Fast LC/MS/MS Analysis of Group 4 Pharmaceuticals from EPA-1694 with RRHD HILIC Plus

Application Note

Environmental

Author

Anne E. Mack
Agilent Technologies, Inc.
2850 Centerville Road,
Wilmington, DE 19808
USA

Abstract

The analysis of the Group 4 compounds in EPA-1694 is sped up using an Agilent 1290 Infinity UHPLC and an Agilent ZORBAX RRHD HILIC Plus column. Excellent peak shape is found for all compounds, while the flow rate and sample throughput are increased by four times the original rate.

Introduction

Pharmaceuticals and personal care products (PPCPs) are an important group of contaminants targeted by environmental laboratories. Several methods address these analytes, including EPA-1694. In this work, the Group 4 compounds from this method (cimetidine, albuterol, ranitidine and metformin) will be addressed, and the method will be improved upon through the use of UHPLC. Previous Agilent application notes have addressed the implementation of UHPLC with the compounds found in Groups 1–3 of EPA-1694, which use an Agilent ZORBAX RRHD Eclipse Plus C18 column (refer to publication numbers 5990-4409EN and 5990-4605EN).

Advancements in liquid chromatography have lead to significantly improved sample throughput, which is advantageous to many environmental laboratories. Agilent Technologies' 1290 Infinity UHPLC and Agilent ZORBAX Rapid Resolution High Definition (RRHD) columns are manufactured to withstand pressures up to 1200 bar, thus allowing the use of faster flow rates and higher throughput.

The newly released Agilent ZORBAX RRHD HILIC Plus is a 1.8 µm column that is stable to 1200 bar. The non-bonded silica is based on the silica used to manufacture Eclipse Plus columns to ensure excellent peak shape. HILIC columns are ideal for the retention of small, polar analytes, such as those found in Group 4 of EPA-1694.

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Experimental

An Agilent 1290 Infinity UHPLC with an Agilent 6410 Triple Quadrupole Mass Spectrometer, and an Agilent ZORBAX RRHD HILIC Plus 2.1 mm × 100 mm, 1.8 µm column (p/n 959758-901) were used in this experiment.

Mobile phase	A: 10 mM ammonium acetate in water, pH 6.7; B: acetonitrile
Flow rate	1 mL/min
Gradient	90% to 55% B in 1.75 minutes
Sample	0.1 µL injection of 0.1 mg/mL each in acetonitrile/water (3:1): cimetidine, albuterol, ranitidine and metformin
TCC	25 °C
MS	dMRM, ESI positive mode, cycle time 35 ms, drying gas: 9 L/min, 300 °C; nebulizer pressure: 40 psig; capillary voltage: 4000; see Table 1 for MRM transition

MassHunter versions B.03.01, B.02.00 and B.03.01 were used for data acquisition, qualitative and quantitative analyses respectively

Table 1. MRM Transitions for the Pharmaceuticals in Group 4 of EPA-1694

Compound	Precursor ion	Fragmentor voltage	Product ion	Collision energy
Cimetidine	253	100	159	10
			95	25
Albuterol	240	90	166	5
			148	15
Ranitidine	315	110	176	15
			130	25
Metformin	130	80	71	25
			60	10

Results and Discussion

A ZORBAX RRHD HILIC Plus column is used to quickly screen the Group 4 analytes found in EPA-1694, shown in Figure 1. This analysis is typically run at 0.25 mL/min, however this 1200 bar stable RRHD HILIC column is capable of running 1 mL/min, which reduces run time by 75% while generating a maximum pressure of 960 bar. Excellent peak shape is found for all four compounds: cimetidine, albuterol, ranitidine and metformin.

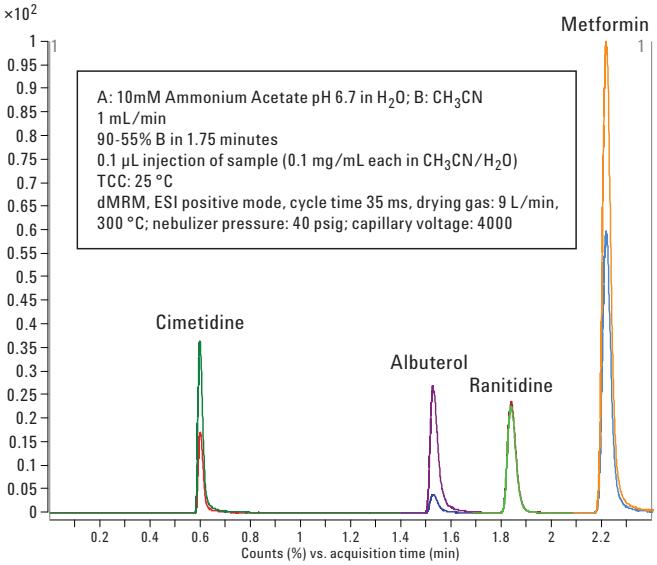

Figure 1. An Agilent RRHD HILIC Plus 2.1 mm × 100 mm, 1.8 µm column is used to rapidly analyze the Group 4 pharmaceuticals from EPA-1694, see Experimental section for detailed method parameters.

Conclusions

The Agilent 1290 Infinity UHPLC coupled with a ZORBAX RRHD HILIC Plus column successfully analyzes the Group 4 pharmaceutical compounds in EPA-1694. The flow rate and analysis is sped up by a factor of 4, while maintaining good peak shape for all compounds.

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