SCIEX Triple Quad™ 7500 LC-MS/MS System – QTRAP® Ready

Daniel McMillan, SCIEX EMEAI

SCIEX
The Power of Precision

Enabling new levels of quantification

SCIEX 7500 System

NEW SOFTWARE, NEW ION OPTICS, NEW SOURCE

- SCIEX Triple Quad 7500 LC-MS/MS System – QTRAP® Ready enables new levels of quantification across a large suite of sample types and workflows
- SCIEX OS Software is the modern mass spectrometry software platform that transforms your samples into meaningful analytical answers

RUO-MKT-11-11650-A

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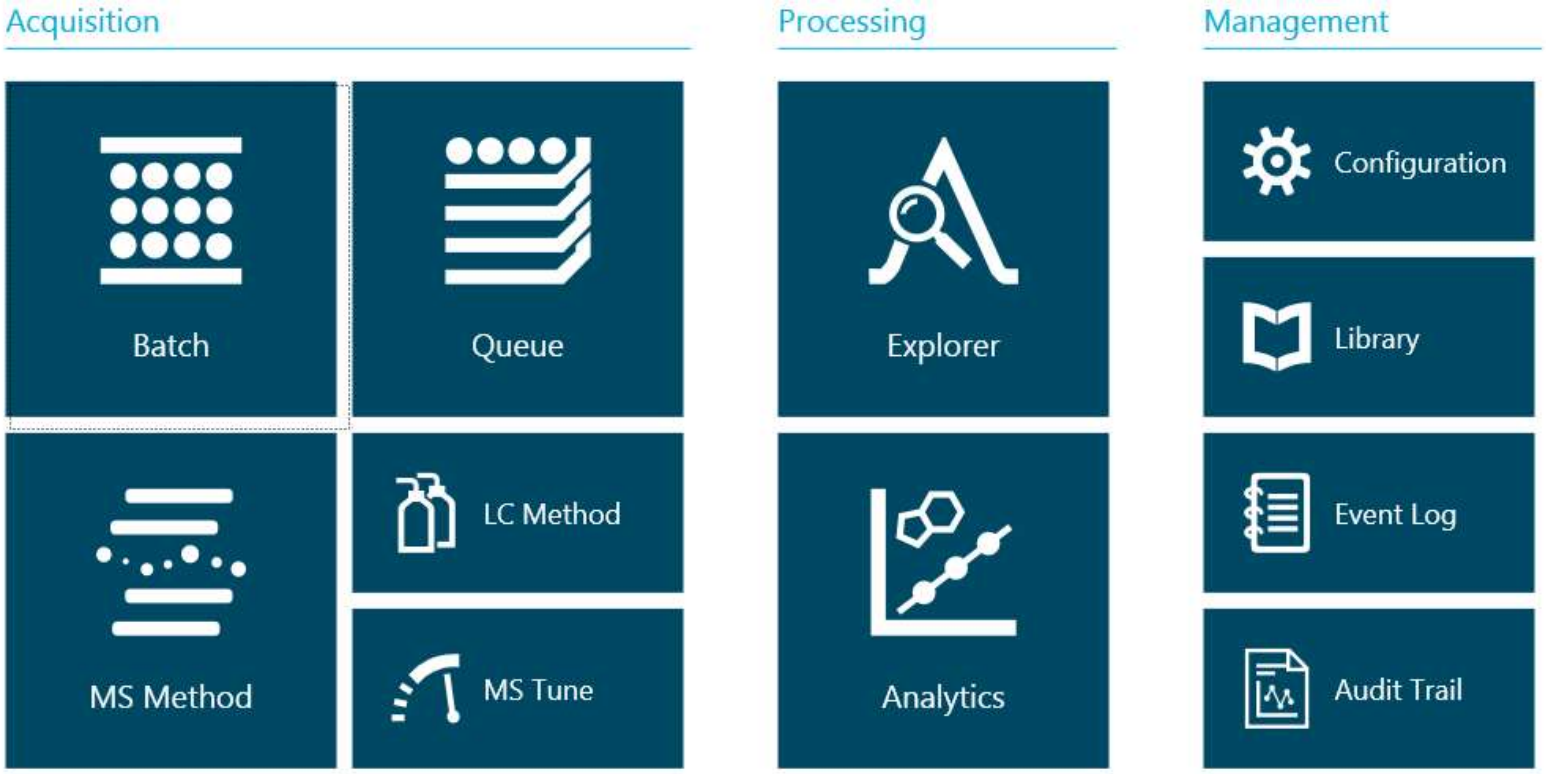
SCIEX OS

SCIEX OS Software

ALL IN ONE PLACE



- ✓ ONE PLATFORM FOR ACQUISITION, PROCESSING AND DATA MANAGEMENT
- ✓ EASY TO LEARN - SIMPLE USER INTERFACE, MODULAR DESIGN TILES
- ✓ CUSTOMIZABLE FOR CUSTOMER WORKFLOW

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Technology - OptiFlow® Pro Ion Source

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The Turbo V™ Ion Source evolution

SCIEX 7500 System

FOR ROBUSTNESS AND RUGGEDNESS

Turbo V Ion Source

Ion Drive™ Turbo V Ion Source

OptiFlow® Ion Source

OptiFlow® Pro Ion Source

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OptiFlow® Pro Ion Source with E Lens™ Technology

SCIEX 7500 System

DESIGNED FOR MODULARITY

ESI

Microflow

APCI

- Maximum performance from 1 µL/min to 3 mL/min without adjustment with drop in probes and electrodes
- A versatile ion source with wide compound coverage with interchangeable ESI and APCI towers
- E Lens Technology for both micro and analytical flow for enhanced sensitivity compared to ESI alone
- Reduced user-to-user variation
- *Designed with extensibility in mind*

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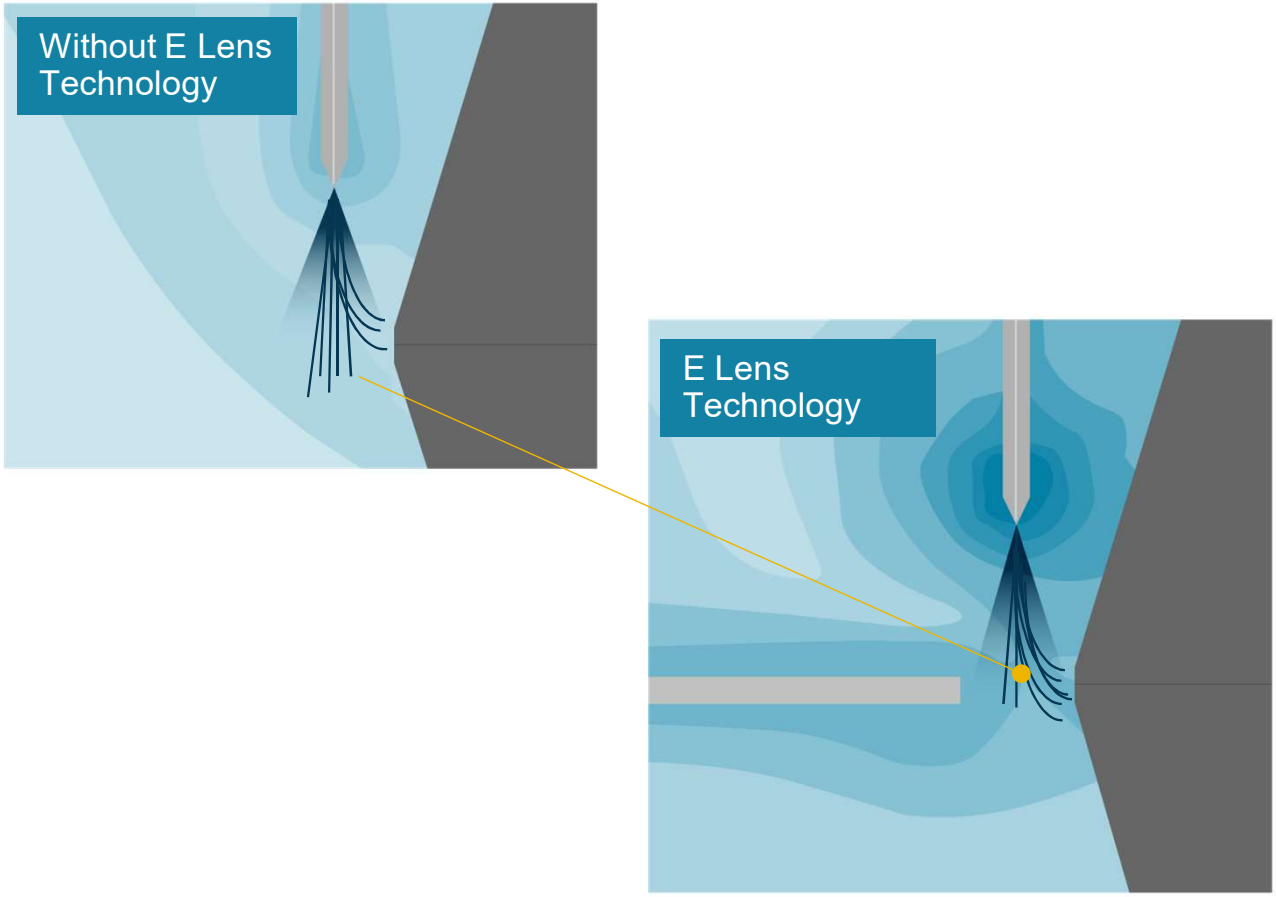
E Lens™ Technology for greater sensitivity

SCIEX 7500 System



- In ESI the E Lens Technology drives ions towards the orifice
- The E Lens Technology creates a stronger field that the droplets must traverse leading to more efficient break-up and release of ions from the droplet
- Gains in performance are up to 2-fold with the largest gains at microflow

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Technology – D Jet™ Ion Guide

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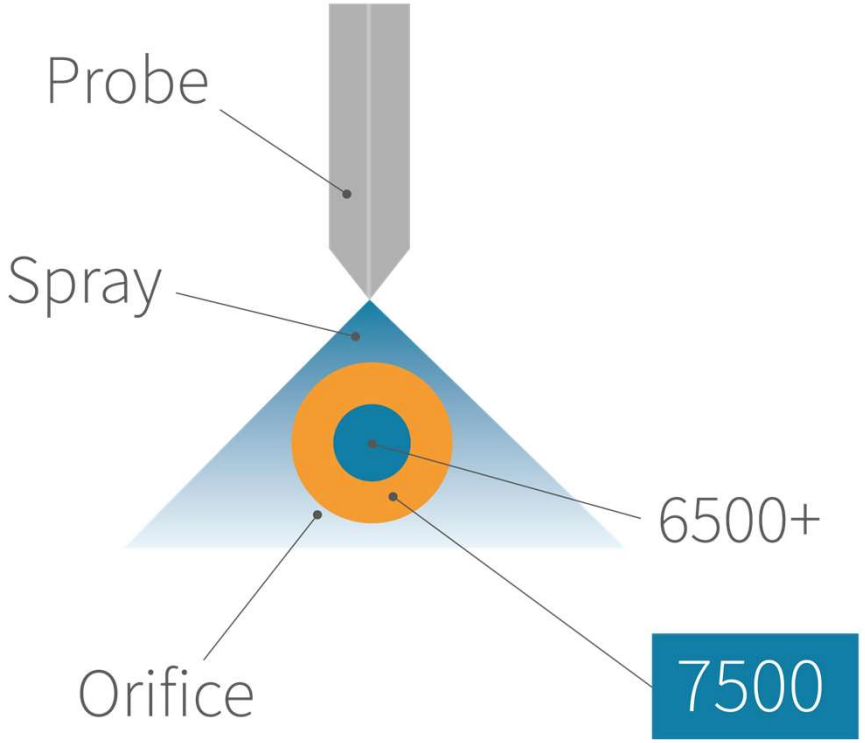
Enabling greater sensitivity

SCIEX 7500 System

- Enabling greater sensitivity can be achieved through gains in the generation of ions, capturing and transmitting ions and detecting ions
- SCIEX QTRAP® 6500+ System with IonDrive™ Technology delivered performance improvements in these key areas
- SCIEX 7500 System makes another leap forward in the capture and transmission of ions
- Sampling area of the 7500 orifice is 4.3x larger than the 6500+ orifice



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SCIEX leadership in sensitivity

SCIEX 7500 System

EVOLUTION OF THE QJET® ION GUIDE

API 5000 System

Sensitivity Gain: 5x-10x over API 4000™ LC-MS/MS System

QTRAP® 5500 System

QTRAP 6500+ System
IonDrive™ Technology

Sensitivity Gain: 6x over QTRAP 5500 System

SCIEX 7500 System

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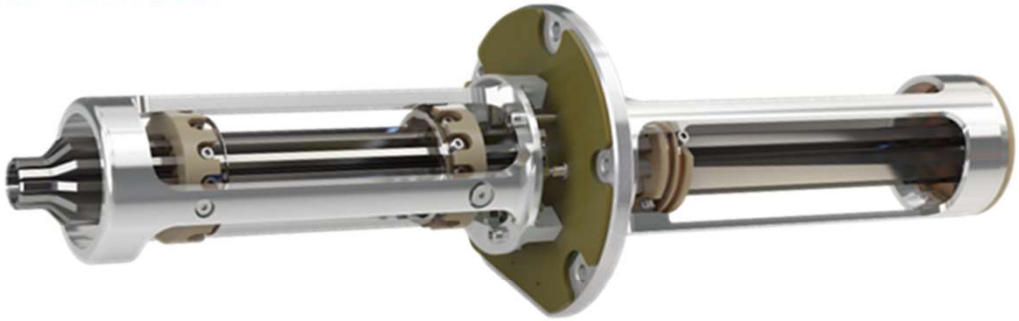
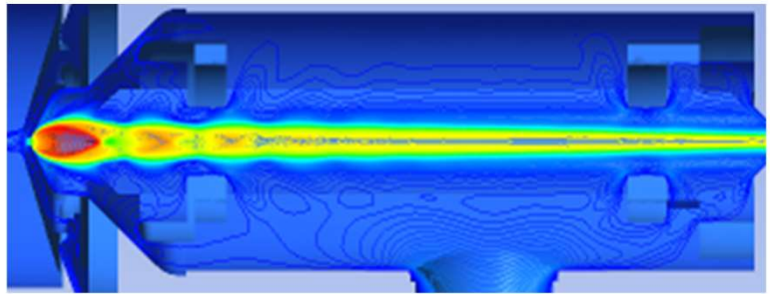
D Jet™ Ion Guide for greater sensitivity

SCIEX 7500 System

THE D JET ION GUIDE IS A DUAL STAGE RF ION GUIDE

- The D Jet Ion Guide efficiently captures and transmits the ions in the high gas flow behind the orifice plate
- The tapered dodecapole geometry of the D Jet Ion guide focuses the ions into the second stage QJet® Ion Guide





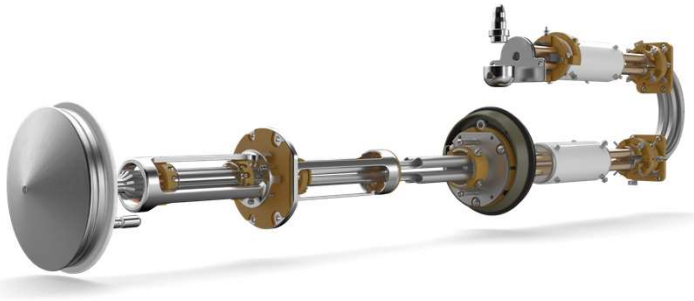
SCIEX The Power of Precision

Built on a legacy of performance

SCIEX 7500 System

SCIEX TRIPLE QUAD™ 7500 LC-MS/MS SYSTEM FEATURES:

- Same rodsets as SCIEX QTRAP® 6500+ System, dual frequency RF drive with triple quadrupole mass range 5 – 2000 Da
- High Energy Detector system for fast polarity switching @ 5 msec and linear dynamic range up to 6 orders from LLOQ
- Curved LINAC® Collision Cell for high speed analysis with no cross-talk
- Simplification: commonality with SCIEX platforms means no re-tuning of compound parameters CE and CXP and no DP tuning required
- QTRAP® Ready



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QTRAP® system technology

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QTRAP® Ready systems

SCIEX 7500 System

FUTURE PROOF YOUR LAB

- Allows users to future proof their lab's capabilities by providing an easy upgrade path to add linear ion trap scan features
- Uses LINAC® electrodes on Q3 to enhance trap performance in LIT mode - in QQQ mode these electrodes are at same potential as the collar voltage and are therefore "invisible to the ions"

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Hybrid triple quadrupole linear ion trap technology

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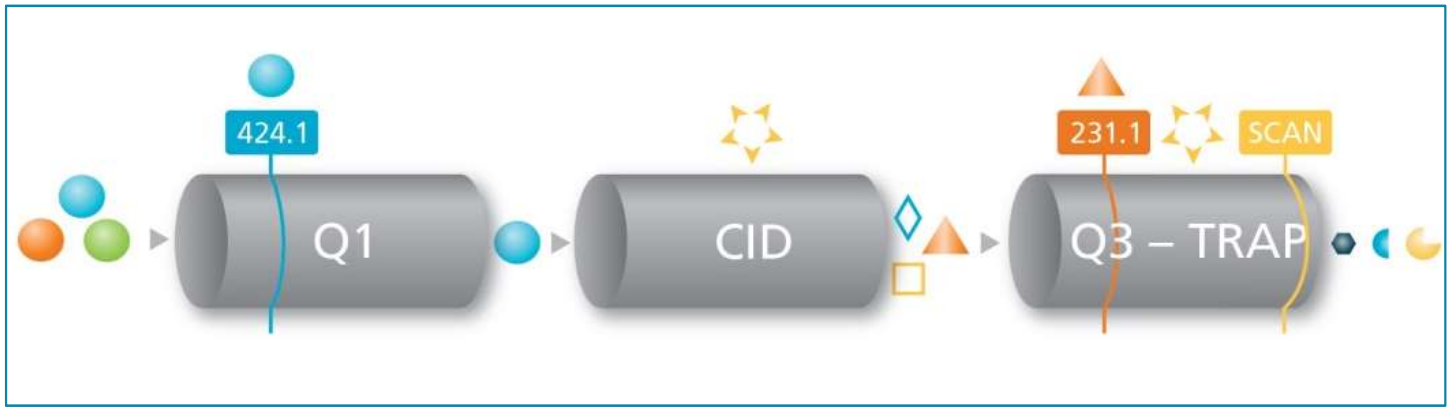
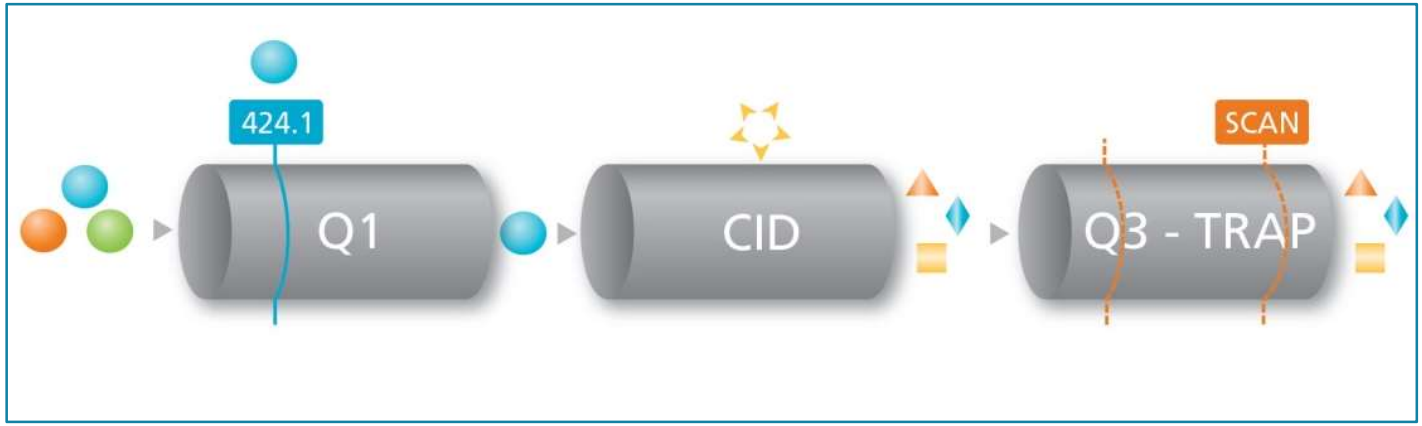
UNIQUE ON THE QTRAP® SYSTEMS

MRM³ Scan





EPI Scan

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Performance

ANALYTICAL FLOW

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Robustness – tea matrix

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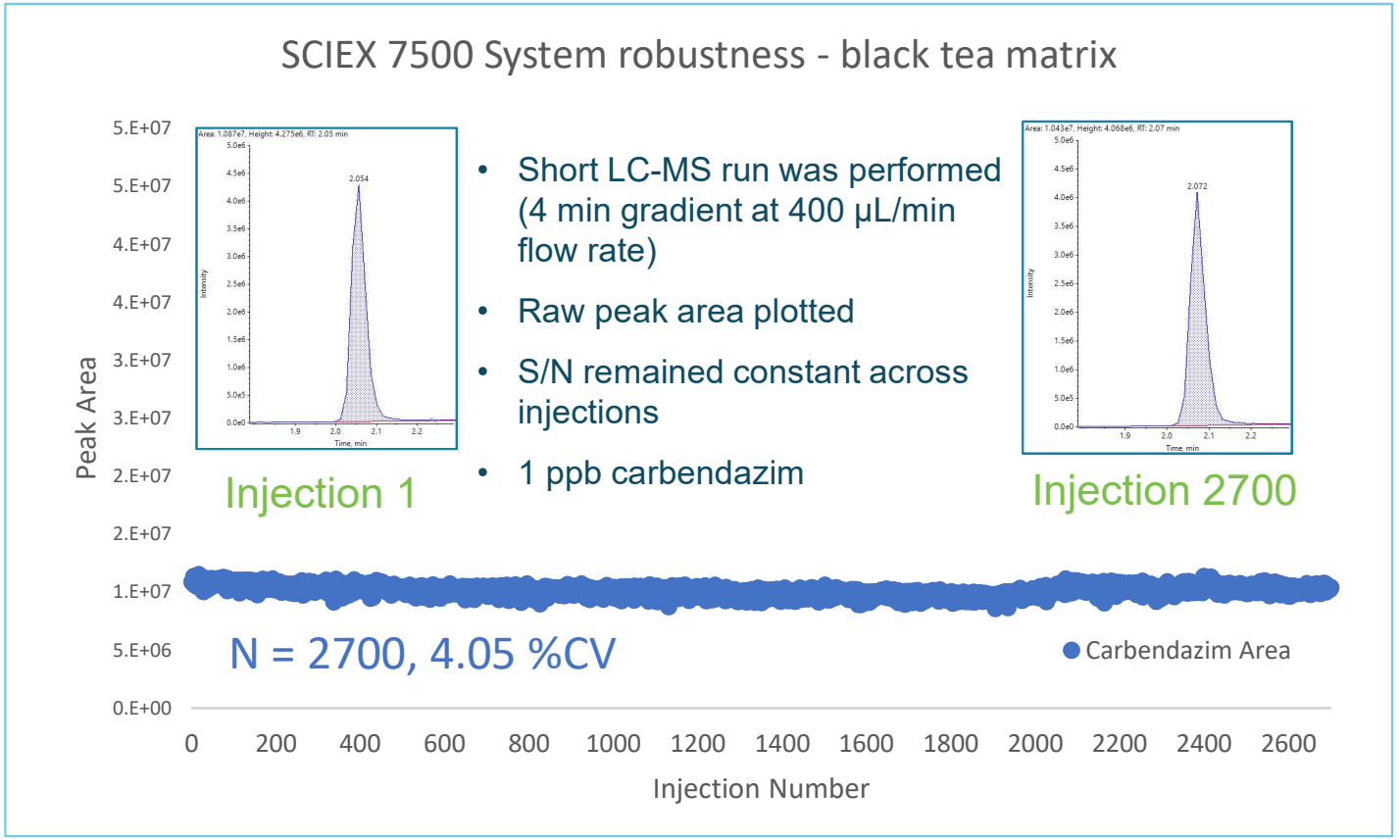

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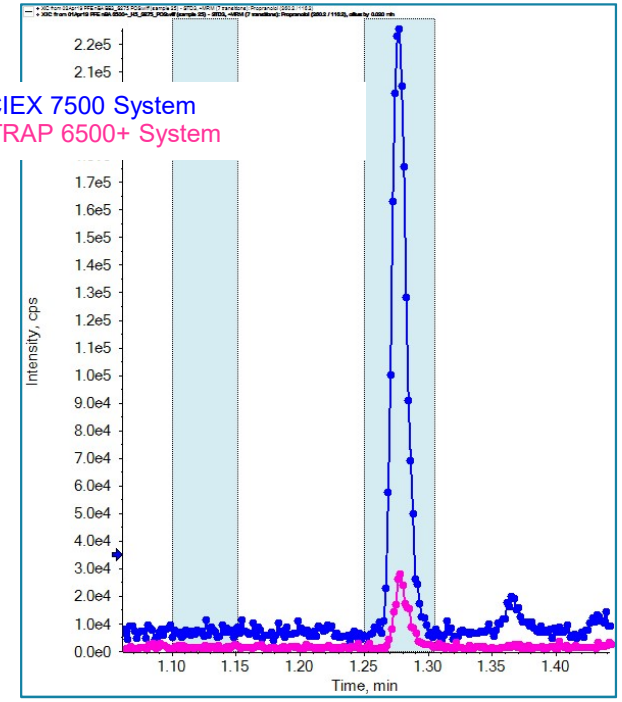
SCIEX The Power of Precision

GO BEYOND with ultimate sensitivity

SCIEX 7500 System

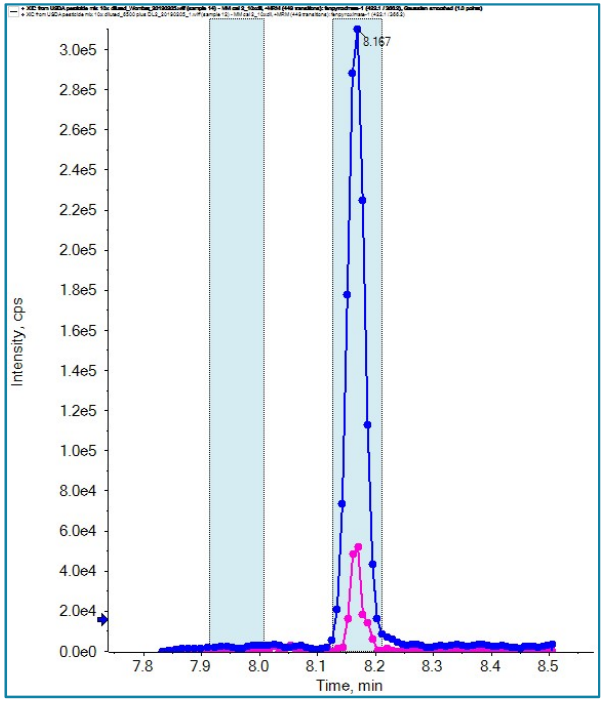
SENSITIVITY GAINS IN MATRIX SAMPLES >300 µL/MIN

Propranolol, 1 pg/mL, Rat Plasma



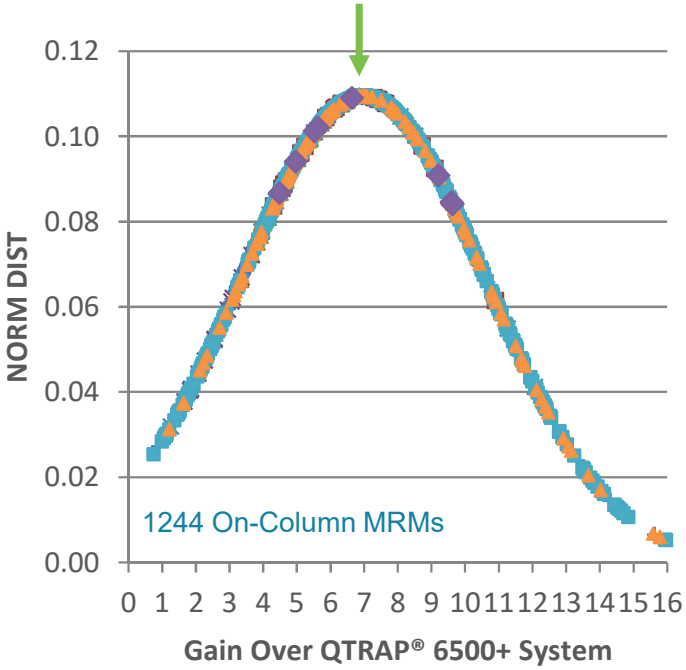
Area Gain - 9.1x
S/N Gain – 3.0x (RMS)

Fenpyroximate, Catfish



Area Gain – 8.1x
S/N Gain – 2.9x (RMS)

Average Peak Area Gain = 7.0x



1. Pesticides POS and NEG
2. Pharma small molecule POS and NEG
3. Vet drugs POS and NEG
4. Peptides

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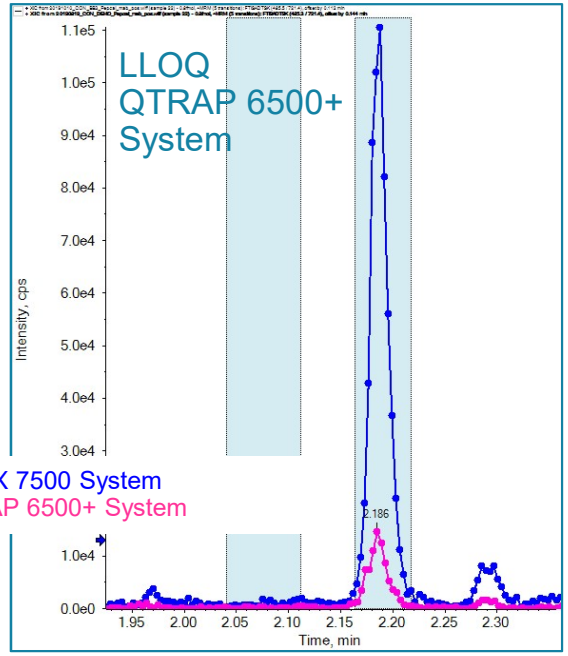
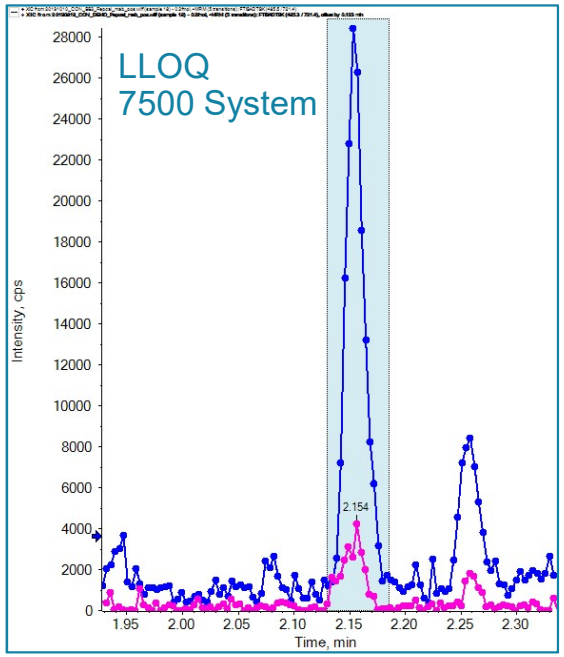
PEPTIDE EXAMPLE FROM MATRIX, >300 µL/MIN

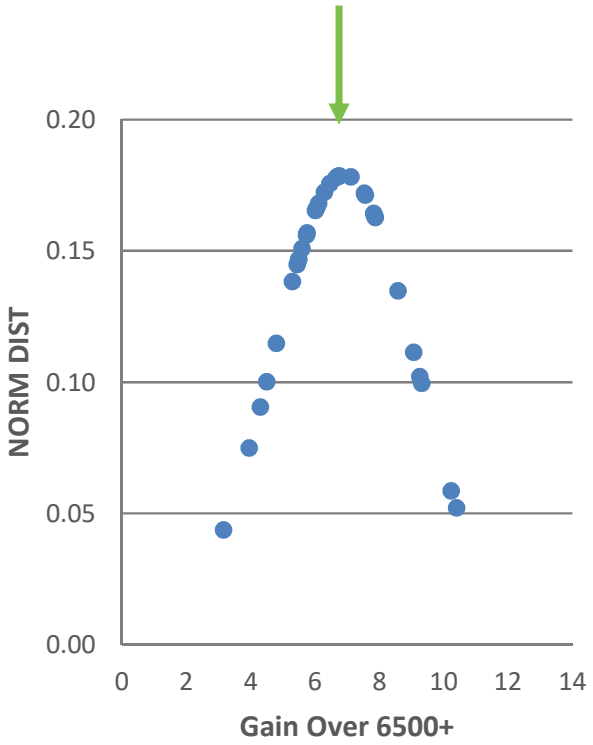
FTISADTSK, 0.8 fmol, Rat Plasma Digest



FTISADTSK, 0.2 fmol Rat Plasma Digest



Average Peptide Peak Area Gain = 6.9x



System	Concentration (fmol)	S/N (PtP) (N=3)
SCIEX Triple Quad 7500 System	0.195	17.2
QTRAP 6500+ System	0.781	19.9

Area Gain -7.2x

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Ultimate sensitivity analysis at microflow

SCIEX 7500 System

PEPTIDE EXAMPLES AT 3 µL/MIN AND 8 µL/MIN

VGNEIQYVAL, 0.8 fmol,
Rat Plasma Digest

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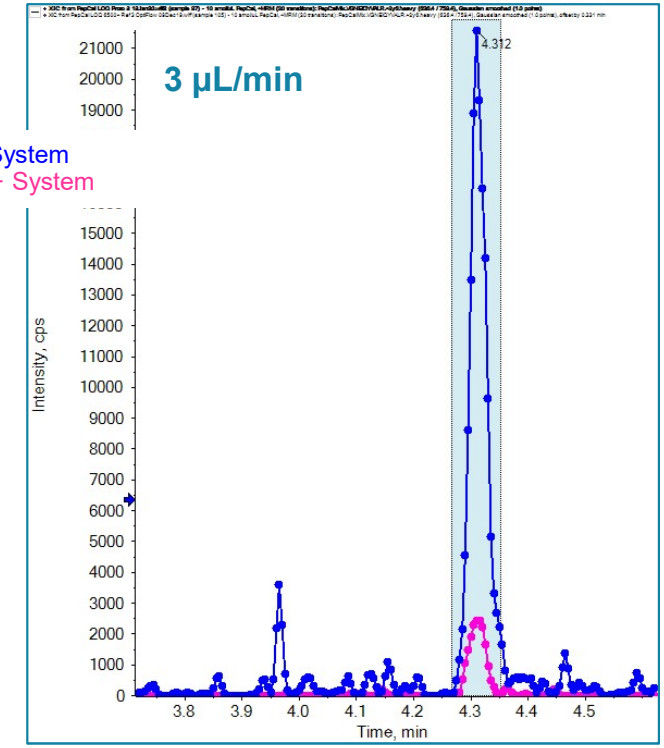
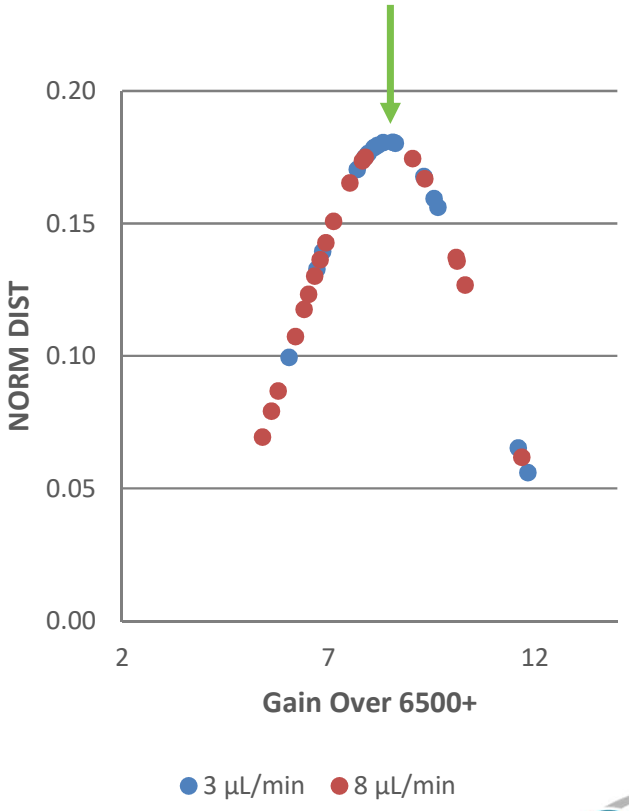
QTRAP 6500+ System



Area Gain -8.1x

Average Peptide Peak Area Gain = 8.5x



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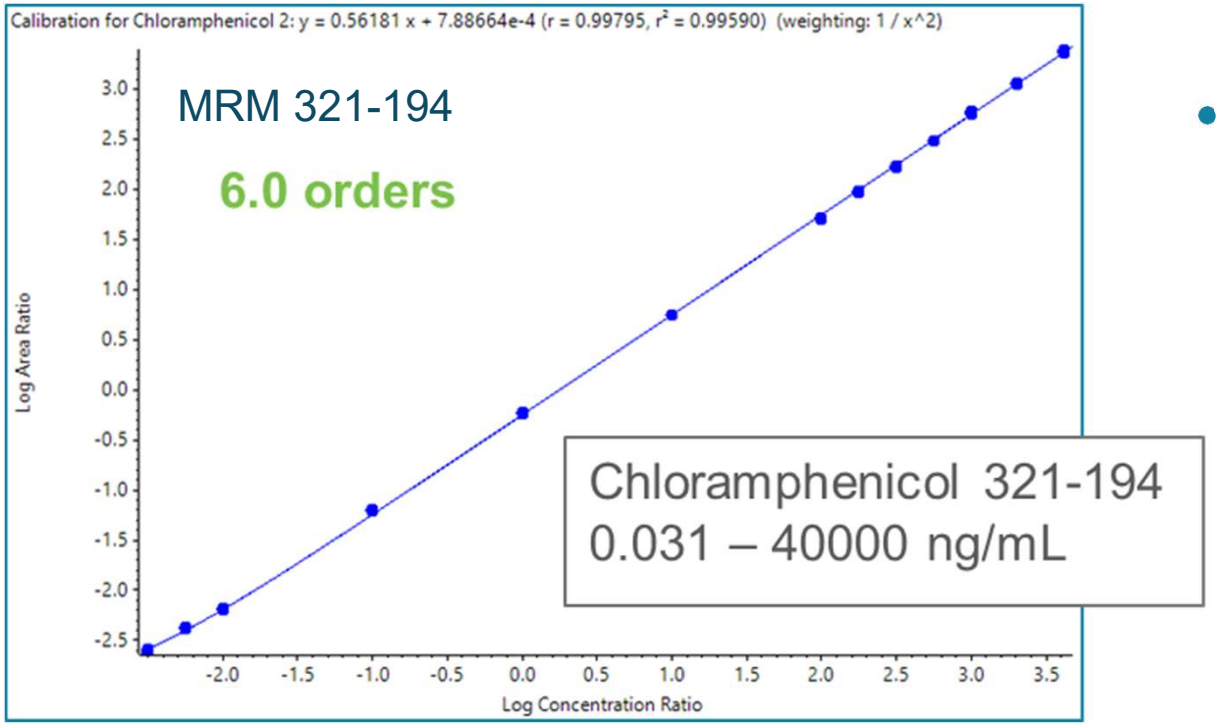
System dynamic range

SCIEX 7500 System



- Up to 6 orders of linear dynamic range from LLOQ

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Enabling new levels of quantification

SCIEX 7500 System

ULTIMATE SENSITIVITY ANALYSIS

- The OptiFlow® Pro Ion Source incorporates the reliability and efficiency of the legendary Turbo V™ Ion Source.
  - New modular design allows fast change between high and low flow, and adapts to workflow requirements
- The D Jet™ Ion Guide and integrated E Lens™ Technology combine to deliver ultimate sensitivity analyses
  - Average sensitivity gains 7x
  - Signal to noise gains 2.5 to 3x
- LDR up to 6 orders
- Uncompromised robustness

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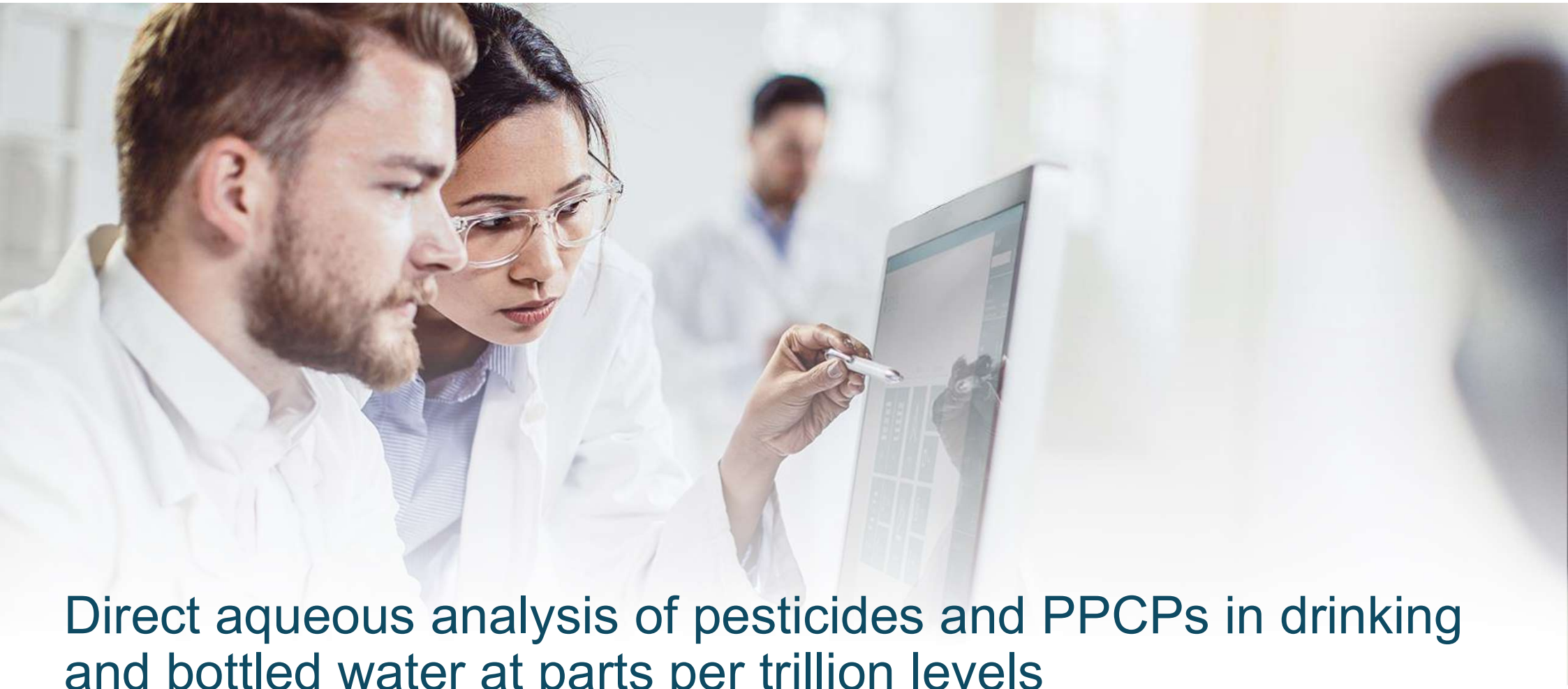

Direct aqueous analysis of pesticides and PPCPs in drinking and bottled water at parts per trillion levels

SCIEX Triple Quad™ 7500 LC-MS/MS system – QTRAP® ready

RUO-MKT-11-12103-A

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Importance of water testing

- Water suppliers and utility companies need to ensure that the final water product they send out for bottling or into supply networks is safe and complies with state and country regulations
- Drinking water analysis is subjected to extremely low and rigid prescribed concentration values (PCV) for determinands
- Water can be a challenging matrix, in particular if it is sourced from a river, lake or reservoir before entering the water treatment process
- Labs must have highly sensitive instrumentation to quantify beyond PCV limits with precision and confidence and also handle all the matrix challenges

Samples

- Pesticides and PPCP in water
- Compounds: positive mode 370, negative mode 61 (46 internal stds)
- The calibration standard concentrations were 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200 and 500 ng/L. A calibration blank was also prepared.
- MilliQ water, tap water (drinking water), Evian, FIJI

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Methods

SCIEX 7500 System

- LC system: ExionLC™ System
- Column: Luna Omega C18 1.6 µm, 100 × 2.1 mm
- Mobile phase:
  - A : Water + 0.1% formic acid + 5mM NH_4 formate
  - B : MeOH + 0.1 % formic acid + 5mM NH_4 formate
- Temperature: 40 ºC
- Injection volume: 500 µL
- MS: fast pos/neg switching with Scheduled MRM™ Algorithm

Total Time (min)	Flow Rate (µL/min)	A (%)	B(%)
0.00	500	99	1
0.50	500	99	1
16.00	500	1	99
21.00	500	1	99
21.10	500	99	1
25.00	500	99	1

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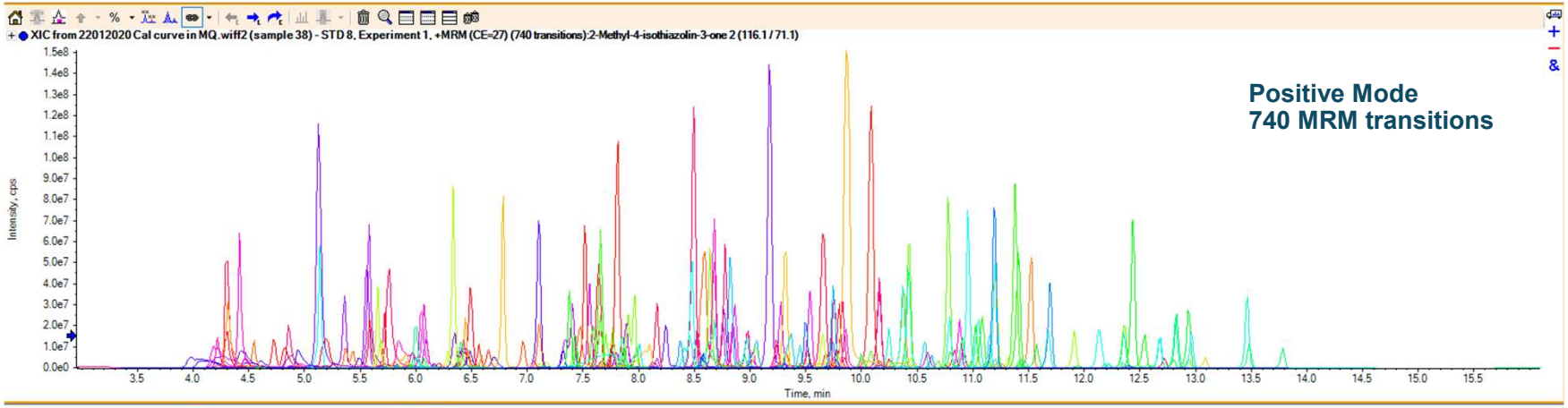
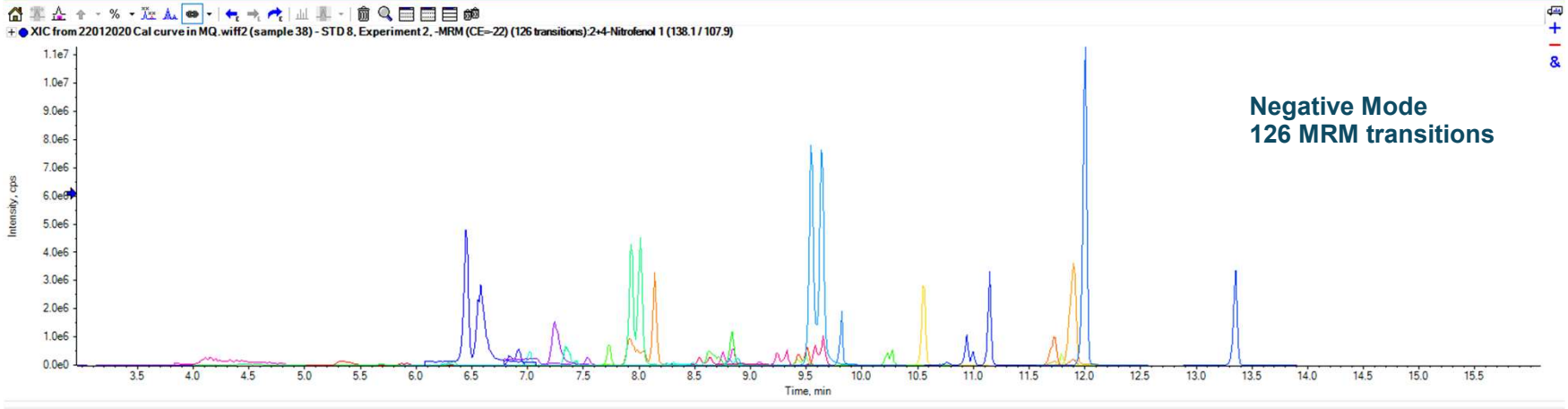
XIC of positive and negative ionization

SCIEX 7500 System

ALL QUANTIFIER IONS IN MILLI-Q WATER





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XIC data points - positive

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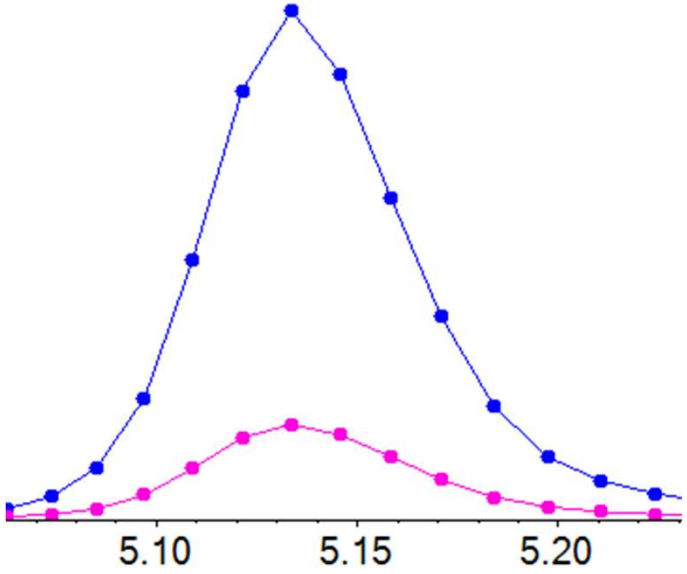
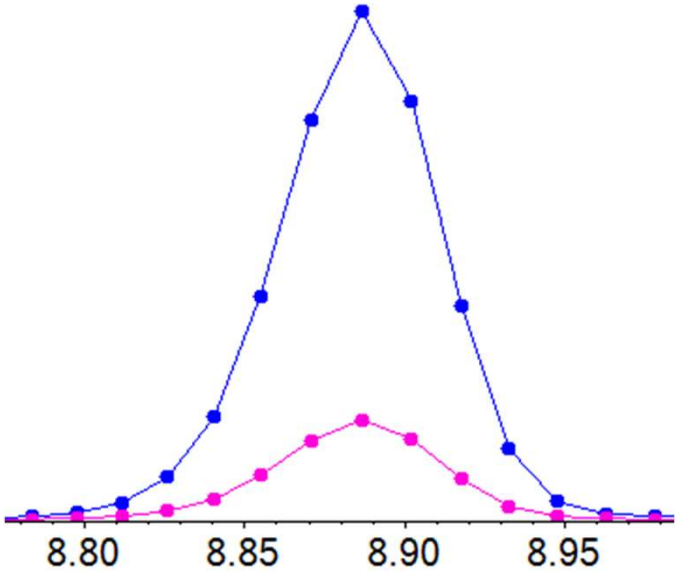
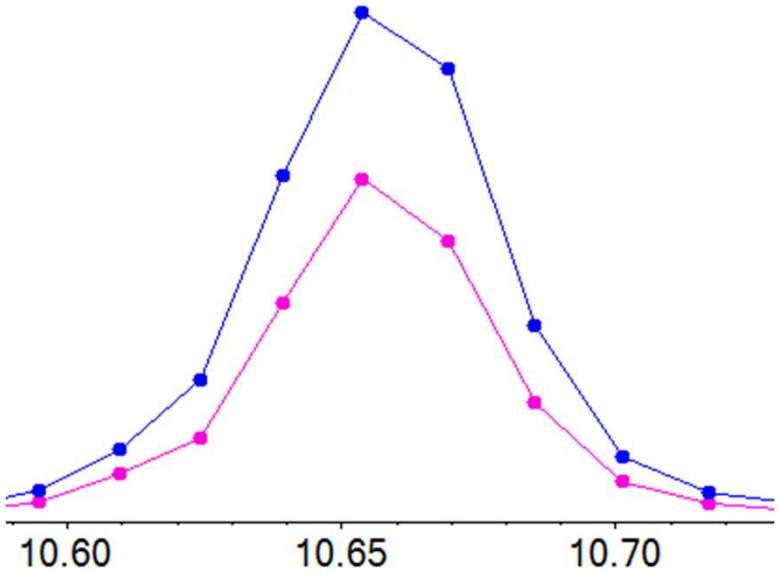


Carbendazim



Atrazine



Cyprodinil

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XIC data points - negative

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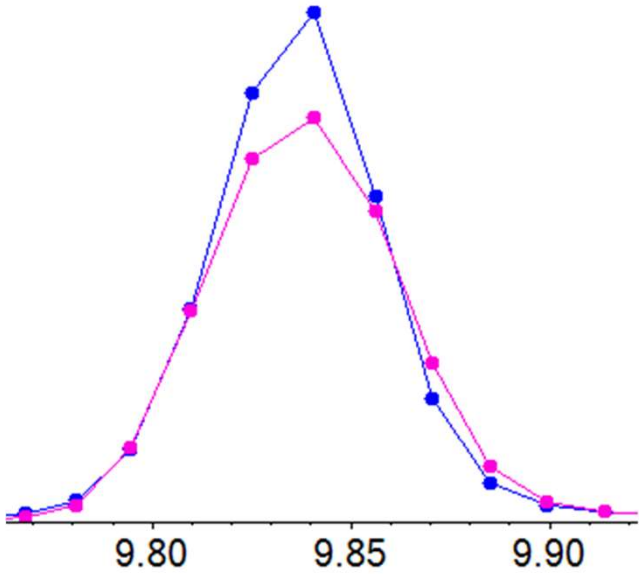
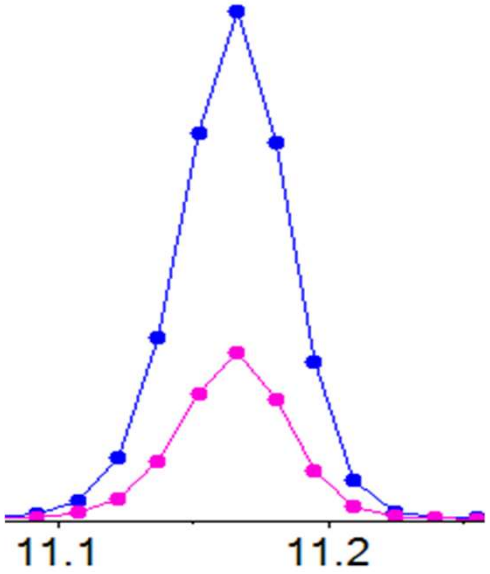
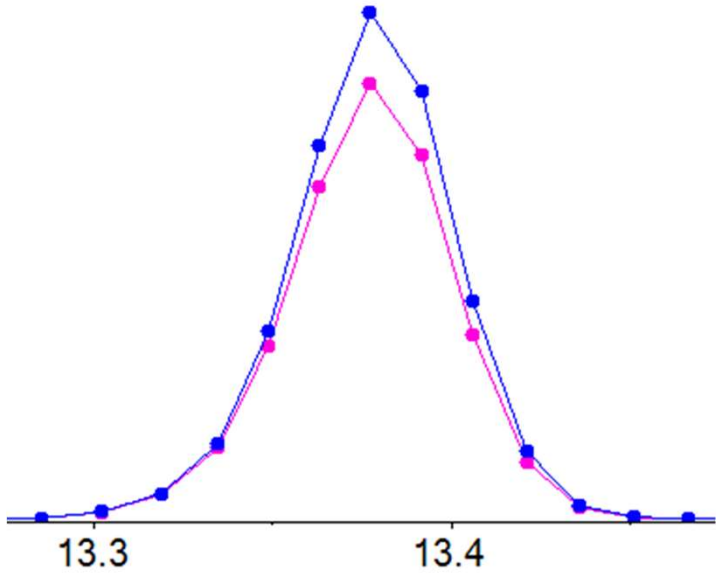


PFOA



PFOS



Fluazinam

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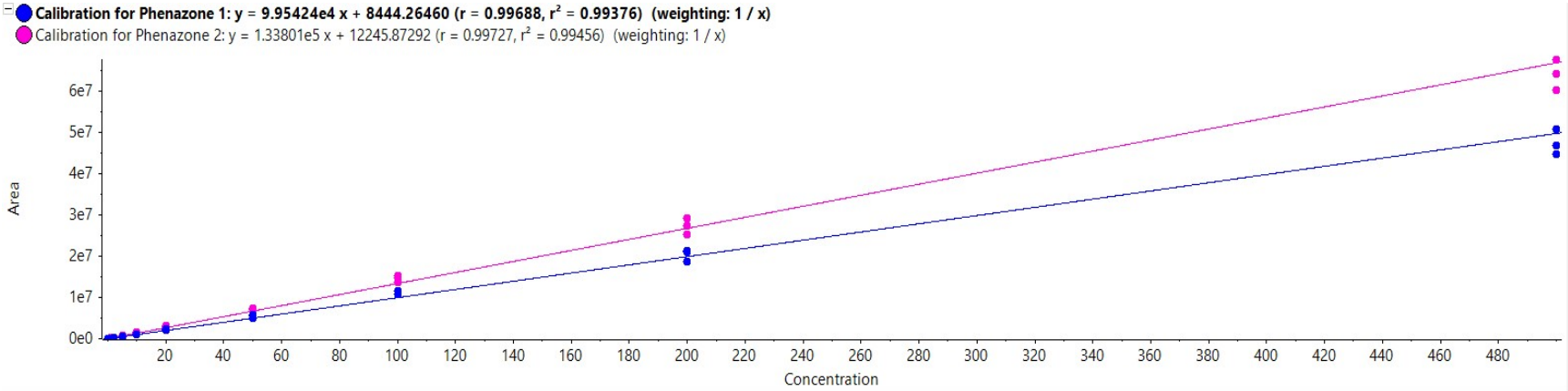
Phenazone (+ve)

SCIEX 7500 System



Index	Sample Name	Sample Type	Component Name	Component Type	Component Group Name	Actual Concentration	Area	Retention Time	Signal / Noise	Used	Calculated Concentration	Ion Ratio	Ion Ratio Confidence
923	STD 16	Standard	Phenazone 1	Quantifiers	Phenazone	0.10	21275.8	6.16	11.3	☑	4.565e-2	0.89	✔
17...	STD 15	Standard	Phenazone 1	Quantifiers	Phenazone	0.20	37733.9	6.15	28.2	☑	1.687e-1	0.67	✔
26...	STD 14	Standard	Phenazone 1	Quantifiers	Phenazone	0.50	67716.0	6.17	27.3	☑	3.928e-1	0.88	✔
35...	STD 13	Standard	Phenazone 1	Quantifiers	Phenazone	1.00	154528.1	6.17	44.9	☑	1.042e0	0.77	✔
43...	STD 12	Standard	Phenazone 1	Quantifiers	Phenazone	2.00	335476.6	6.17	118.5	☑	2.395e0	0.67	✔
52...	STD 11	Standard	Phenazone 1	Quantifiers	Phenazone	5.00	725149.5	6.17	438.0	☑	5.308e0	0.73	✔
61...	STD 10	Standard	Phenazone 1	Quantifiers	Phenazone	10.00	1573538.9	6.17	295.3	☑	1.165e1	0.71	✔
69...	STD9	Standard	Phenazone 1	Quantifiers	Phenazone	20.00	2957920.5	6.18	627.1	☑	2.200e1	0.70	✔
78...	STD 8	Standard	Phenazone 1	Quantifiers	Phenazone	50.00	7441689.9	6.15	1533.3	☑	5.552e1	0.76	✔
87...	STD 7	Standard	Phenazone 1	Quantifiers	Phenazone	100.00	14790475.2	6.18	2688.3	☑	1.105e2	0.72	✔
95...	STD 6	Standard	Phenazone 1	Quantifiers	Phenazone	200.00	27399055.8	6.17	5610.4	☑	2.047e2	0.77	✔
10...	STD 5	Standard	Phenazone 1	Quantifiers	Phenazone	500.00	64296556.3	6.16	10642.9	☑	4.805e2	0.73	✔

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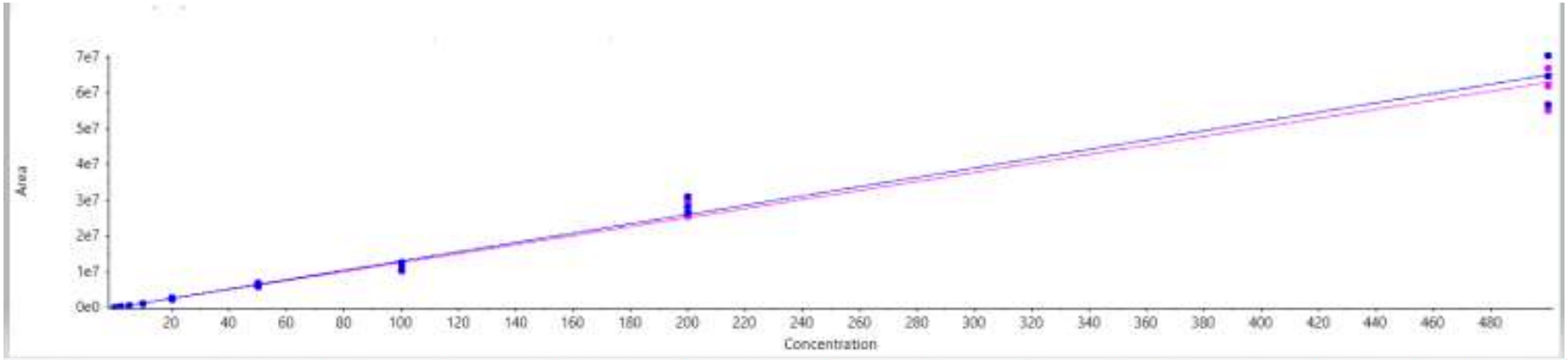
Fluazinam (-ve)

SCIEX 7500 System

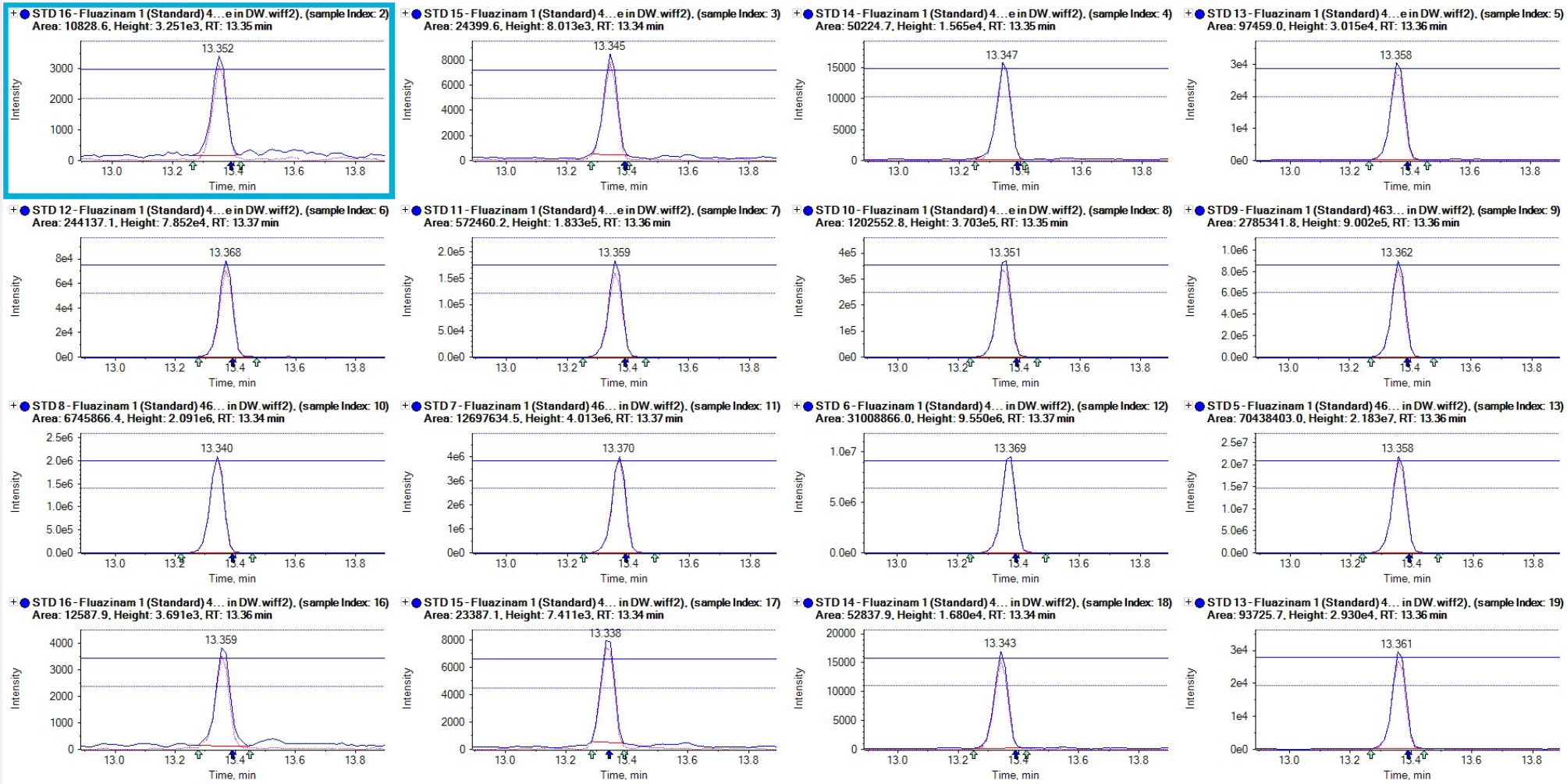


Index	Sample Name	Sample Type	Component Name	Component Type	Component Group Name	Actual Concentration	Area	Retention Time	Signal / Noise	Used	Calculated Concentration	Ion Ratio	Ion Ratio Confidence
17...	STD 16	Standard	Fluazinam 1	Quantifiers	Fluazinam	0.10	10828.6	13.35	60.8	☑	1.587e-1	0.93	✔
25...	STD 15	Standard	Fluazinam 1	Quantifiers	Fluazinam	0.20	24399.6	13.34	98.8	☑	2.630e-1	1.01	✔
34...	STD 14	Standard	Fluazinam 1	Quantifiers	Fluazinam	0.50	50224.7	13.35	406.8	☑	4.615e-1	0.99	✔
43...	STD 13	Standard	Fluazinam 1	Quantifiers	Fluazinam	1.00	97459.0	13.36	1174.9	☑	8.246e-1	0.92	✔
51...	STD 12	Standard	Fluazinam 1	Quantifiers	Fluazinam	2.00	244137.1	13.37	2714.3	☑	1.952e0	0.90	✔
60...	STD 11	Standard	Fluazinam 1	Quantifiers	Fluazinam	5.00	572460.2	13.36	7434.7	☑	4.476e0	0.89	✔
69...	STD 10	Standard	Fluazinam 1	Quantifiers	Fluazinam	10.00	1202552.8	13.35	9328.0	☑	9.320e0	0.91	✔
77...	STD9	Standard	Fluazinam 1	Quantifiers	Fluazinam	20.00	2785341.8	13.36	14319.1	☑	2.149e1	0.94	✔
86...	STD 8	Standard	Fluazinam 1	Quantifiers	Fluazinam	50.00	6745866.4	13.34	23155.2	☑	5.193e1	0.99	✔
95...	STD 7	Standard	Fluazinam 1	Quantifiers	Fluazinam	100.00	12697634.5	13.37	46072.0	☑	9.768e1	0.97	✔
10...	STD 6	Standard	Fluazinam 1	Quantifiers	Fluazinam	200.00	31008866.0	13.37	49666.8	☑	2.384e2	0.98	✔
11...	STD 5	Standard	Fluazinam 1	Quantifiers	Fluazinam	500.00	70438403.0	13.36	145466.6	☑	5.415e2	0.95	✔

SCIEX The Power of Precision

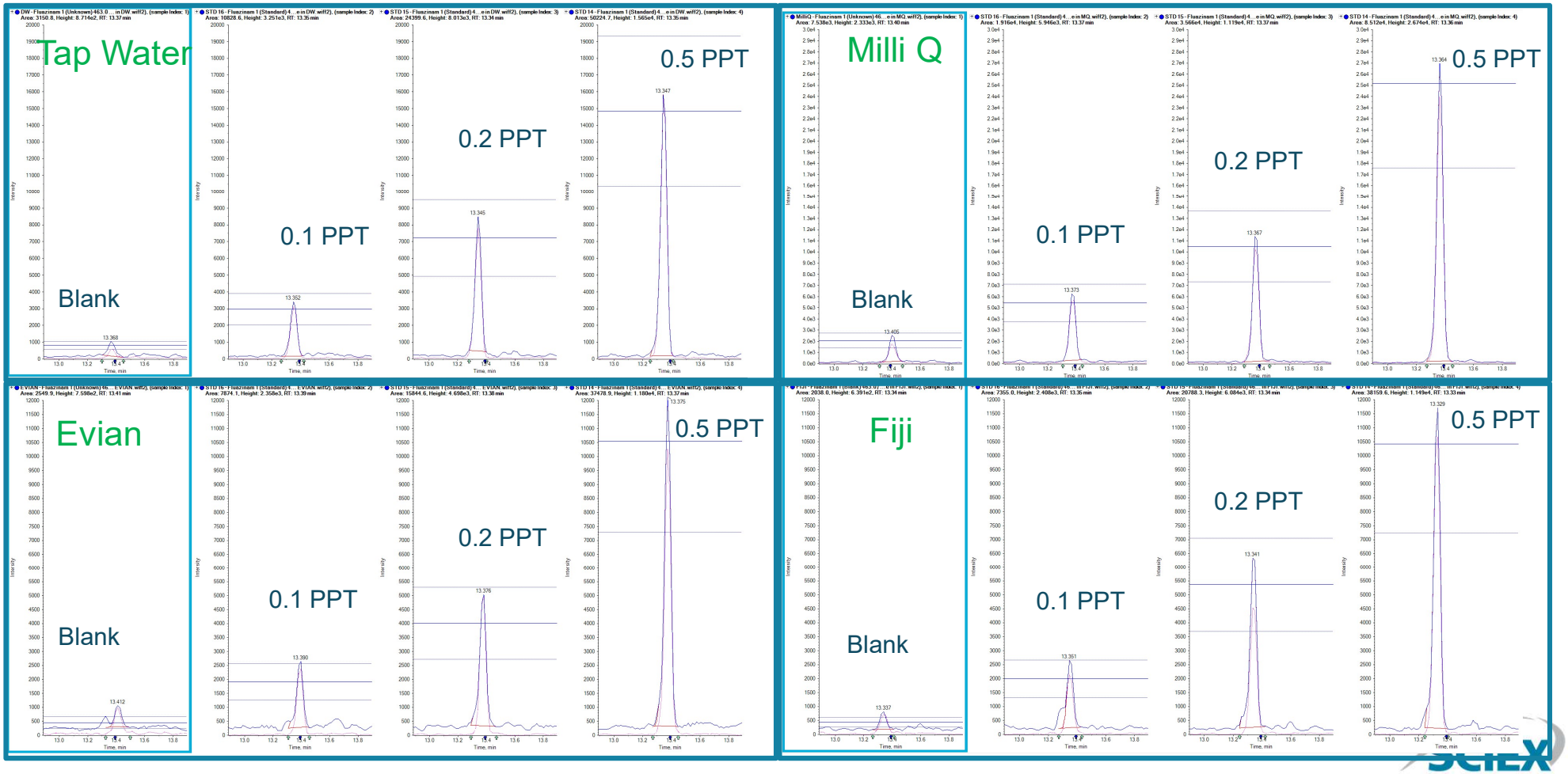
Fluazinam (–ve)

SCIEX 7500 System



Fluazinam (-ve)

SCIEX 7500 System



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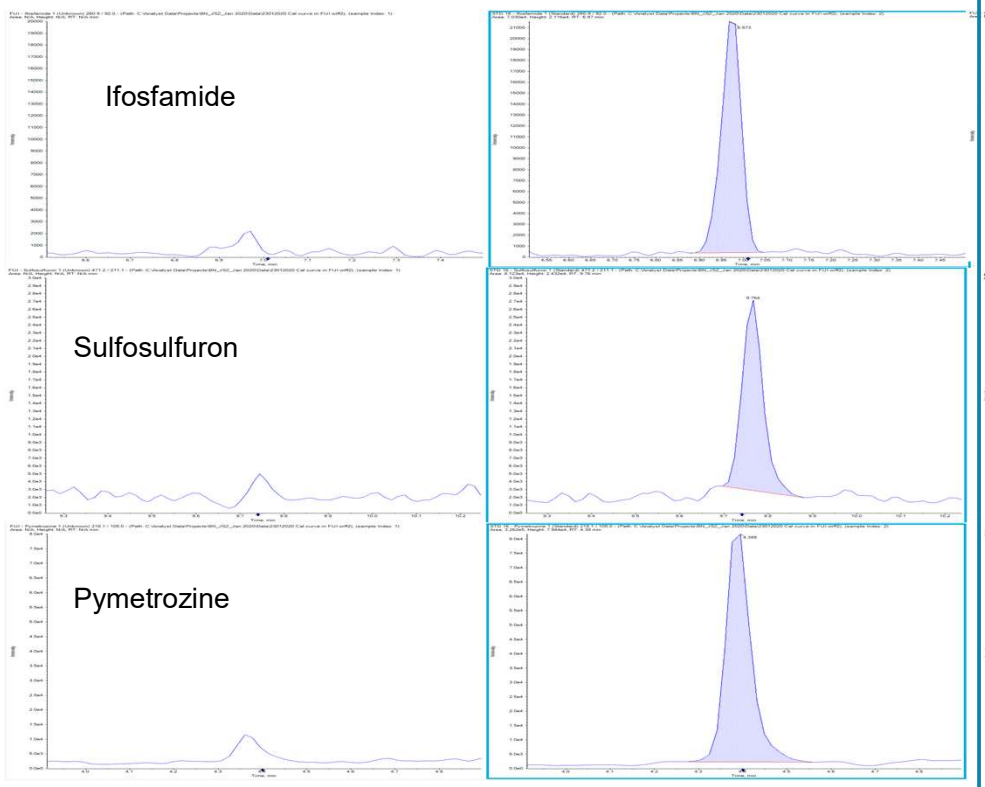
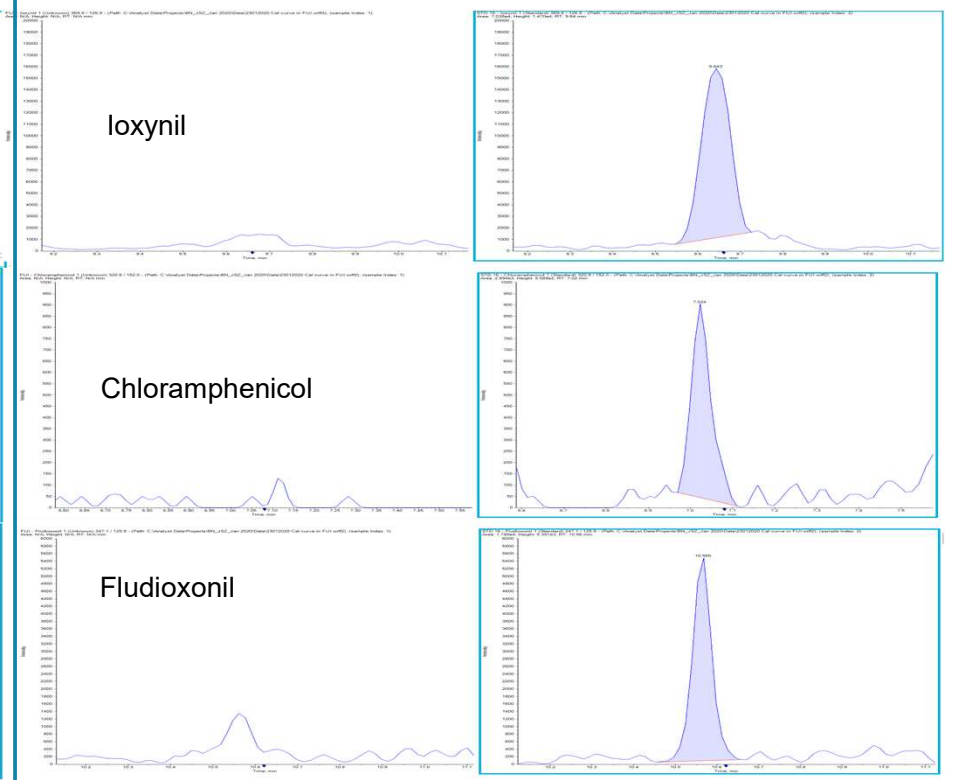
Lower limits of quantification

SCIEX 7500 System



Positive



Negative

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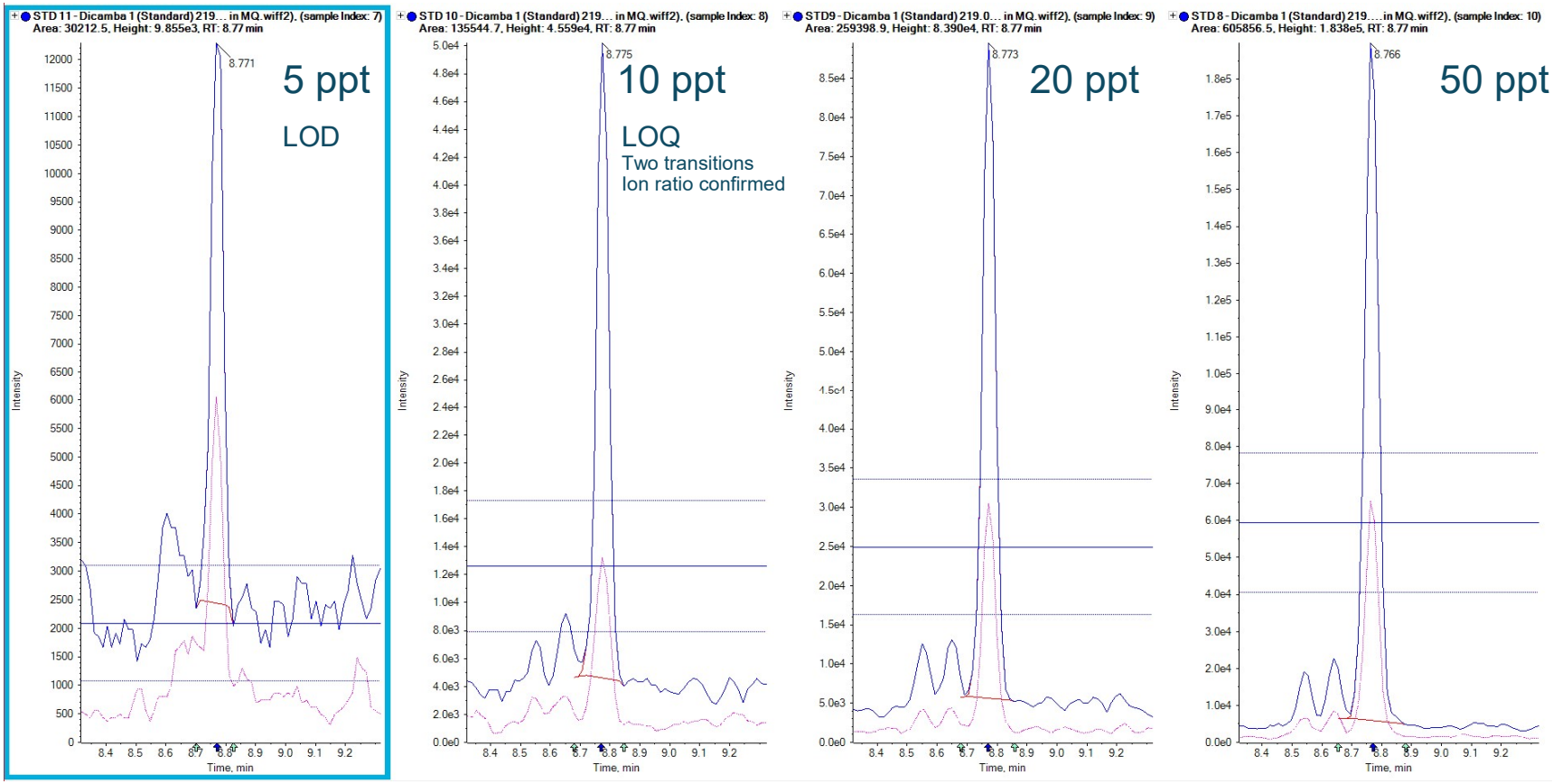
Dicamba

SCIEX 7500 System



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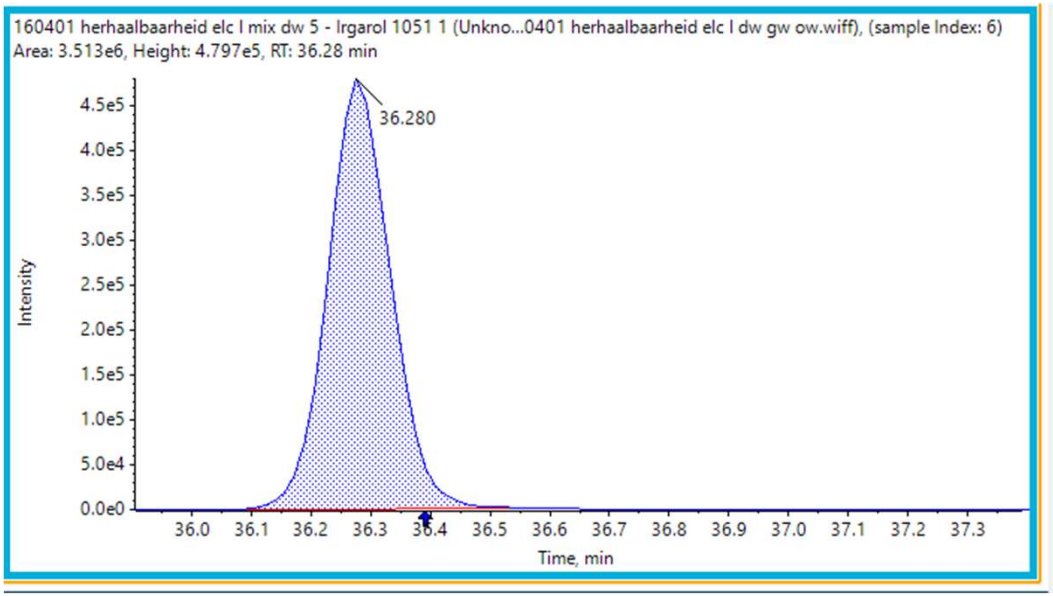
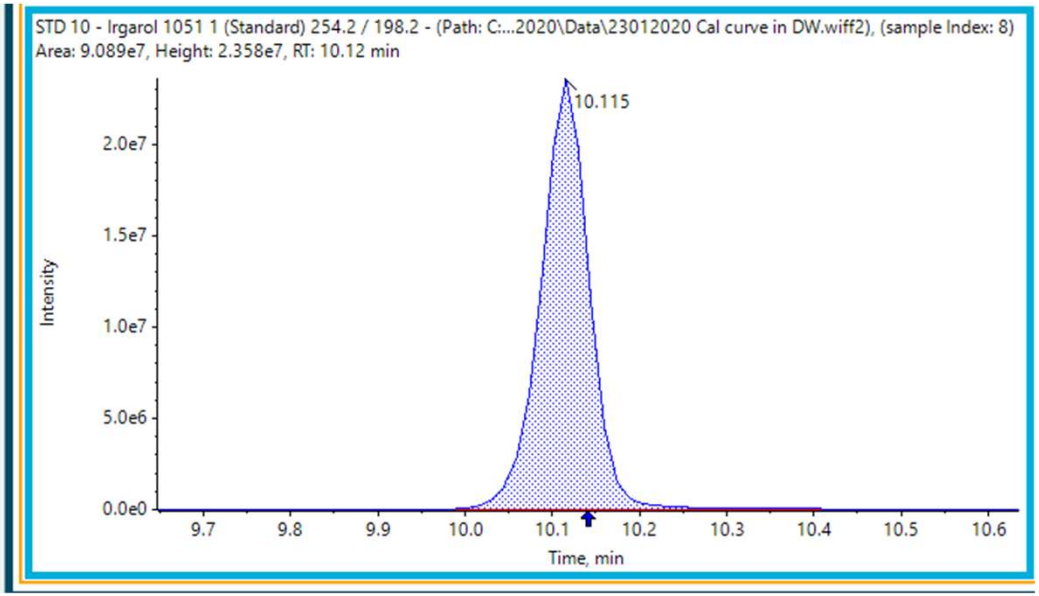
Irgarol 1051(+ve) (tap water)

SCIEX 7500 System

QTRAP® 6500+ System



SCIEX 7500 system



Measured 20 ppt

Calculated LOQ 1 ppt

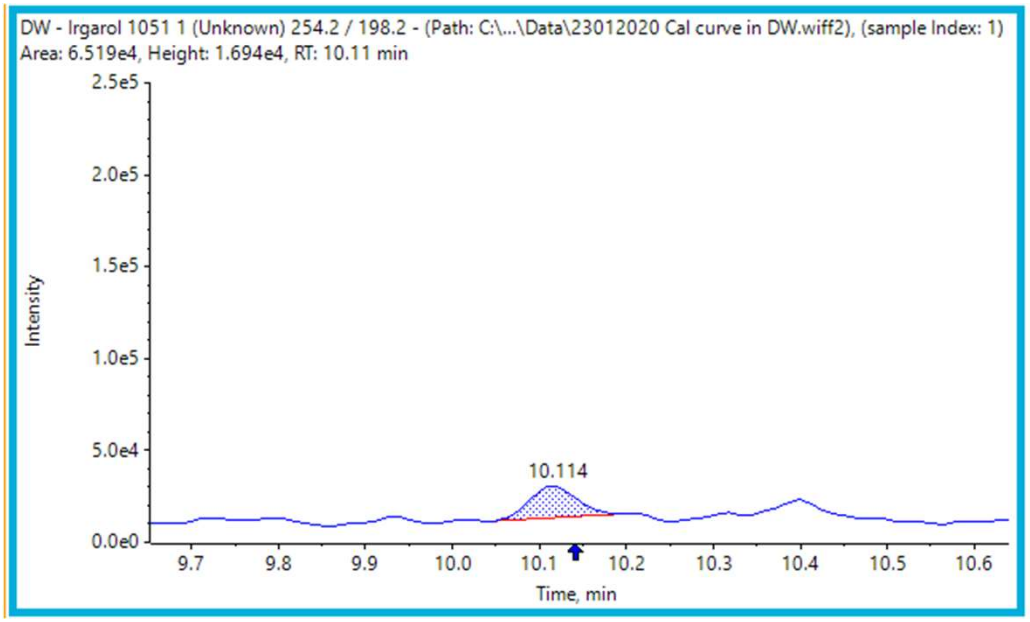
Measured 20 ppt

SCIEX The Power of Precision

Irgarol 1051 (+ve) (tap water)

SCIEX 7500 System

SCIEX 7500 system



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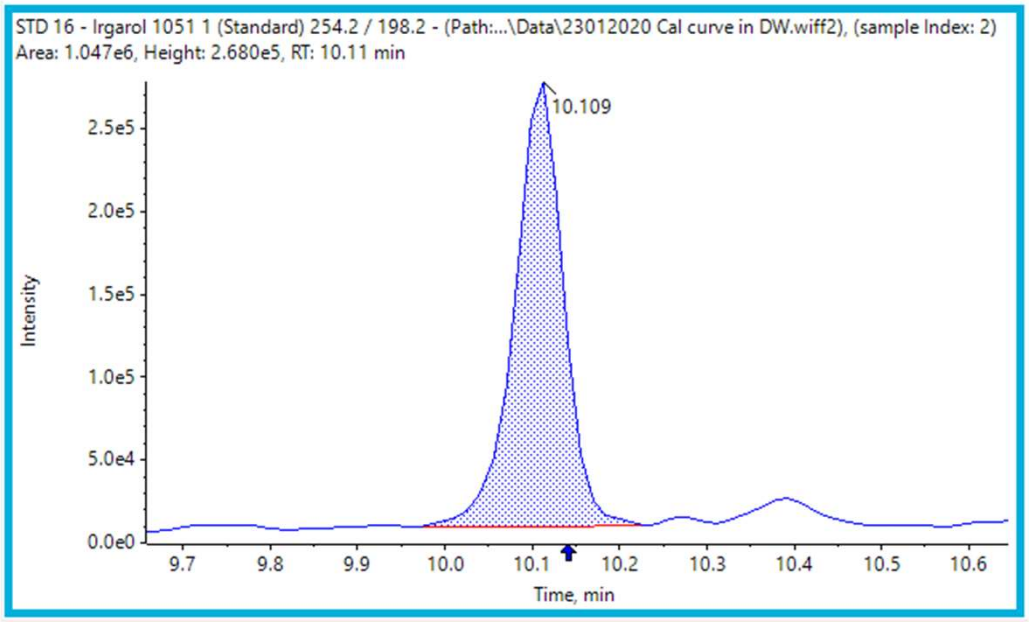
SCIEX 7500 system



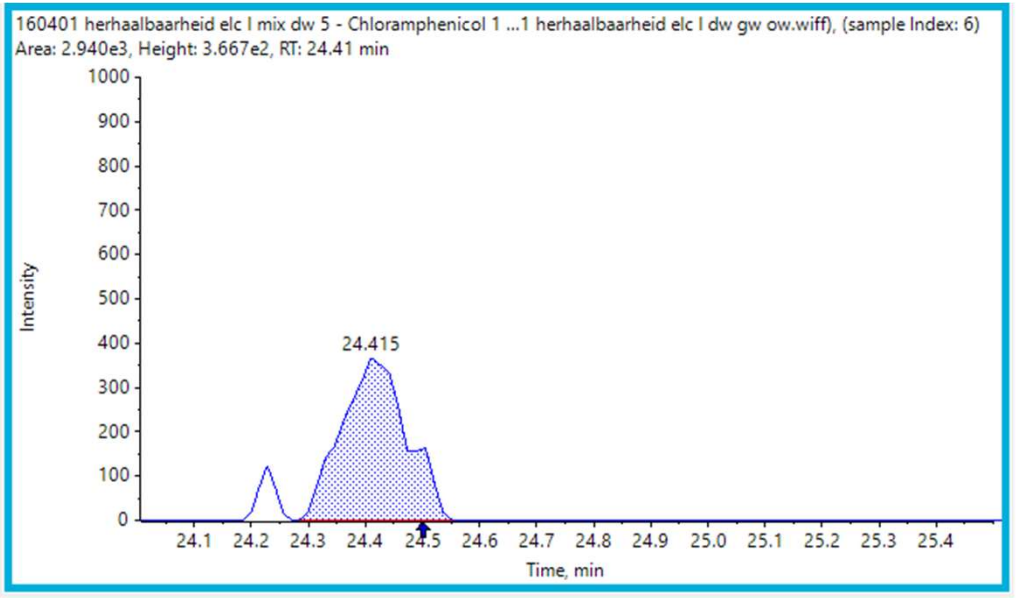
Measured 0.1 ppt

SCIEX The Power of Precision

Chloramphenicol (-ve) (tap water)

SCIEX 7500 System

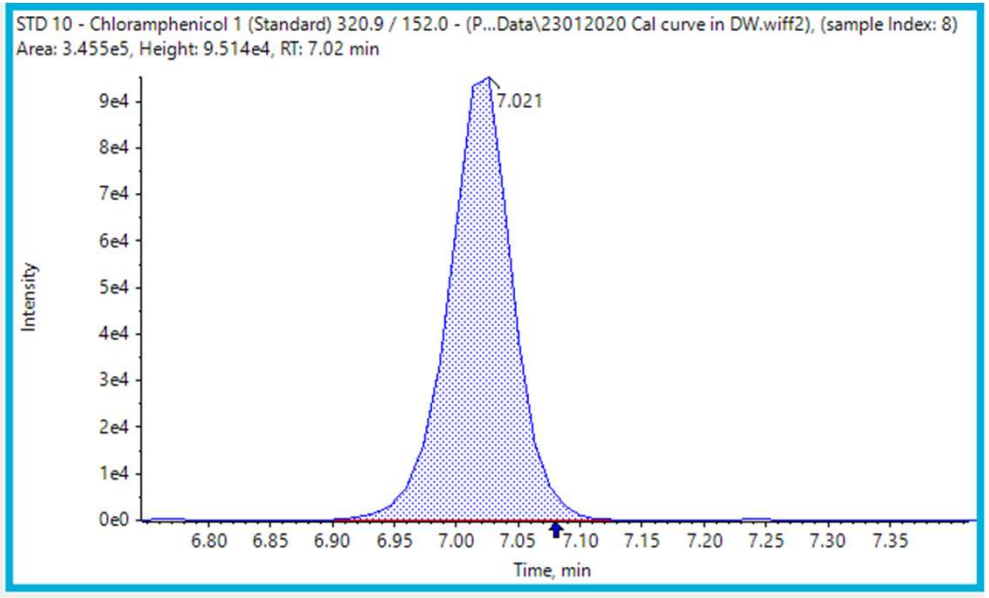
QTRAP® 6500+ System



Measured 10 ppt

Calculated LOQ 2 ppt

SCIEX 7500 system



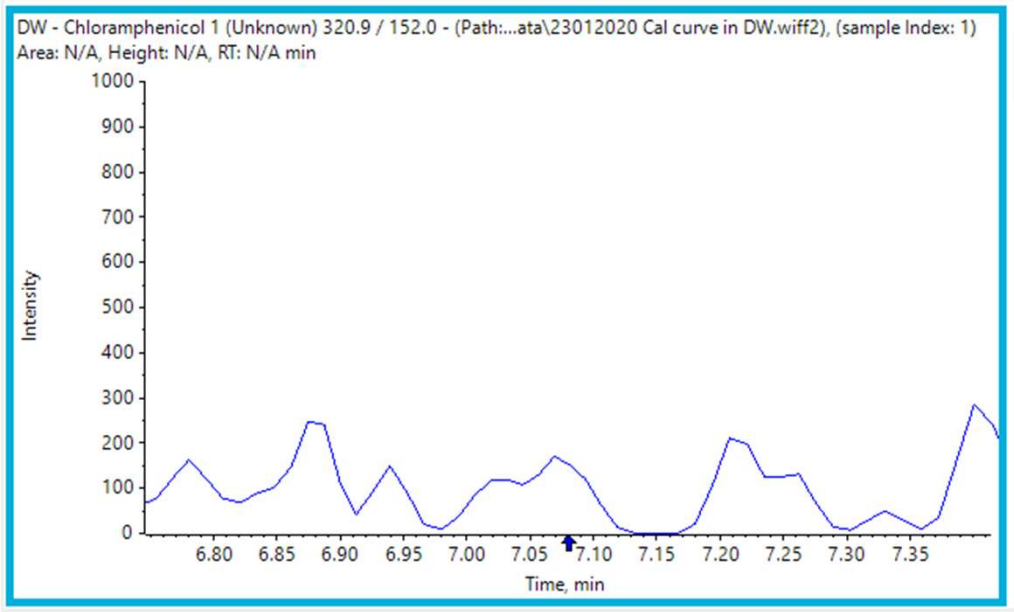
Measured 10 ppt

SCIEX The Power of Precision

Chloramphenicol (-ve) (tap water)

SCIEX 7500 System

SCIEX 7500 system



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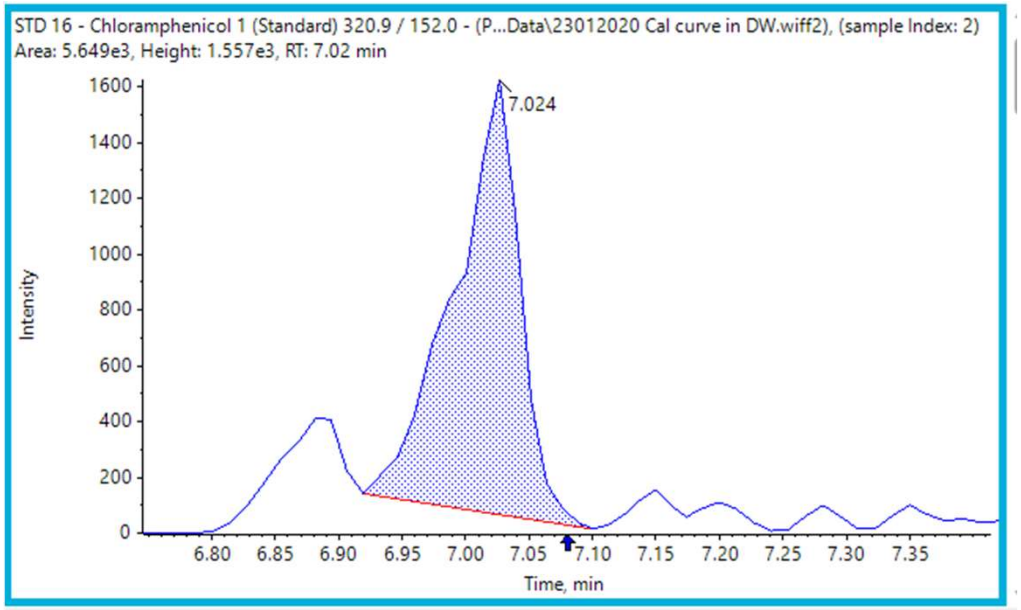
SCIEX 7500 system



Measured 0.1 ppt

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Conclusions

SCIEX 7500 System

- The SCIEX Triple Quad™ 7500 LC-MS/MS System – QTRAP® Ready provides impressive levels of sensitivity, robustness and accuracy
- Fast polarity switching functionality and the powerful Scheduled MRM™ Algorithm allow over 1400 MRM transitions for 700 compounds analyzed in a single analysis, example of food
- Fast polarity switching functionality and the powerful Scheduled MRM Algorithm allow over 850 MRM transitions for 430 compounds analyzed in a single analysis, example of water
- Multiple MRMs per analyte enabled ion ratio monitoring to ensure confident detection
- The ability to analyze this many compounds with high sensitivity without the need for extensive sample preparation improves operational efficiency

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Acknowledgements

- Vitens, Netherlands
  - Ronny Bosch
  - Bernard Bajema
- SCIEX
  - Jianru Stahl-Zeng
  - Bertram Nieland
  - Phil Taylor
  - Jack Steed
  - Ian Moore

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