

Improving Resolution Using CORTECS UPLC Columns

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This is an Application Brief and does not contain a detailed Experimental section.

Abstract

This application brief demonstrates the high resolution capability of CORTECS UPLC 1.6 μm Columns.

Benefits

High efficiency CORTECS UPLC Columns improve resolution for difficult separations, resulting in more accurate characterization and quantitation of analytes.

Introduction

In complex separations, higher resolution is a desirable quality as it allows for more accurate calculations due to the reduction of interferences from closely eluting peaks. Resolution is measured as a function of the efficiency of the system (N), the selectivity between compounds (α), and retention factor (k). Since resolution is proportional to the square-root of the efficiency, a column with higher efficiency can lead to higher resolution of the separation.¹ By using a high efficiency CORTECS UPLC 1.6 μm Column, analytes can be better separated without the need to further optimize the analytical method.

Results and Discussion

Higher resolution between peaks using a CORTECS UPLC Column is demonstrated by the separation of local anesthetics using Hydrophilic Liquid Chromatography (HILIC). Local anesthetics are used in many fields of medicine including dentistry. The improved separation of five structurally similar local anesthetics (Figure 1) using the CORTECS UPLC Column, compared to the original separation on a fully-porous column will be shown.

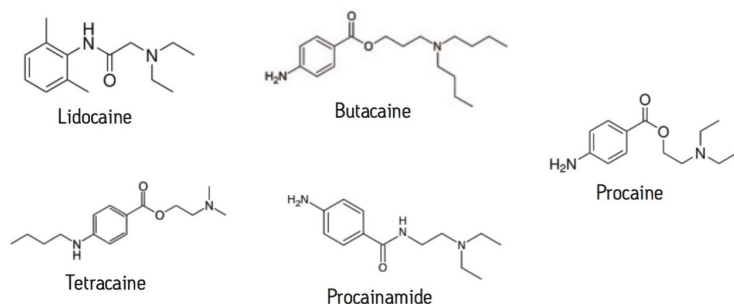


Figure 1. Structures of local anesthetics that were fully resolved using a CORTECS UPLC HILIC Column.

In order to accurately quantify or characterize peaks in liquid chromatography, it is important to minimize the potential interferences from closely eluting peaks. Improving the resolution of a separation can be achieved by using a column with more theoretical plates, thus higher efficiency. Waters CORTECS UPLC Columns are high efficiency columns that can improve resolution as a result of advanced solid-core particle and column packing technologies. An example of this can be seen in the separation of local anesthetics (Figure 2), which compares the original separation using a fully porous HILIC column to the separation on a CORTECS HILIC UPLC Column, using the same method conditions.

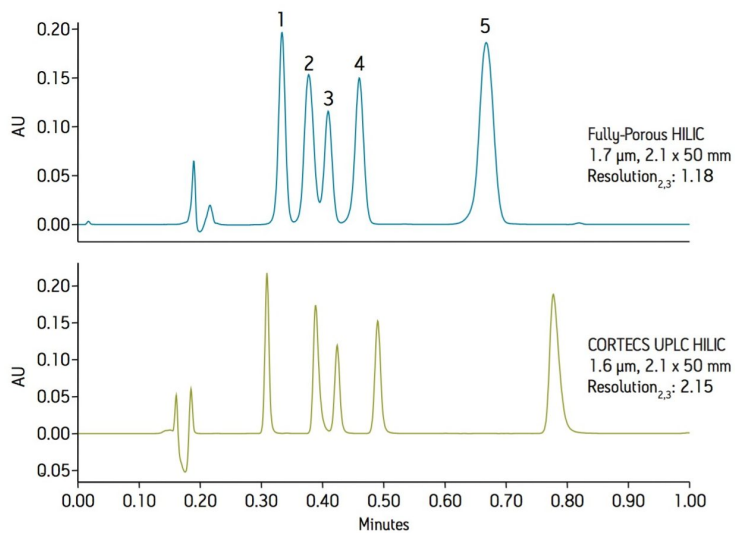


Figure 2. Separation of local anesthetics by HILIC, demonstrating the improved resolution using a CORTECS UPLC HILIC Column. Compounds: 1) lidocaine, 2) butacaine, 3) tetracaine, 4) procaine, and 5) procainamide.

In this study, by simply replacing the original column with a CORTECS UPLC HILIC Column, a 51% increase in resolution between peaks 2 and 3 is achieved. Peaks 2 and 3 were clearly coeluting with a resolution of 1.18 in the original separation. Using the CORTECS UPLC HILIC Column, the peaks are baseline resolved with a resolution of 2.15, allowing tetracaine (2) and butacaine (3) to be accurately characterized or quantified. Since the CORTECS UPLC Column uses the same method conditions as the original separation, there is no need to develop the method further, rendering lab resources more efficient.

Conclusion

Obtaining high resolution between peaks in a difficult separation can be challenging. In order to obtain higher resolution, method development requiring more time and reducing productivity may be needed. However, the use of high efficiency CORTECS UPLC Columns can help improve resolution for difficult separations, resulting in more accurate characterization and quantitation of analytes.

References

1. Neue UD. HPLC Columns: Theory, Technology, and Practice. Wiley-VCH. 1997.

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