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ACQUITY UPLC I-Class/Xevo TQD IVD System: Analytical Performance for Antibiotics

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Introduction

The Waters ACQUITY UPLC I-Class/Xevo TQD IVD System enables the quantification of organic compounds in human biological liquid matrices.

This document describes a test of the analytical performance of the ACQUITY UPLC I-Class/Xevo TQD IVD System for the analysis of ampicillin, azithromycin, cefazolin, cefepime, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, clindamycin, daptomycin, flucloxacillin, linezolid, meropenem, piperacillin, sulbactam, and tazobactam in plasma.

Experimental

The ACQUITY UPLC I-Class/Xevo TQD IVD System was controlled by MassLynx Software (v4.2) and the data processed using the TargetLynx XS Application Manager. Calibrators and Quality Controls were prepared by spiking commercially available reference material in plasma and the samples were processed using the following conditions:

Sample Preparation Conditions

A 50 µL sample was processed with methanol and centrifuged, then subsequently diluted with acidified water prior to analysis.

LC Conditions

Column:	ACQUITY UPLC BEH C_{18}, 1.7 µm, 2.1 mm x 100 mm
Mobile phase A:	0.1% ammonia in water
Mobile phase B:	Methanol
Flow rate:	0.5 mL/min
Gradient:	90% A initial, gradient 6 until 0% A at 3.00 minutes, hold until 4.00 minutes, 90% A gradient 6 at 4.10 minutes, then hold until 5.00 minutes

Gradient

Time (minutes)	Flow (mL/min)	% Mobile phase A	% Mobile phase B	Curve
Initial	0.5	90	10	Initial
3.00	0.5	0	100	6
4.00	0.5	0	100	6
4.01	0.5	90	10	6
5.00	0.5	90	10	6

MS Conditions

Resolution:	MS1 (0.75 FWHM), MS2 (0.75FWHM)

Acquisition mode:	MRM
Polarity:	ESI (+/-)

Results and Discussion

Chromatographic selectivity of a range of antibiotics using the ACQUITY UPLC I-Class/ Xevo TQD IVD System is illustrated in Figure 1. Performance characteristics of the antibiotics are shown in Table 1.

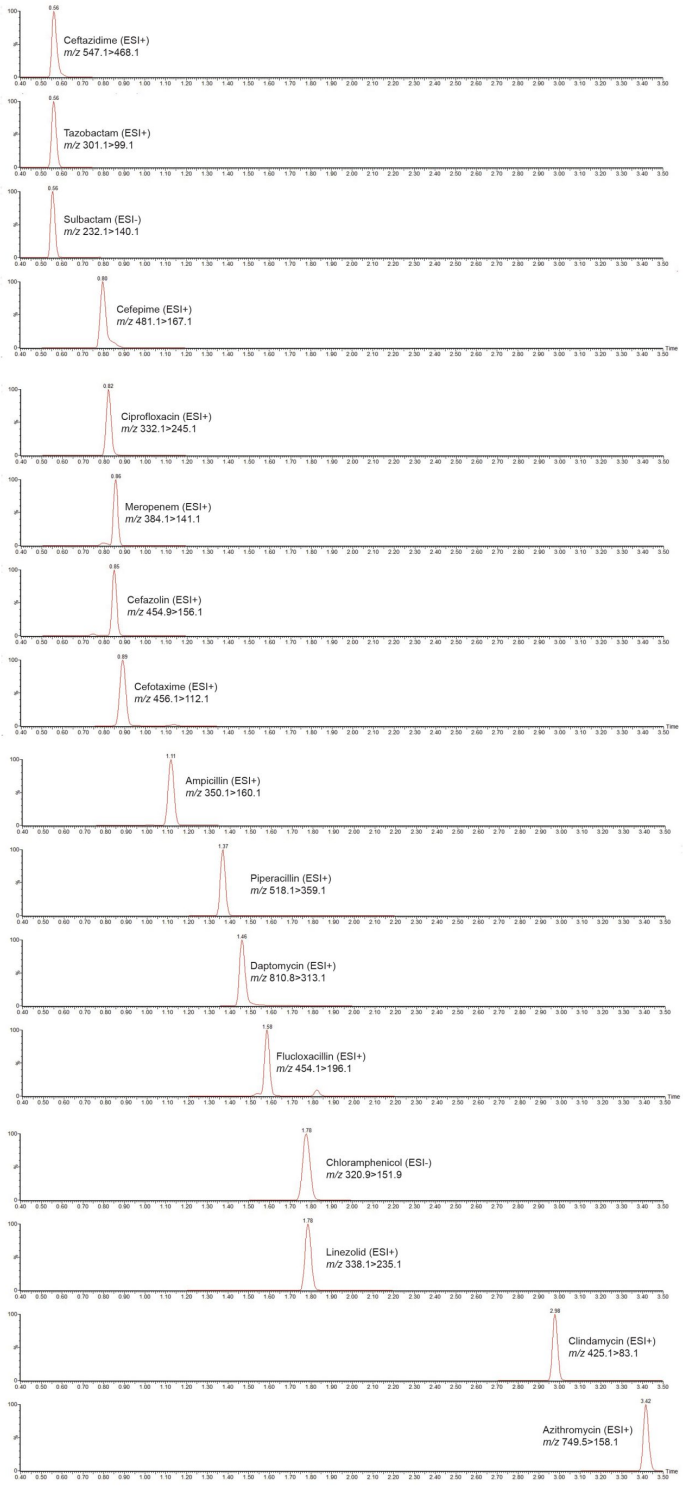

Figure 1. Chromatographic selectivity of a range of antibiotics using the ACQUITY UPLC I-Class/ Xevo TQD IVD System.

Compound	Calibration range* (µg/mL)	LLOQ (µg/mL)	Linear range µg/mL	Total precision	Repeatability
Ampicillin	0.5–50	0.375	0.5–50	≤7.8%	≤7.6%
Azithromycin	0.005–0.5	0.00375	0.00374–0.650	≤8.3%	≤2.6%
Cefazolin	1–100	1	0.748–130	≤12.2%	≤11.6%
Cefepime	1–100	0.9	0.748–130	≤11.5%	≤11.1%
Cefotaxime	0.5–50	0.375	0.374–65	≤9.2%	≤4.1%
Ceftazidime	1–100	0.75	0.975–101	≤8.2%	≤4.7%
Chloramphenicol	0.5–50	0.375	0.374–65	≤10.9%	≤4.2%
Ciprofloxacin	0.1–10	0.075	0.0748–13	≤12.5%	≤6.1%
Clindamycin	0.1–10	0.075	0.0975–10.1	≤5.8%	≤2.8%
Daptomycin	2–200	1.5	1.76–231	≤7.6%	≤4.3%
Flucloxacillin	1–100	1	0.748–130	≤9.6%	≤5.5%
Linezolid	0.5–50	0.375	0.374–65	≤6.5%	≤4.1%
Meropenem	1–100	0.9	0.975–130	≤12.4%	≤10.6%
Piperacillin	2–200	0.5	1.5–260	≤9.3%	≤3.6%
Sulbactam	1–100	0.75	0.748–130	≤8.6%	≤8.6%
Tazobactam	0.5–50	0.375	0.488–50.7	≤11.2%	≤8.1%

Table 1. Performance characteristics of the analytes evaluated.

**Calibration Range was defined by linear fit where r^2 >0.995 for cefepime, daptomycin, piperacillin and sulbactam; for all other analytes a quadratic fit was used. LLOQ defined by S/N (PtP) >10 with %RSD ≤20% and ≤15%. %RSD at LLOQ determined through analytical sensitivity experiments performed over five occasions (n=50). Total precision and repeatability of QCs performed over 5 occasions in plasma (n=25). Data was collected in two runs.*

Conclusion

The Waters ACQUITY UPLC I-Class/Xevo TQD IVD System has demonstrated the capability to analyze a panel of antibiotics in plasma.

Disclaimer

The analytical performance data presented here is for illustrative purposes only. Waters does not recommend or suggest analysis of the analytes described herein. These data are intended solely to demonstrate the performance capabilities of the system for analytes representative of those commonly analyzed using liquid chromatography and tandem mass spectrometry. Performance in an individual laboratory may differ due to a number of factors, including laboratory methods, materials used, intra-operator technique, and system

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- MassLynx MS Software <https://www.waters.com/513662>
- TargetLynx <https://www.waters.com/513791>

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