns are a great choice for this analysis because the high surface area of the DiatoSorb-W solid support increases the coating capacity of the polymer, resulting in a column with high efficiency that is able to separate even the most volatile solvents. The analysis of underivatized free fatty acids in Figure 6 is another example of how DiatoSorb-W packed columns perform well for difficult applications. In this case, the high inertness of the DiatoSorb-W column allows these reactive compounds to be monitored reliably even at low levels.

**Figure 5:** Even volatile solvents can be retained and reliably separated on high-efficiency DiatoSorb-W diatomaceous earth columns.



**Column:** 20% OV-101, 0.1% CW-1500, 100/120 mesh on DiatoSorb-WHP, SilcoSmooth tubing, 3 m, 1/8 in OD, 2 mm ID; **Sample:** Equal proportions of neat compounds; **Inj. Vol.:** 0.1  $\mu$ L on-column; **Inj. Temp.:** 200 °C; **Oven Temp.:** 100 °C (hold 5 min); **Carrier Gas:** He, constant flow at 40 mL/min; **Detector:** FID @ 250 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. Methanol, 2. Ethanol, 3. Acetone, 4. Methyl ethyl ketone (MEK), 5. Isopropyl acetate, 6. 2-Nitropropane, 7. Methyl isobutyl ketone (MIBK), 8. Toluene.

**Figure 6:** Highly inert DiatoSorb-W packed columns are ideal for analyzing underivatized free fatty acids.



**Column:** 10% FFAP, 1% H<sub>3</sub>PO<sub>4</sub>, 100/120 mesh on DiatoSorb-WHP, SilcoSmooth tubing, 2 m, 1/8 in OD, 2 mm ID; **Sample:** 1,000  $\mu$ g/mL fatty acids C1-C7 in ether; **Inj. Vol.:** 8  $\mu$ L on-column; **Inj. Temp.:** 200 °C; **Oven Temp.:** 125 °C (hold 2 min) to 175 °C at 10 °C/min (hold 5 min); **Carrier Gas:** He, constant flow at 30 mL/min; **Detector:** TCD @ 230 °C; **Instrument:** Agilent 7890B GC; **Peaks:** 1. Acetic acid, 2. Formic acid, 3. Propionic acid, 4. Isobutyric acid, 5. n-Butyric acid, 6. Isovaleric acid, 7. n-Valeric acid, 8. Isocaproic acid, 9. n-Caproic acid, 10. Heptanoic acid.

# Switch to DiatoSorb-W Columns Today and Say Goodbye to Long Delivery Times

Struggling to find a reliable supply of white diatomaceous earth? Frustrated with the high cost of long delivery times and inconsistent product quality? Save time, money, and aggravation by switching to DiatoSorb-W today. Whether you need packed columns or custom packing materials, DiatoSorb-W is consistent in quality and always available.

## DiatoSorb Diatomaceous Earth Packed Columns

Bonded Stationary Phase Packed Columns

Bonded Phase on 100/120 Silcoport W***	Stainless Steel Tubing				SilcoSmooth Tubing**			
	L (ft)	OD (in)	ID (mm)	cat.#*	L (m)	OD (in)	ID (mm)	cat.#*
3% Rtx-1	6	1/8	2.1	80441-	2	1/8	2.0	80401-
10% Rtx-1	6	1/8	2.1	80442-	2	1/8	2.0	80405-
20% Rtx-1	6	1/8	2.1	80443-	2	1/8	2.0	80409-
3% Rtx-5	6	1/8	2.1	80444-	2	1/8	2.0	80477-
10% Rtx-5	6	1/8	2.1	80445-	2	1/8	2.0	80478-
20% Rtx-5	6	1/8	2.1	80446-	2	1/8	2.0	80479-
5% Rtx-Stabilwax	6	1/8	2.1	80447-	2	1/8	2.0	80415-
10% Rtx-Stabilwax	6	1/8	2.1	80448-	2	1/8	2.0	80416-
20% Rtx-Stabilwax	6	1/8	2.1	80449-	2	1/8	2.0	80417-
Rtx-1 SimDist 2887****	25"	1/8	2.1	80450-	25"	1/8	2.0	80000-

## DiatoSorb Diatomaceous Earth Packed Columns

Nonbonded Stationary Phase Packed Columns

On 100/120 Silcoport W***	Stainless Steel Tubing				SilcoSmooth Tubing**			
	L (ft)	OD (in)	ID (mm)	cat.#*	L (m)	OD (in)	ID (mm)	cat.#*
3% Rt-101	6	1/8	2.1	80461-	2	1/8	2.0	80400-
5% Rt-1200/1.75% Bentone 34	6	1/8	2.1	80463-	2	1/8	2.0	80125-
5% Rt-1200/5% Bentone 34	6	1/8	2.1	80464-	2	1/8	2.0	80129-

\*Please add column instrument configuration suffix number to cat.# when ordering.

\*\*Siltek-treated stainless steel.

\*\*\*Modified version of DiatoSorb W; highest inertness, most consistent performance.

\*\*\*\*Application-specific column.

Custom packings are available for DiatoSorb-W in 60/80, 80/100, and 100/120 mesh sizes. Contact your Restek representative for a quote.

Order today!  
[www.restek.com/DiatoSorb-W](http://www.restek.com/DiatoSorb-W)

### Column Instrument Configurations



General Configuration  
Suffix -800



Agilent 5880, 5890, 5987,  
6890, 7890:  
Suffix -810\*



Bruker 430, 3700, Vista Series, FID:  
Suffix -820



PE 900-3920, Sigma 1,2,3:  
Suffix -830



PE Auto System 8300, 8400, 8700  
Suffix -840

Additional configurations available.

Note: Initial 2" of column will be empty to accommodate a needle. For a completely filled column (not on-column), add suffix -901.

\*-810 suffix also includes 1 1/2" void on detector side.

Note: Standard micropacked columns fit all instruments. No special instrument configuration suffix is required.





## Meet the Experts

Restek's packed column experts have decades of industry experience. If you have any questions about DiatoSorb-W products or packed column applications, consider them your personal technical resources!



### Barry Burger

Restek's Senior Petrochemical Innovations Chemist, Barry has more than 30 years of chromatography experience and has been a voting member of the ASTM D2 committee for over a decade. He specializes in petrochemical applications.

[Barry.Burger@restek.com](mailto:Barry.Burger@restek.com)



### Jaap de Zeeuw

Jaap is a world-renowned chromatographer with over 35 years of experience, including 27 years with Varian/Chrompack focusing on industrial analysis challenges. Directly involved with the creation of numerous chemically bonded columns, including the first bonded PEG column and the stabilized PLOT columns widely used in the petrochemical arena, Restek's International GC Specialist has helped develop new techniques, such as fast GC-MS using vacuum GC technology, and has filed two patents for his work.

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### Katarina Oden

Katarina came to Restek with a B.S. in Chemistry from the University of Ljubljana, Slovenia, and research experience in both commercial and university labs. After three years as a QA Analyst, she joined the Innovations Department, where her work focuses on supporting new product development and applications for the petrochemical market.

[Katarina.Oden@restek.com](mailto:Katarina.Oden@restek.com)

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