

# Pinnacle™ DB Base-Deactivated HPLC Columns

## Effective Replacements for Hypersil® BDS Columns

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- Sharp, symmetric peaks for basic analytes.
- Excellent reproducibility, column-to-column and lot-to-lot.
- Chromatography equivalent to Hypersil® BDS material.

With Pinnacle™ DB base-deactivated silica, we have created an exceptional material for analyses of basic compounds, matching or exceeding the chromatographic performance of Hypersil® BDS material. Pinnacle™ DB silica and bonded phase packings are made through efficient processes that ensure reproducible performance and reliable stock levels—we ship 90% of all analytical columns ordered within 24 hours.

In Figure 1, peak symmetry for the basic compound pyridine is noticeably better on the Pinnacle™ DB C18 column than on a typical Type B C18 column, and the analysis time is shorter by more than 30%. You can expect similar results if you make your own comparisons. Figure 2 shows how closely matched the important physical characteristics of particle size and pore size distribution are for Pinnacle™ DB and Hypersil® BDS materials. Physical/chemical characteristics of Pinnacle™ DB packings are listed in Table I.

For certain physical parameters - most notably, metals content - we intentionally deviate from Hypersil® BDS material, as Figure 3 shows. The major difference in sodium content is especially important, as metal ions on the surface of silica particles negatively affect peak symmetry and

otherwise interfere with chromatography, particularly for basic analytes. But, there is another important problem with silicas that have a high metal content, especially sodium—they are structurally inferior to silicas containing lesser amounts of metals. To strengthen silica particles containing high concentrations of sodium, some manufacturers use an annealing process to embed the sodium into the framework of the particles. Although annealing imparts strength to the particles, it destroys some of their useable surface area. And, as the particles age or crack, embedded ions are re-exposed. Deactivation for bases is lost, and stability in highly aqueous mobile phases erodes.

Our manufacturing process strips metals and other impurities from the silica surface. By removing metals, rather than covering them, we make a more rugged silica that does not need annealing to impart strength. Peak shapes for bases are more consistent as the column ages, and the potential lifetime for a Pinnacle™ DB column is longer. Also, large pores (140Å) make Pinnacle™ DB material an excellent choice when you want to shorten analysis time.

But - how do separations on Pinnacle™ DB columns and Hypersil® BDS columns compare? The chromatograms in Figures 4 and 5 are

analyses of a base/neutral test mix and an acid/base test mix, respectively. Behavior of each of these analytes will vary, based on differences in carbon load, ligand density, degree of base deactivation, endcapping, and exposed metals. Columns that are similar for these characteristics should provide similar chromatography, and Figures 4 and 5 show Pinnacle™ DB C18 columns and Hypersil® BDS columns perform nearly identically.

If you are looking for rugged, high-quality columns for analyzing basic compounds, or as replacements for Hypersil® BDS columns, and you want them supplied quickly and reliably, Pinnacle™ DB columns are the ideal answer. In addition to the product quality you expect, you'll receive Plus 1™ service and prompt, expert technical help when you deal with Restek.

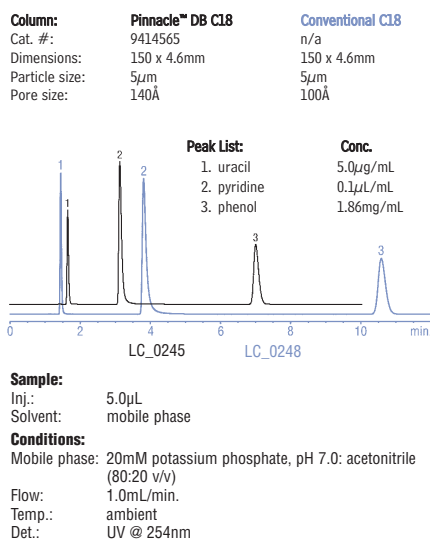
**Table I**

Physical/chemical characteristics of Pinnacle™ DB packings.

|                     |                |
|---------------------|----------------|
| <b>Particle:</b>    | 5µm, spherical |
| <b>Pore size:</b>   | 140Å           |
| <b>Pore volume:</b> | 0.65mL/g       |
| <b>Carbon load:</b> | C18—11%        |
|                     | C8—6%          |
|                     | Cyano—4%       |

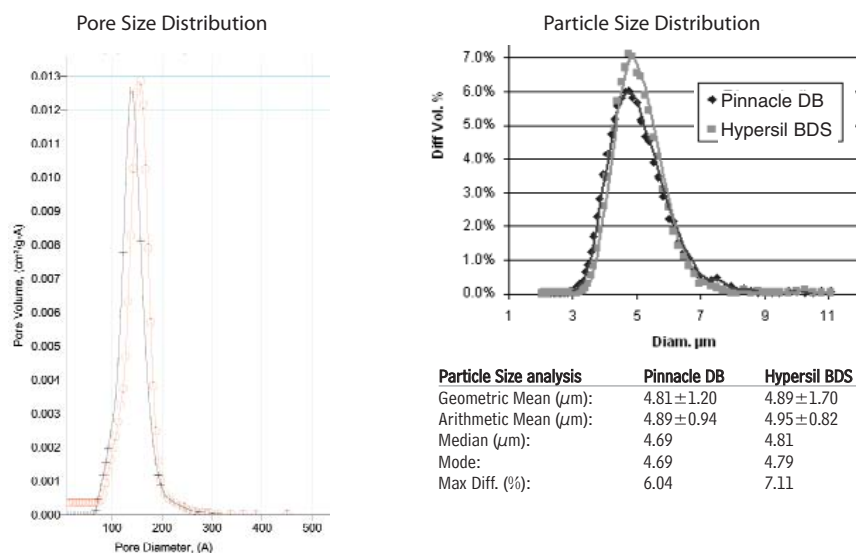
**Figure 1**

Superior peak symmetry for pyridine, and a faster analysis, on a Pinnacle™ DB column.



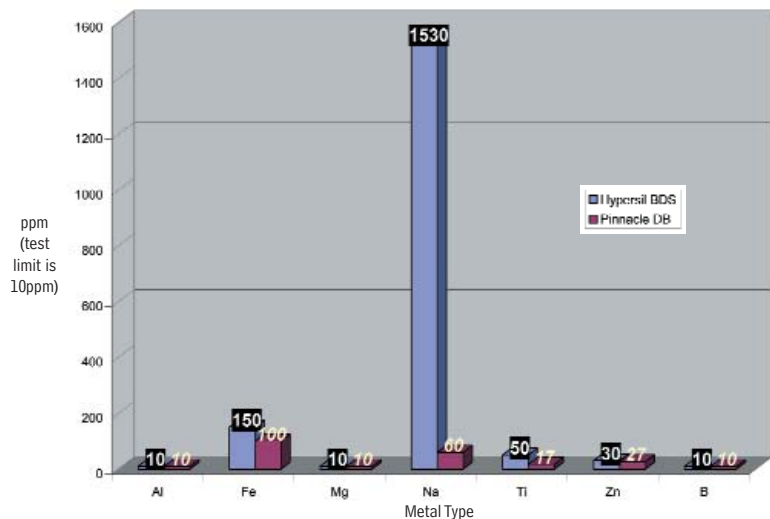
**Figure 2**

Physical characteristics of Pinnacle™ DB silica and Hypersil® BDS silica are remarkably similar.



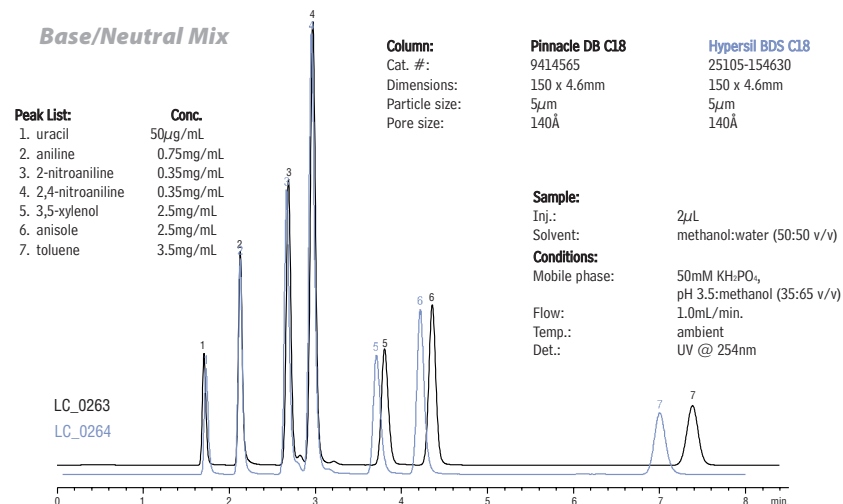
**Figure 3**

Low metals content in Pinnacle™ DB silica ensures sharper, more symmetric peaks for basic analytes.



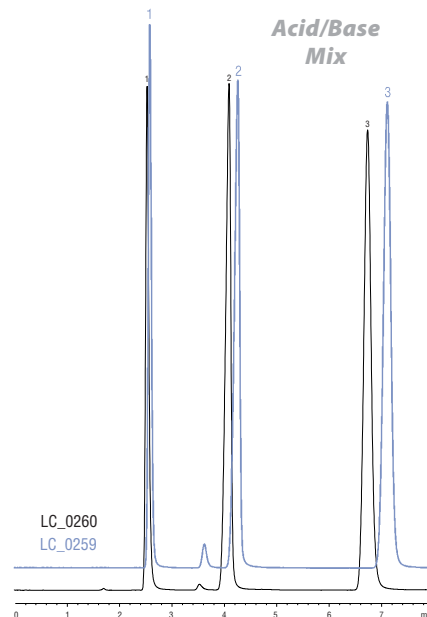
**Figure 4**

Pinnacle™ DB columns and Hypersil® BDS columns provide nearly identical retention, peak symmetry, and efficiency.



**Figure 5**

Pinnacle™ DB columns and Hypersil® BDS columns provide nearly identical retention, peak symmetry, and efficiency.



**for more info**

To see additional performance comparisons, request *Pinnacle™ DB HPLC Columns as Replacements for Hypersil® BDS* (lit. cat.# 59742).



**Pinnacle™ DB Columns**

The Pinnacle™ DB column line includes silica and C18, C8, and cyano bonded phases. Other phases and particle sizes are available on request.

**Pinnacle™ DB C18 (USP L1), 5µm**

|        | 1.0mm ID | 2.1mm ID | 3.2mm ID | 4.6mm ID |
|--------|----------|----------|----------|----------|
| Length | cat.#    | cat.#    | cat.#    | cat.#    |
| 30mm   | 9414531  | 9414532  | 9414533  | 9414535  |
| 50mm   | 9414551  | 9414552  | 9414553  | 9414555  |
| 100mm  | 9414511  | 9414512  | 9414513  | 9414515  |
| 150mm  | 9414561  | 9414562  | 9414563  | 9414565  |
| 200mm  | 9414521  | 9414522  | 9414523  | 9414525  |
| 250mm  | 9414571  | 9414572  | 9414573  | 9414575  |

**Pinnacle™ DB Cyano (USP L10), 5µm**

|        | 1.0mm ID | 2.1mm ID | 3.2mm ID | 4.6mm ID |
|--------|----------|----------|----------|----------|
| Length | cat.#    | cat.#    | cat.#    | cat.#    |
| 30mm   | 9416531  | 9416532  | 9416533  | 9416535  |
| 50mm   | 9416551  | 9416552  | 9416553  | 9416555  |
| 100mm  | 9416511  | 9416512  | 9416513  | 9416515  |
| 150mm  | 9416561  | 9416562  | 9416563  | 9416565  |
| 200mm  | 9416521  | 9416522  | 9416523  | 9416525  |
| 250mm  | 9416571  | 9416572  | 9416573  | 9416575  |

**Pinnacle™ DB C8 (USP L7), 5µm**

|        | 1.0mm ID | 2.1mm ID | 3.2mm ID | 4.6mm ID |
|--------|----------|----------|----------|----------|
| Length | cat.#    | cat.#    | cat.#    | cat.#    |
| 30mm   | 9413531  | 9413532  | 9413533  | 9413535  |
| 50mm   | 9413551  | 9413552  | 9413553  | 9413555  |
| 100mm  | 9413511  | 9413512  | 9413513  | 9413515  |
| 150mm  | 9413561  | 9413562  | 9413563  | 9413565  |
| 200mm  | 9413521  | 9413522  | 9413523  | 9413525  |
| 250mm  | 9413571  | 9413572  | 9413573  | 9413575  |

**Pinnacle™ DB Silica (USP L3), 5µm**

|        | 1.0mm ID | 2.1mm ID | 3.2mm ID | 4.6mm ID |
|--------|----------|----------|----------|----------|
| Length | cat.#    | cat.#    | cat.#    | cat.#    |
| 30mm   | 9410531  | 9410532  | 9410533  | 9410535  |
| 50mm   | 9410551  | 9410552  | 9410553  | 9410555  |
| 100mm  | 9410511  | 9410512  | 9410513  | 9410515  |
| 150mm  | 9410561  | 9410562  | 9410563  | 9410565  |
| 200mm  | 9410521  | 9410522  | 9410523  | 9410525  |
| 250mm  | 9410571  | 9410572  | 9410573  | 9410575  |