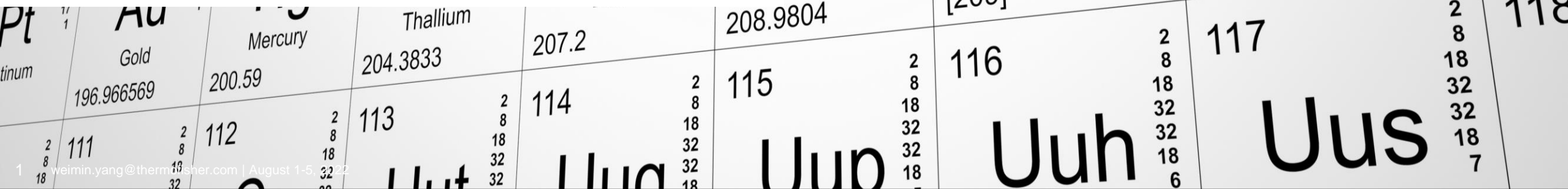


## How to overcome unexpected interferences and accelerate environmental analysis using ICP-MS

Weimin Yang, Sabrina Antonio, Bhagyesh Surekar, Daniel Kutscher



# Introduction

- Brief background on Thermo Scientific ICP-MS history
- What are the key aspects making ICP-MS a key tool in many applications and regulated methods?
- Recent trends in single and triple quadrupole ICP-MS



# Thermo Fisher Scientific > 35 years of ICP-MS experience



- Quadrupole ICP-MS
  - 1<sup>st</sup> commercialized Q-ICP-MS in 1983
  - 5<sup>th</sup> Generation of single quadrupole ICP-MS instruments



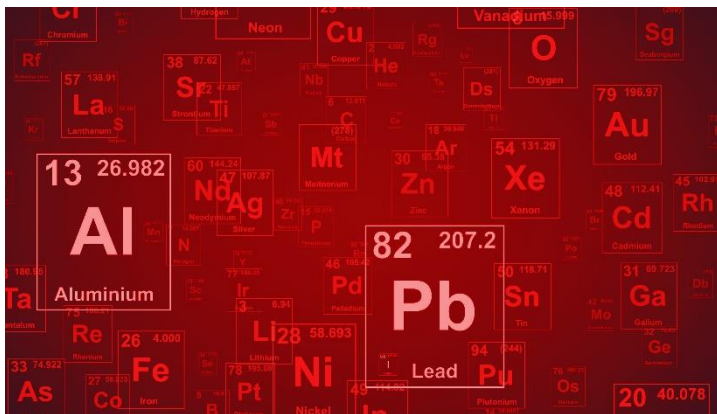
- High Resolution ICP-MS
  - 1<sup>st</sup> routine HR-ICP-MS introduced in 1994
  - Following instrument generations with significantly improved performance and extended dynamic range



- Triple Quadrupole ICP-MS
  - Added in 2017 with a strong focus on combining superior interference removal and ease of use in a compact system
  - Bringing TQ-ICP-MS into applied analytical testing labs



# Advantages of TQ-ICP-MS over SQ-ICP-MS



## Better Interference Removal

- **Overcome false positives** – Always an interruption to the daily workplan and a significant cost as well
- **Open up new options** – future proof your laboratory today



## Better Sensitivity and LOD's

- **Take on new challenges** – Analysis of emerging contaminants
- **More confidence** – Sometimes there is more than “less than”



## Option to increase productivity

- **Reduce sample turnover times** – Provide right answers faster
- **Simple method development** – Easy and straightforward to leverage new technology from day 1.

There are good reasons for TQ-ICP-MS in a busy laboratory

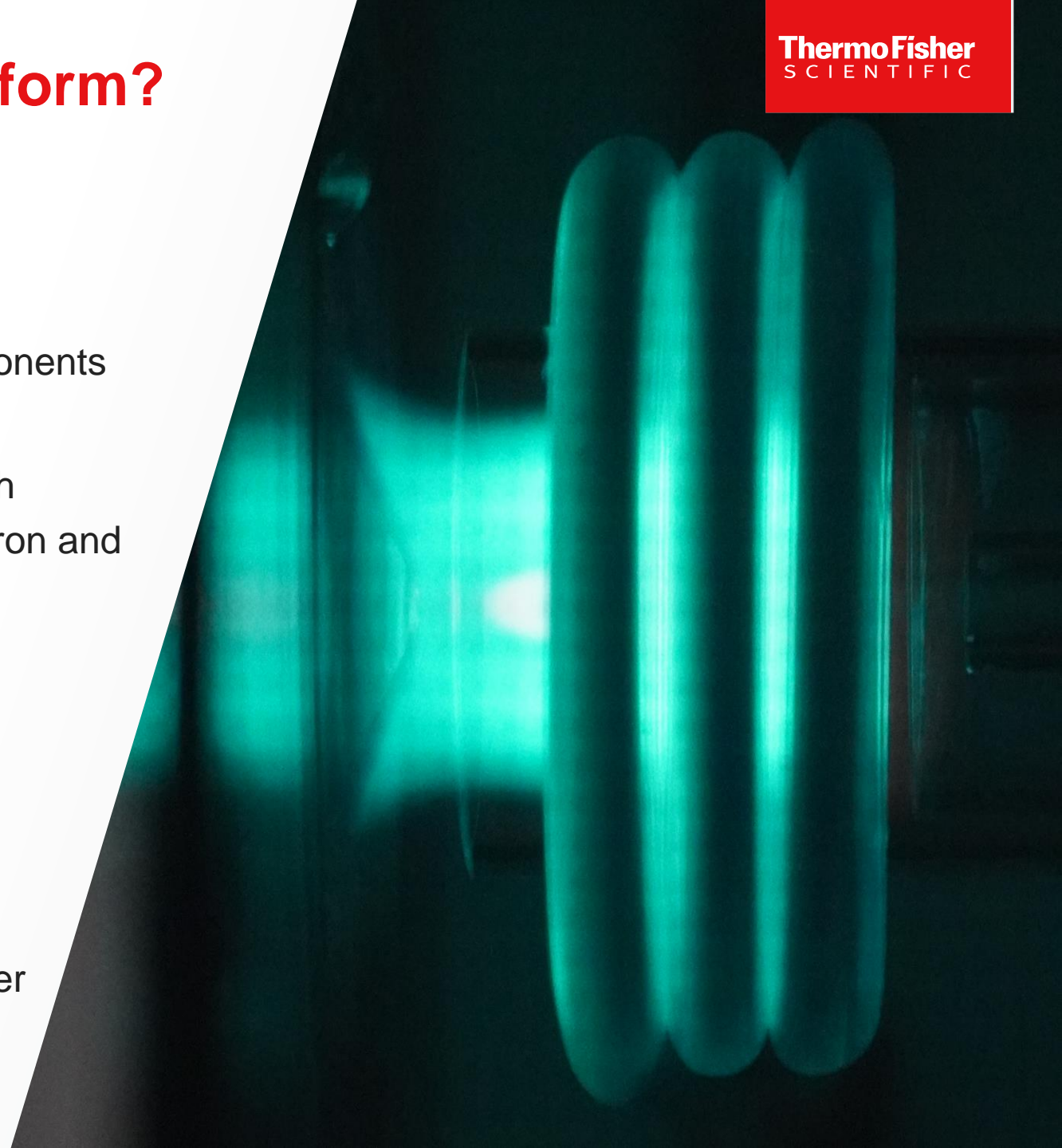
# Where do spectral interferences form?

- **In the argon plasma**


- High temperature environment (6,000 – 8,000K)
- Ar ions formed and react with sample matrix components (O, Cl, H, Na etc.) to form polyatomic species
- Plasma is hot enough for elements with low enough second ionisation potentials to lose a second electron and become doubly charged


- **In the sampling interface**


- Steep temperature gradient in the boundary layer between the plasma and the cooled sample cone induces recombination reactions
- Temperature drop between the sample and skimmer cone can also lead to recombination processes



# How much better is a TQ-ICP-MS?

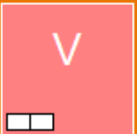
 Vanadium	Isotope	Abundance [%]
	$^{50}\text{V}$	0.25
	$^{51}\text{V}$	99.75
Main interferences	$^{35}\text{Cl}^{16}\text{O}^+$ ( $^{37}\text{Cl}^{14}\text{N}^+$ )	


 Manganese	Isotope	Abundance [%]
	$^{55}\text{Mn}$	100
	Main interferences	$^{54}\text{Fe}^{1}\text{H}^+$ , $^{39}\text{K}^{16}\text{O}^+$ , $^{37}\text{Cl}^{17}\text{O}^{1}\text{H}$

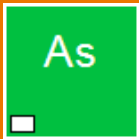
 Arsenic	Isotope	Abundance [%]
	$^{75}\text{As}$	100
	Main interferences	( $^{40}\text{Ar}^{35}\text{Cl}^+$ , $^{40}\text{Ca}^{35}\text{Cl}^+$ ,)
Other interferences	$^{59}\text{Co}^{16}\text{O}^+$ $^{150}\text{Nd}^{++}$ , $^{150}\text{Sm}^{++}$	

They are monoisotopic or quasi monoisotopic!

# How much better is a TQ-ICP-MS?

 <b>Vanadium</b>	Isotope	Abundance [%]
	$^{50}\text{V}$	0.25
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IDL Improvement	20 times better	
Sensitivity Improvement	10 times higher	

 <b>Manganese</b>	Isotope	Abundance [%]
	$^{55}\text{Mn}$	100
Main interferences	$^{54}\text{Fe}^{1}\text{H}^+$ , $^{39}\text{K}^{16}\text{O}^+$ , $^{37}\text{Cl}^{17}\text{O}^{1}\text{H}$	
IDL Improvement	9 times better	
Sensitivity Improvement	4 times higher	

 <b>Arsenic</b>	Isotope	Abundance [%]
	$^{75}\text{As}$	100
Main interferences	$(^{40}\text{Ar}^{35}\text{Cl}^+, ^{40}\text{Ca}^{35}\text{Cl}^+)$	
Other interferences	$^{59}\text{Co}^{16}\text{O}^+$ $^{150}\text{Nd}^{++}$ , $^{150}\text{Sm}^{++}$	
IDL Improvement	10 times better	
Sensitivity Improvement	6 times higher	

**Increase in sensitivity and a more significant decrease in detection limit leads to a significantly better signal-to-noise ratio!**



# Accurate analysis of arsenic in presence of REE

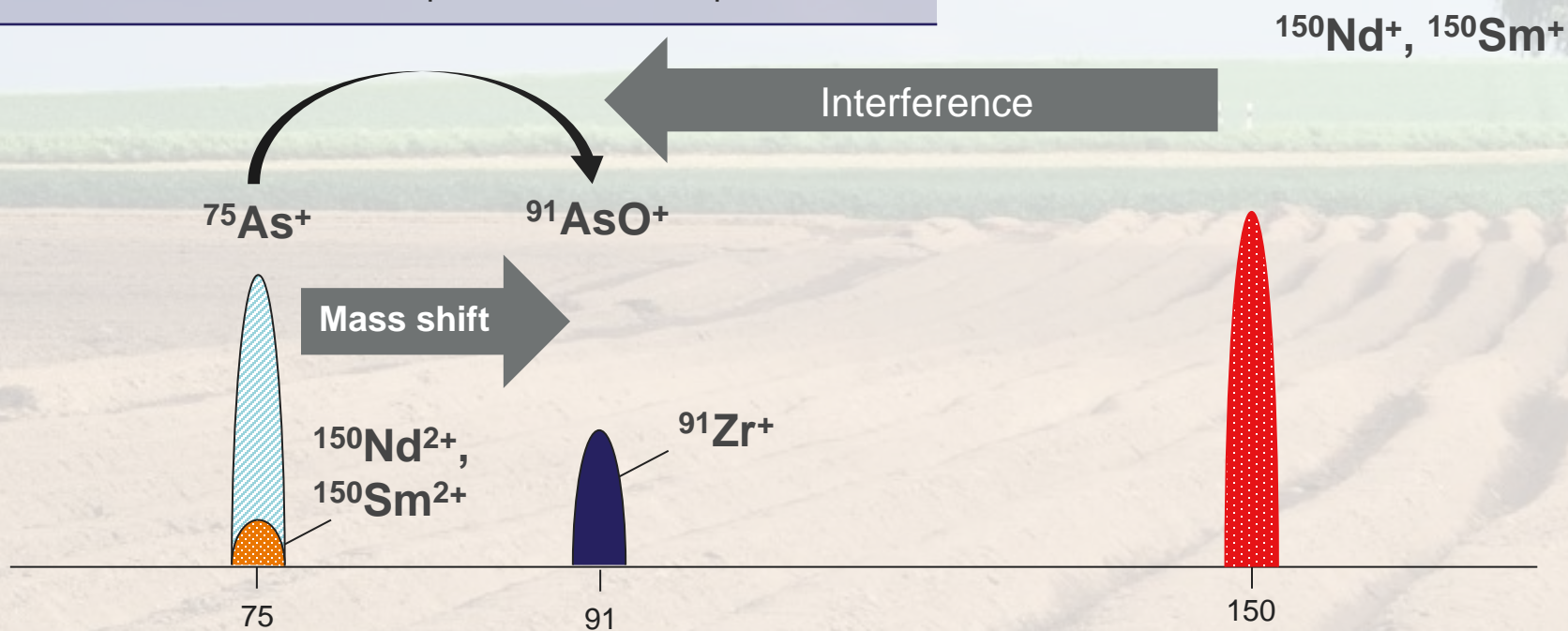
## Problem Statement

REE elements easily form  $M^{++}$  ions, interfering with elements  $m/z$  70-88.

*KED mode typically enhances these interferences*

**Solution:** Mass shift As and Se using  $O_2$

**Other interferences:**  $^{91}Zr^+$ ,  $^{94,96}Mo^+$ , if present in the sample





# Arsenic analysis

Sample	SQ-KED [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	TQ-O <sub>2</sub> [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	Comment
100 mg·L <sup>-1</sup> Ca, 5% HCl	0.06	0.00	KED is suitable, but not capable to eliminate all Cl based interferences
10 $\mu\text{g}\cdot\text{L}^{-1}$ REE Mix	1.05	0.00	KED shows expected false positive result
100 $\mu\text{g}\cdot\text{L}^{-1}$ REE Mix	11.97	0.00	

**O<sub>2</sub> is effectively removing polyatomic and other interferences, in particular doubly charged ions of the REE**

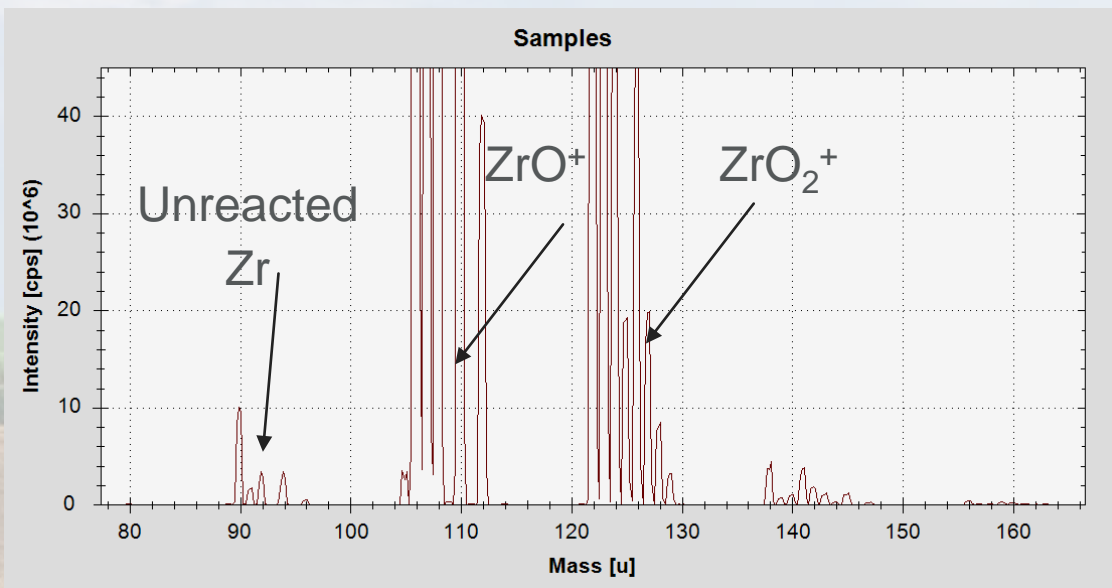
**Why is it not widely used on single quadrupole ICP-MS instruments?**

# Arsenic analysis

Sample	SQ-KED [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	TQ-O <sub>2</sub> [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	SQ-O <sub>2</sub> [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	Comment
100 $\text{mg}\cdot\text{L}^{-1}$ Ca, 5% HCl	0.06	0.00	0.2	KED is suitable, but not capable to eliminate all Cl based interferences SQ-O <sub>2</sub> shows a significant bias
10 $\mu\text{g}\cdot\text{L}^{-1}$ REE Mix	1.05	0.00	0.02	KED shows expected false positive result
100 $\mu\text{g}\cdot\text{L}^{-1}$ REE Mix	11.97	0.00	0.04	SQ-O <sub>2</sub> is less effective compared to TQ-O <sub>2</sub>
0.5 $\text{mg}\cdot\text{L}^{-1}$ Zr	0.00	0.00	148.72	No mass filtration in Q1 leads to a completely wrong result in SQ-O <sub>2</sub> mode

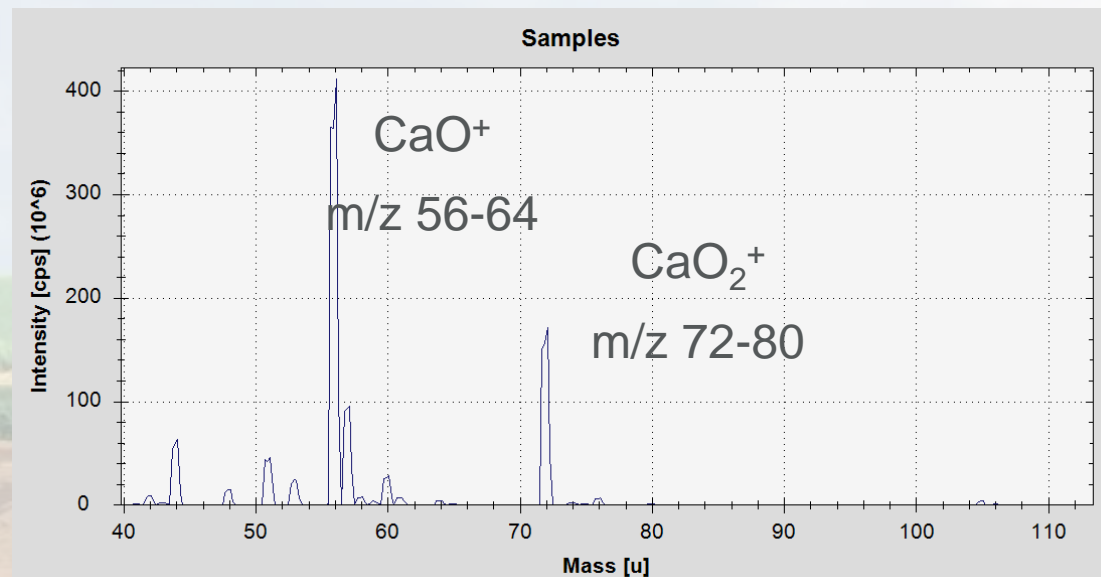
# What went wrong – Survey Scans in SQ-O<sub>2</sub> Mode

0.5  $\mu\text{g}\cdot\text{L}^{-1}$  Zr



**Bias through unreacted <sup>91</sup>Zr**

100  $\text{mg}\cdot\text{L}^{-1}$  Ca, 5% HCl



**Bias through side reactions of Ca with O<sub>2</sub>**

**Mass filtration before CRC is essential when using reactive gases!**



# What causes the complication...

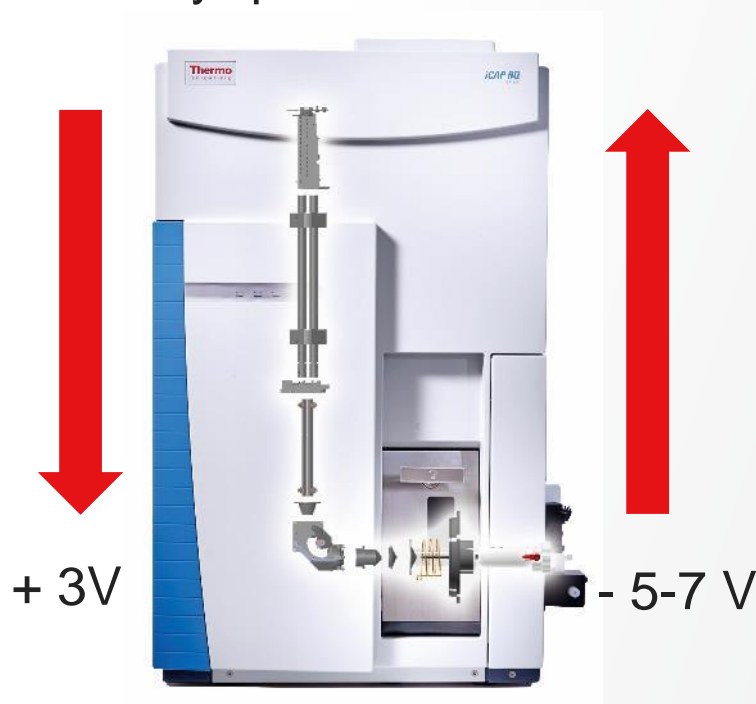
- Reactive gases can provide additional means for interference removal for difficult elements
  - Sulfur, phosphorous etc.
- The reality in a complex sample is usually quite different

## KED mode

Positive bias potential between CRC and quad (3V)

*Species are slowed down and all polyatomics are removed*

This includes ions you normally don't worry about...



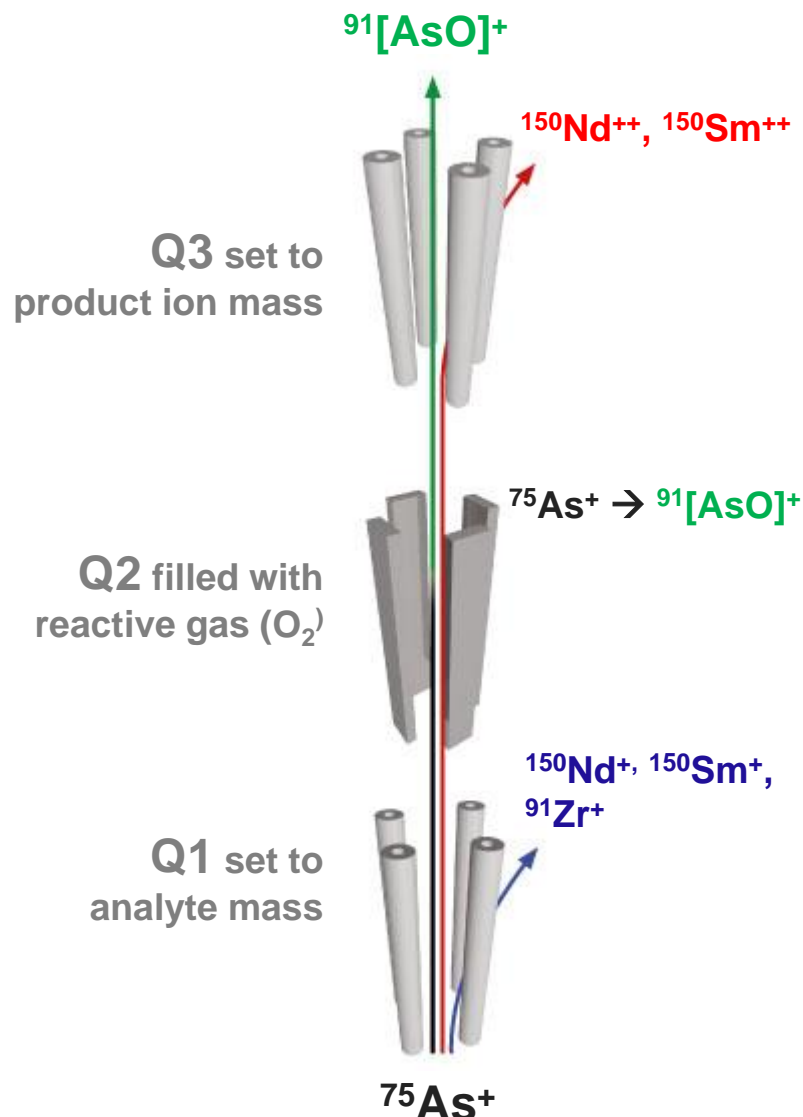
## Reactive mode

Negative bias potential between CRC and quad (5-7V)

*All ions are accelerated through the CRC and may react with what ever gas is used!*

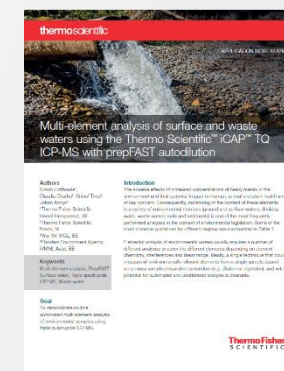
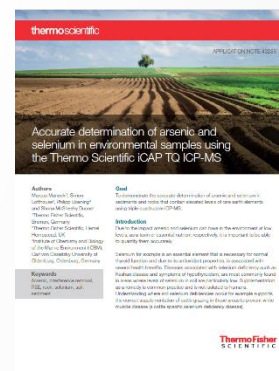
Some ions can cause significant problems, although not an obvious interference

# Accurate analysis of arsenic in presence of REE

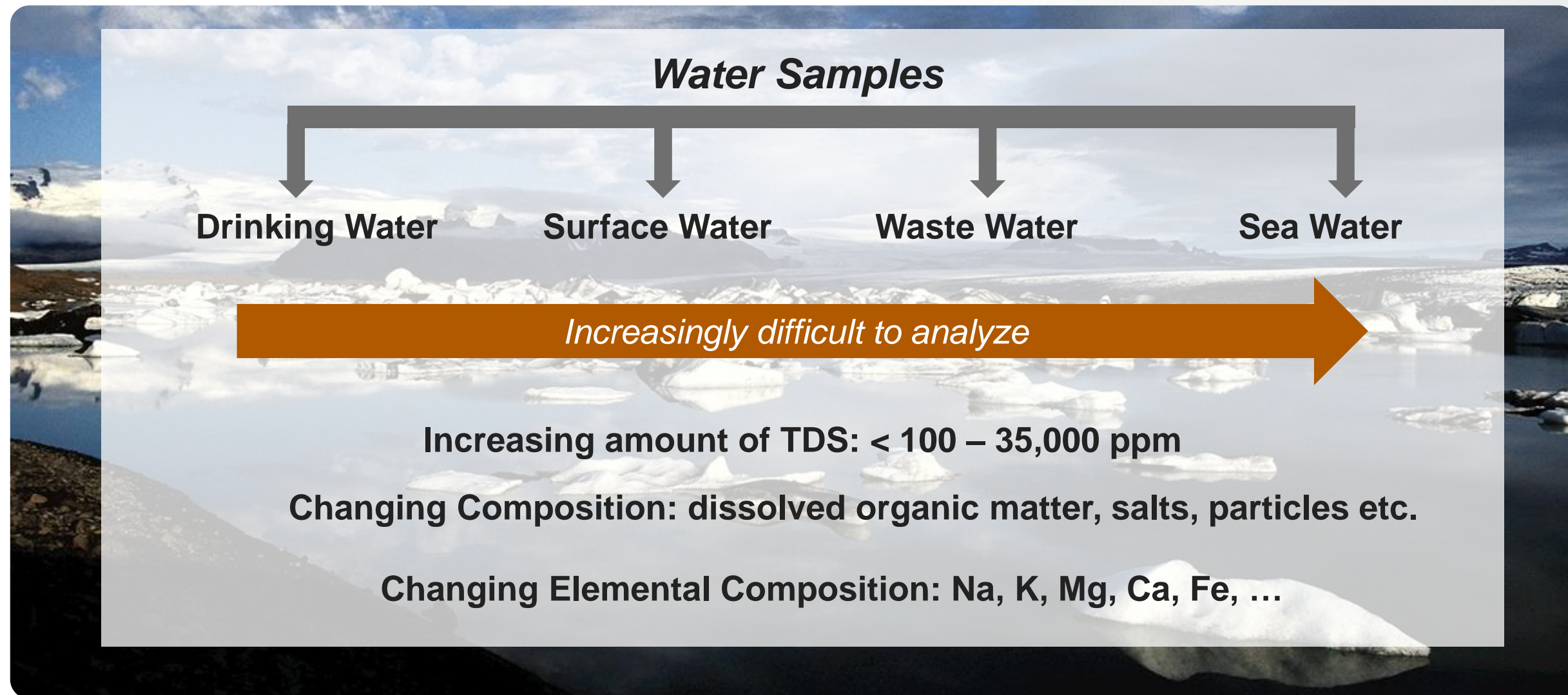


## • Solution is TQ-ICP-MS:

- Control ions entering the cell using Q1
- Use  $O_2$  to efficiently convert As and Se to AsO and SeO in Q2
- Selectively detect AsO free from REE $^{++}$  interference, using Q3
- ✓ Better interference removal reduces false positives
- ✓ Sensitivity and LOD are improved



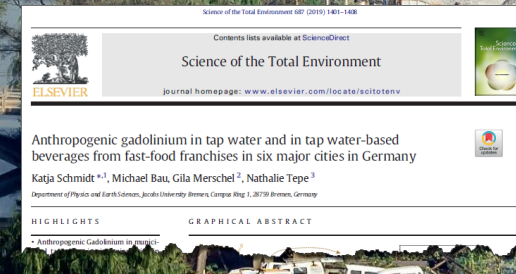
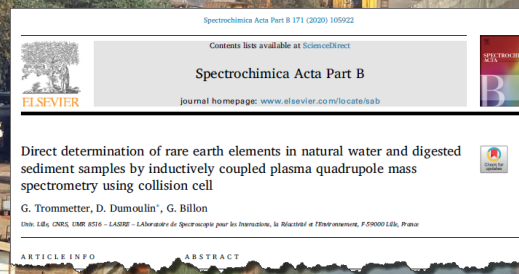
# Water Analysis using ICP-MS





# Adding rare earth elements as emerging contaminants

- REE's are of high importance in high technology products
  - Electronic devices
  - Batteries
- Medical applications
  - Contrast agents in MRT
- Impact to the environment
  - REE's are increasingly found in surface waters like rivers, especially around hospitals



# Challenges with the analysis of rare earth elements

- Are there any?

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

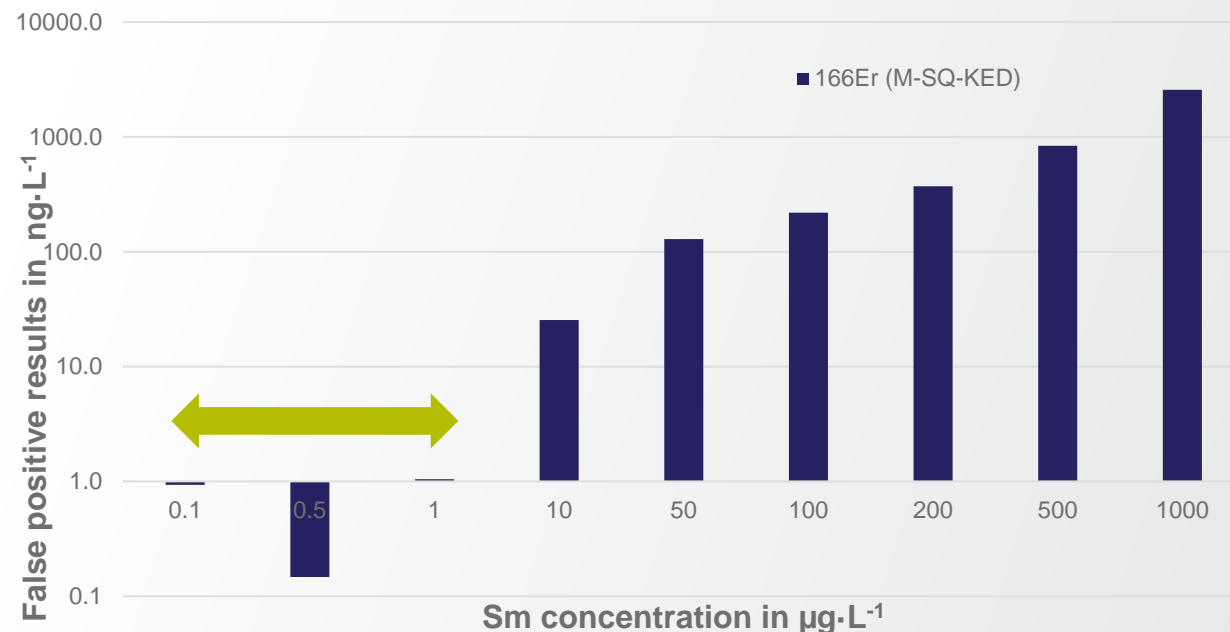
- Very low concentrations in nature, therefore background contamination is normally negligible
  - Mass range between 140-180 is usually free from interferences and offers high sensitivity
  - Rare earth elements form oxides quite easily, allowing to use reactive mode for even better sensitivity!
- 
- Rare earth elements do interfere on other elements, but also amongst themselves!



# Challenges with the analysis of rare earth elements

Element	Potentially interfering on...	Interference
Barium	e.g. Europium	BaO <sup>+</sup>
Cerium	Gadolinium	CeO <sup>+</sup>
Neodymium	e.g. Terbium	NdO <sup>+</sup>
Samarium	e.g. Erbium	SmO <sup>+</sup>
Gadolinium	Ytterbium	GdO <sup>+</sup>

- ✓  $^{166}\text{Er}$  is the most abundant isotope (33.60%)
- ✓ Although  $^{150}\text{Nd}$  and  $^{150}\text{Sm}$  are not the most abundant isotopes of both elements, significant interferences can be observed when using KED mode



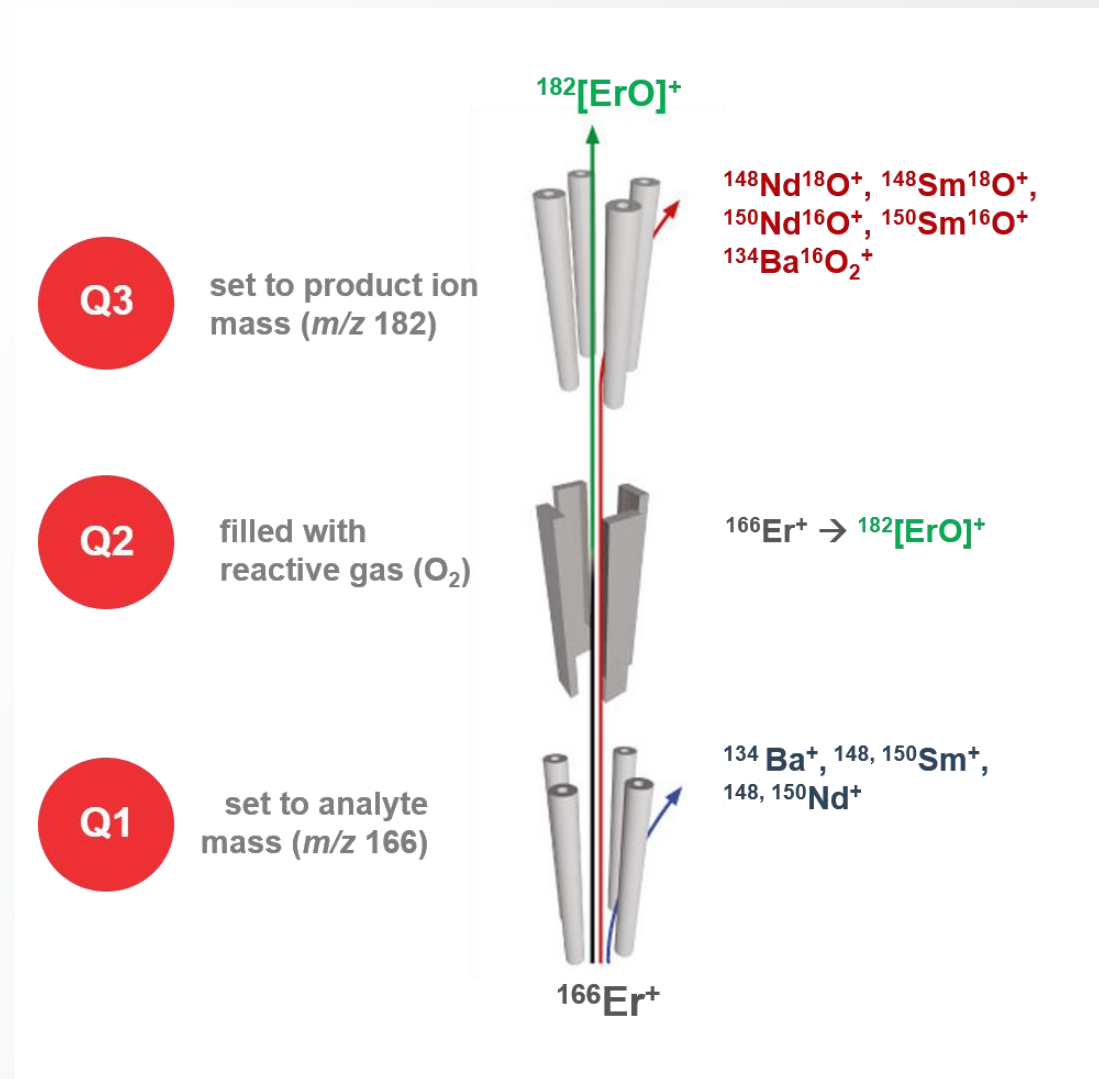
False positive results could be obtained for  $^{166}\text{Er}$  in presence of less than  $10\mu\text{g}\cdot\text{L}^{-1}$  of other REE's (here Sm) when measured in KED mode



# Challenges with the analysis of rare earth elements

Element	Potentially interfering on...	Interference
Barium	e.g. Europium	$\text{BaO}^+$
Cerium	Gadolinium	$\text{CeO}^+$
Neodymium	e.g. Terbium	$\text{NdO}^+$
Samarium	e.g. Erbium	$\text{SmO}^+$
Gadolinium	Ytterbium	$\text{GdO}^+$

- ✓  $^{166}\text{Er}$  is the most abundant isotope (33.60%)
- ✓ Although  $^{150}\text{Nd}$  and  $^{150}\text{Sm}$  are not the most abundant isotopes of both elements, significant interferences can be observed when using KED mode



# Adding REE analysis to a novel ICP-MS method

- Collection of different surface waters in and around Bremen
  - Broad range of TDS and other content
- Method Development
  - Optimize for throughput conscious laboratories
  - Straightforward definition, yet full interference removal
- Preliminary Validation
  - River sediment CRM
  - River Water CRM
  - Spike recovery



# Instrument configuration and sample preparation

Thermo Scientific™ iCAP™ TQe ICP-MS



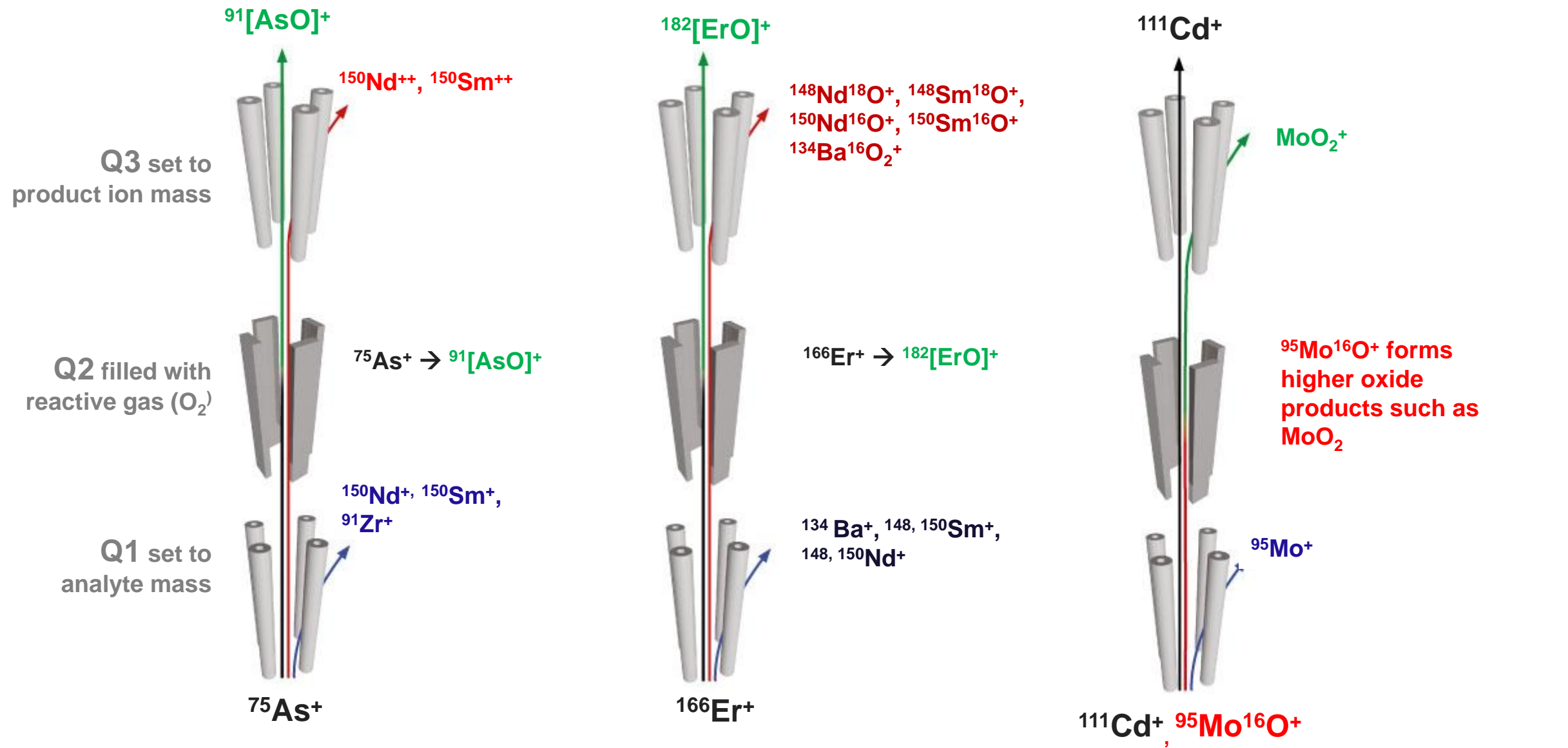
Parameter	Value
Nebulizer	Borosilicate glass, 400 $\mu\text{L}\cdot\text{min}^{-1}$
Spraychamber	Quartz cyclonic, cooled at 2.7 $^{\circ}\text{C}$
Injector	2.5 mm i.d., quartz
Interface	Nickel sampler and nickel skimmer cone with robust insert
Plasma power	1550 W
Nebulizer gas	1.04 $\text{L}\cdot\text{min}^{-1}$
Analysis Mode	TQ- $\text{O}_2$
Gas flow	100% $\text{O}_2$ , 0.34 $\text{mL}\cdot\text{min}^{-1}$
Sample uptake and wash	55 sec each
Total analysis time	2 min 50 sec

- ✓ Water samples were acidified and filtered
- ✓ BCR-2 was digested (introducing a 2,500 times dilution)

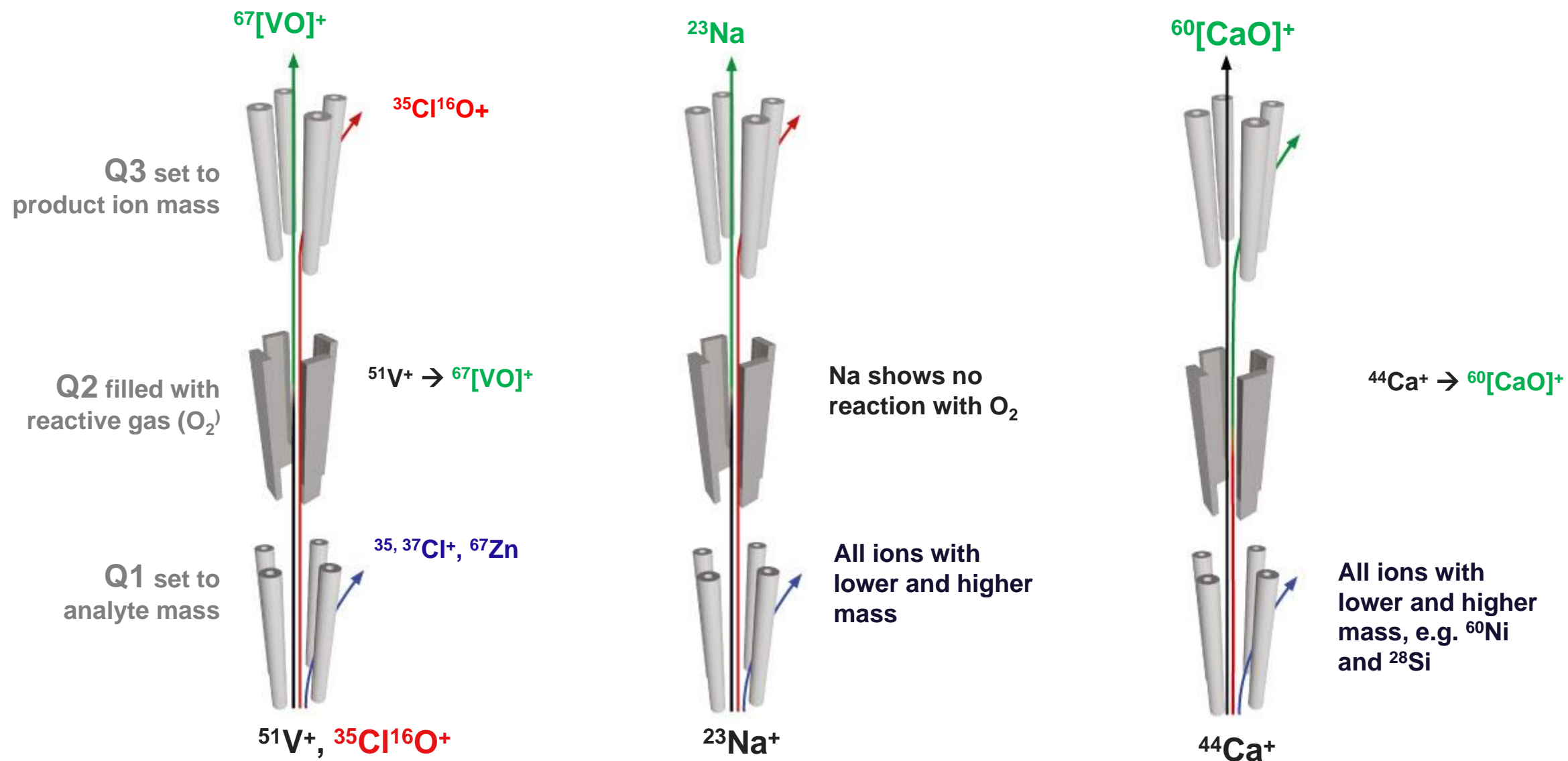




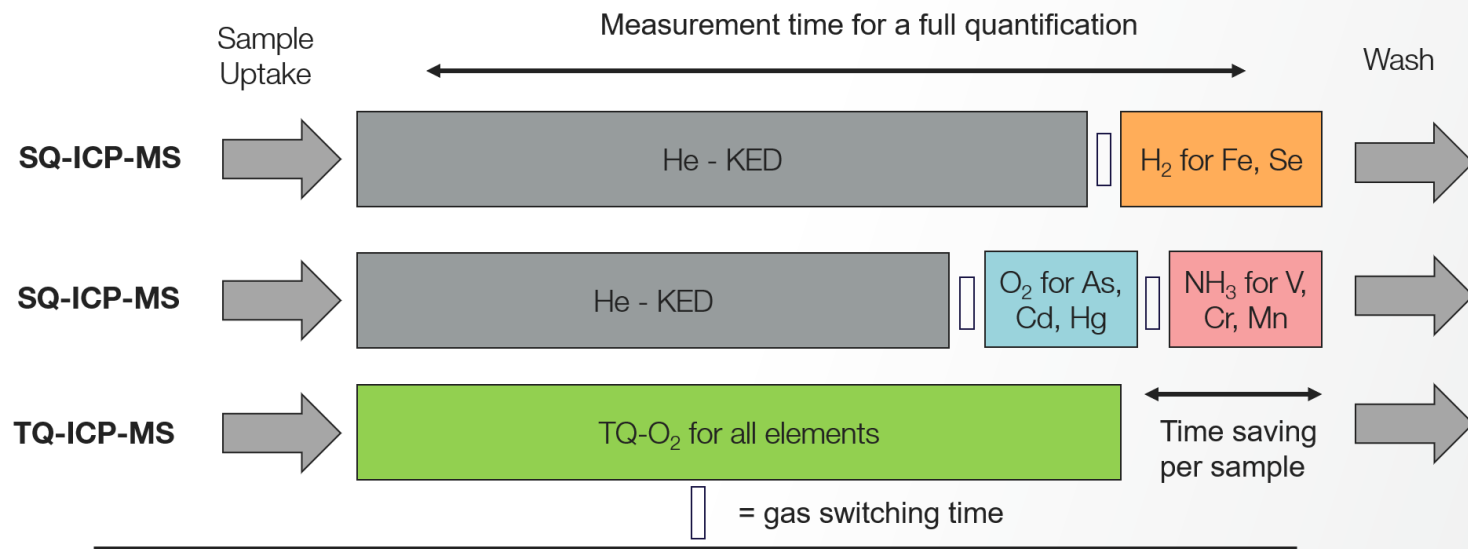
# Method Development – Single Mode Analysis



# Method Development – Single Mode Analysis



# Let's have a look at throughput

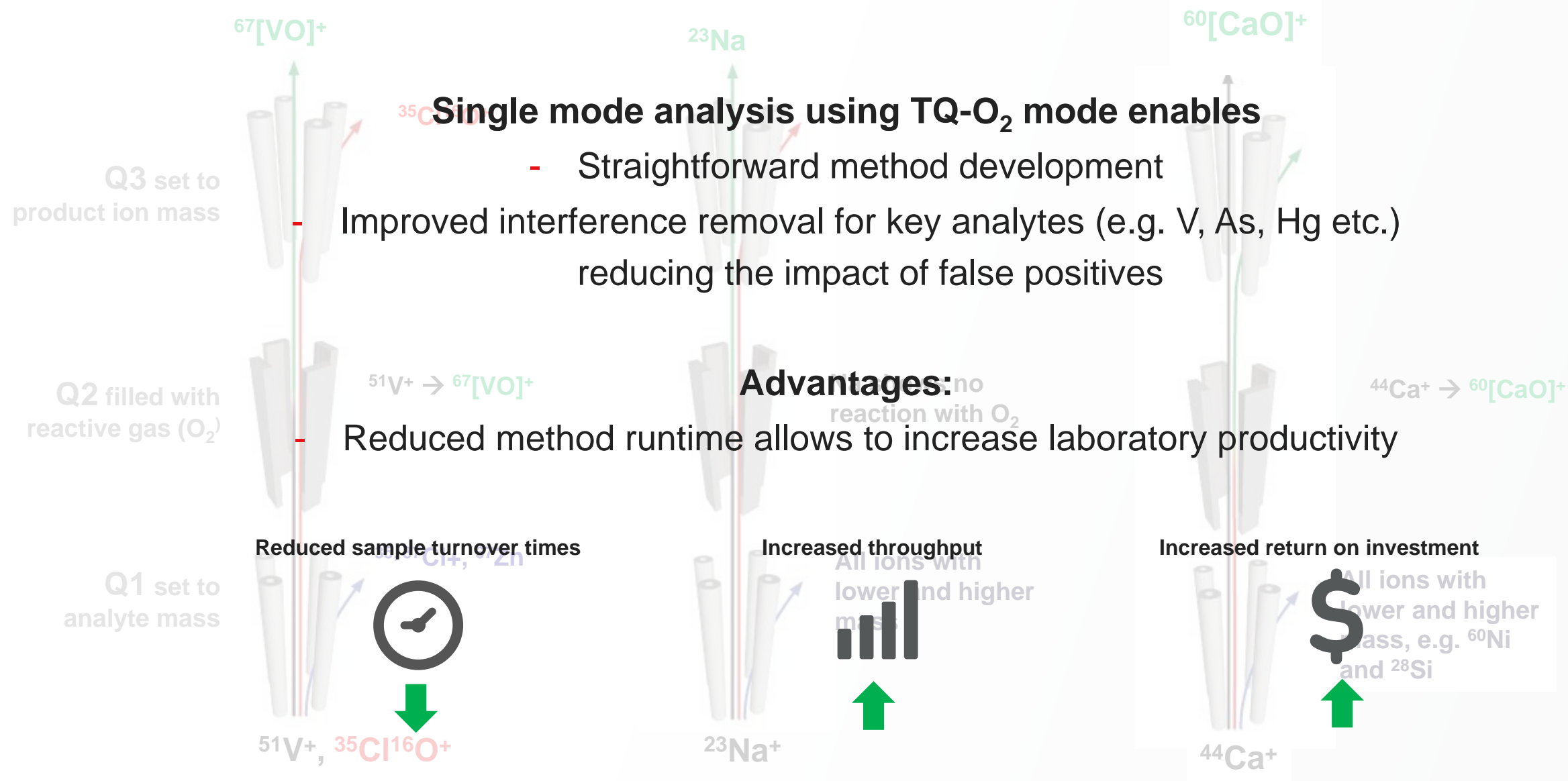


- ✓ Measurement time per sample reduced at no significant expense on performance
  - ✓ Improved detection limits for a series of elements
  - ✓ Confidence that all interferences are under control

- Often, combinations of different cell gases are used for improving on key analytes on a single quadrupole ICP-MS
- However, every gas switch is adding extra time to the method



# Method Development – Single Mode Analysis



# Results – Rare earth elements in Columbia River Basalt

Analyte and mass	MDL [ $\mu\text{g}\cdot\text{L}^{-1}$ ] incl. DF	Measured [ $\mu\text{g}\cdot\text{g}^{-1}$ ]	CRM consensus values [ $\mu\text{g}\cdot\text{g}^{-1}$ ]
$^{139}\text{La}$ as $^{139}\text{La}\cdot^{16}\text{O}$ at m/z 155	0.001	$26 \pm 0.5$	$25 \pm 1$
$^{140}\text{Ce}$ as $^{140}\text{Ce}\cdot^{16}\text{O}$ at m/z 156	0.001	$55 \pm 1$	$53 \pm 2$
$^{141}\text{Pr}$ as $^{141}\text{Pr}\cdot^{16}\text{O}$ at m/z 157	0.001	$7.0 \pm 0.2$	$6.8 \pm 0.3$
$^{146}\text{Nd}$ as $^{146}\text{Nd}\cdot^{16}\text{O}$ at m/z 162	0.002	$30 \pm 1$	$28 \pm 2$
$^{149}\text{Sm}$ as $^{149}\text{Sm}\cdot^{16}\text{O}$ at m/z 165	0.001	$6.9 \pm 0.5$	$6.7 \pm 0.3$
$^{153}\text{Eu}$	0.0003	$2.1 \pm 0.1$	$2.0 \pm 0.1$
$^{157}\text{Gd}$ as $^{157}\text{Gd}\cdot^{16}\text{O}$ at m/z 173	0.001	$7.1 \pm 0.1$	$6.8 \pm 0.3$
$^{159}\text{Tb}$ as $^{159}\text{Tb}\cdot^{16}\text{O}$ at m/z 175	0.001	$1.10 \pm 0.03$	$1.07 \pm 0.04$
$^{163}\text{Dy}$ as $^{163}\text{Dy}\cdot^{16}\text{O}$ at m/z 179	0.001	$7.1 \pm 0.2$	-
$^{165}\text{Ho}$ as $^{165}\text{Ho}\cdot^{16}\text{O}$ at m/z 181	0.0003	$1.45 \pm 0.05$	$1.33 \pm 0.06$
$^{166}\text{Er}$ as $^{166}\text{Er}\cdot^{16}\text{O}$ at m/z 182	0.0003	$4.2 \pm 0.3$	-
$^{169}\text{Tm}$ as $^{169}\text{Tm}\cdot^{16}\text{O}$ at m/z 185	0.0003	$0.6 \pm 0.1$	0.54
$^{172}\text{Yb}$	0.001	$3.7 \pm 0.2$	$3.5 \pm 0.2$
$^{175}\text{Lu}$ as $^{175}\text{Lu}\cdot^{16}\text{O}$ at m/z 191	0.0003	$0.55 \pm 0.02$	$0.51 \pm 0.02$

Excellent recovery with certified concentrations and sub  $\text{ng}\cdot\text{L}^{-1}$  detection limits for REE's enabling sensitive and reliable analysis at ultra-trace levels

# Results – Other elements in SLRS-5 CRM

Analyte and mass (as m/z)	MDL [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	SLRS-5 [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	SLRS-5 CRM value [ $\mu\text{g}\cdot\text{L}^{-1}$ ]	Concentration range in water samples [ $\mu\text{g}\cdot\text{L}^{-1}$ ]
$^9\text{Be}$	0.006	$0.004 \pm 0.005$	0.005*	0.003 - 0.07
$^{23}\text{Na}$	13.3	$5,374 \pm 98$	$5,380 \pm 100$	10,972 – 110,328
$^{24}\text{Mg}$	3	$2,443 \pm 110$	$2,540 \pm 160$	3,332 - 35,128
$^{27}\text{Al}$	0.3	$50.1 \pm 6.0$	$49.5 \pm 5.0$	0.002 - 0.2
$^{39}\text{K}$	2.1	$822 \pm 60$	$839 \pm 36$	2,216 - 19,681
$^{44}\text{Ca}$ as $^{44}\text{Ca}\cdot^{16}\text{O}$ at 60	12.9	$10,060 \pm 380$	$10,500 \pm 400$	18,100 - 48,082
$^{51}\text{V}$ as $^{51}\text{V}\cdot^{16}\text{O}$ at 67	0.002	$0.291 \pm 0.020$	$0.317 \pm 0.033$	0.36 - 0.92
$^{52}\text{Cr}$ as $^{52}\text{Cr}\cdot^{16}\text{O}$ at 68	0.012	$0.199 \pm 0.021$	$0.208 \pm 0.023$	0.09 - 0.46
$^{55}\text{Mn}$	0.005	$4.21 \pm 0.28$	$4.33 \pm 0.18$	0.16 - 519.8
$^{57}\text{Fe}$	0.57	$93.5 \pm 2.8$	$91.2 \pm 5.8$	50.1 - 1,051
$^{60}\text{Ni}$	0.024	$0.495 \pm 0.038$	$0.476 \pm 0.064$	0.82 - 1.93
$^{63}\text{Cu}$	0.3	$18.7 \pm 1.8$	$17.4 \pm 1.3$	0.77 - 127.02
$^{66}\text{Zn}$	0.048	$0.89 \pm 0.018$	$0.845 \pm 0.095$	3.8 - 163.3
$^{75}\text{As}$ as $^{75}\text{As}\cdot^{16}\text{O}$ at 91	0.0038	$0.389 \pm 0.03$	$0.413 \pm 0.039$	0.06 - 1.08
$^{80}\text{Se}$ as $^{80}\text{Se}\cdot^{16}\text{O}$ at 96	0.0041	$0.09 \pm 0.02$	-	0.04 - 0.12
$^{89}\text{Y}$ as $^{89}\text{Y}\cdot^{16}\text{O}$ at 105	0.0009	$0.11 \pm 0.006$	-	0.01 - 0.77
$^{98}\text{Mo}$ as $^{98}\text{Mo}\cdot^{16}\text{O}$ at 114	0.0082	$0.5 \pm 0.1$	0.5*	0.1 - 1.2
$^{107}\text{Ag}$	0.002	$0.005 \pm 0.001$	-	0.004 - 0.019
$^{111}\text{Cd}$	0.0016	$0.0069 \pm 0.0012$	$0.0060 \pm 0.0014$	0.001 - 0.031
$^{121}\text{Sb}$	0.0016	$0.29 \pm 0.02$	0.3*	0.029 - 0.31
$^{238}\text{U}$ as $^{238}\text{U}\cdot^{16}\text{O}_2$ at 270	0.0003	$0.100 \pm 0.003$	0.1*	0.014 - 0.596

Excellent recovery with certified concentrations for all elements!



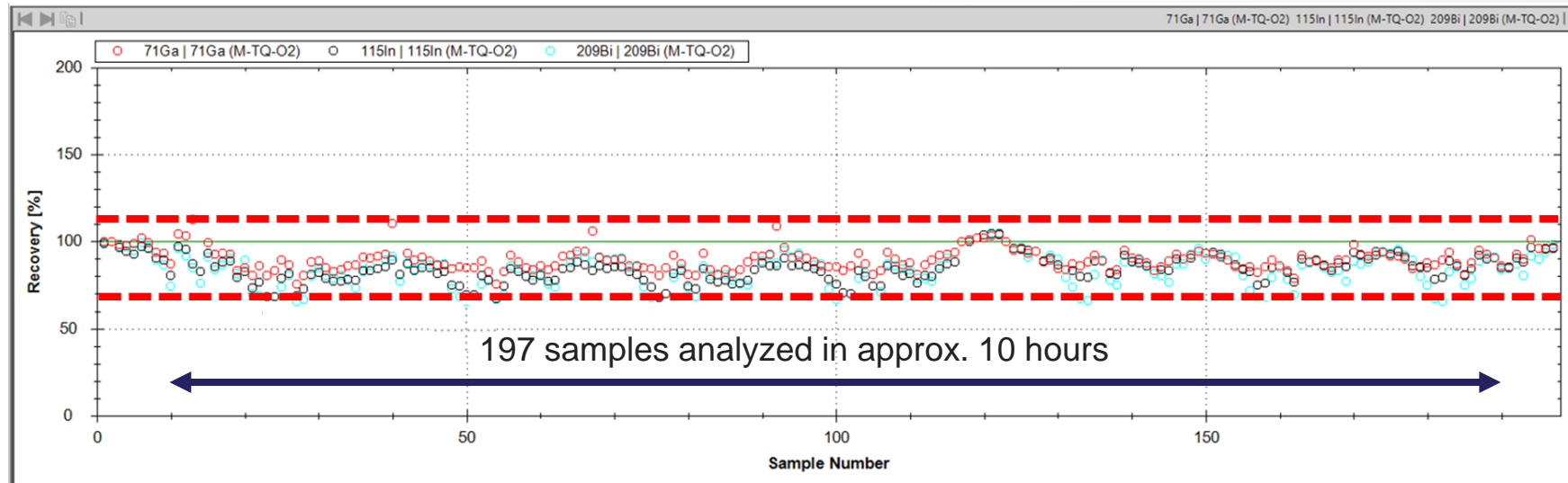
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$^{107}\text{Ag}$	0.002	$0.005 \pm 0.001$	-	0.004 - 0.019
$^{111}\text{Cd}$	0.0016	$0.0069 \pm 0.0012$	$0.0060 \pm 0.0014$	0.001 - 0.031
$^{121}\text{Sb}$	0.0016	$0.29 \pm 0.02$	0.3*	0.029 - 0.31
$^{238}\text{U}$ as $^{238}\text{U}\cdot^{16}\text{O}_2$ at 270	0.0003	$0.100 \pm 0.003$	0.1*	0.014 - 0.596

Samples covered a broad range of matrix load ( $\sim 20 \text{ mg}\cdot\text{L}^{-1}$  to  $> 200 \text{ mg}\cdot\text{L}^{-1}$ )!

# Robustness

- Typical parameters characterizing robustness: Internal standard and QC recoveries!



- Internal standard recovery well within 80-120% in a 10 hour long sequence
- Quality control samples (CCV) (every 20 samples) did read out with  $\pm 3\%$



# Let's recap

- Full interference removal accomplished for all analytes
  - Good agreement between certified concentrations for both certified reference materials
  - No false positive results observed for As and Se in BCR-2
- Consistent internal standard and QC recovery throughout a 10 hour sequence
  - Collected water samples were significantly different in total matrix content and composition
  - For example, the concentration for calcium varied between 11 and 110 mg·L<sup>-1</sup>, up to 20-fold concentration differences for Fe and Ni, up to a 100-fold difference for Cu



# Comparison of detection limits

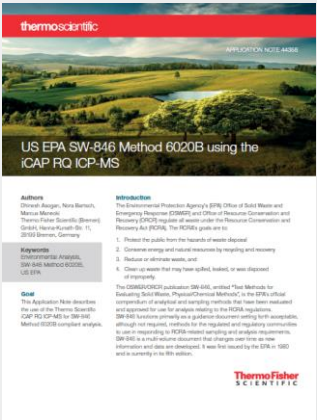


<sup>9</sup> Be	<sup>23</sup> Na	<sup>24</sup> Mg	<sup>27</sup> Al	<sup>39</sup> K	<sup>51</sup> V	<sup>52</sup> Cr	<sup>55</sup> Mn	<sup>60</sup> Ni	<sup>63</sup> Cu	<sup>66</sup> Zn	<sup>75</sup> As	Se	<sup>107</sup> Ag	<sup>111</sup> Cd	<sup>121</sup> Sb	<sup>208</sup> Pb	<sup>238</sup> U
+++	O	O	O	O	++	+	++	O	O	+	+	+	++	+	O	O	++

O Equivalent or slightly higher DL

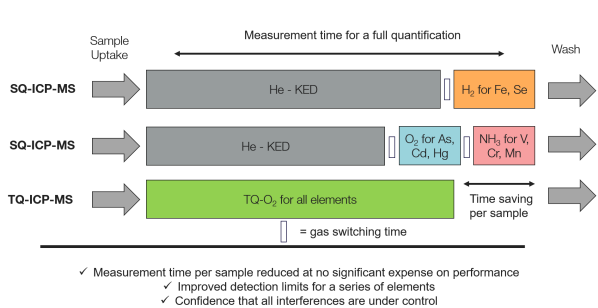
+ Detection Limit improvement factor > 2; ++ Detection Limit Improvement factor > 5; +++ Detection Limit Improvement factor > 10

- An improvement in the detection limit is most obviously observed for critical contaminats, often combined with a better interferecne remvoval
- Typical major elements are not affected significantly



Application Note 44358  
(iCAP RQ ICP-MS)

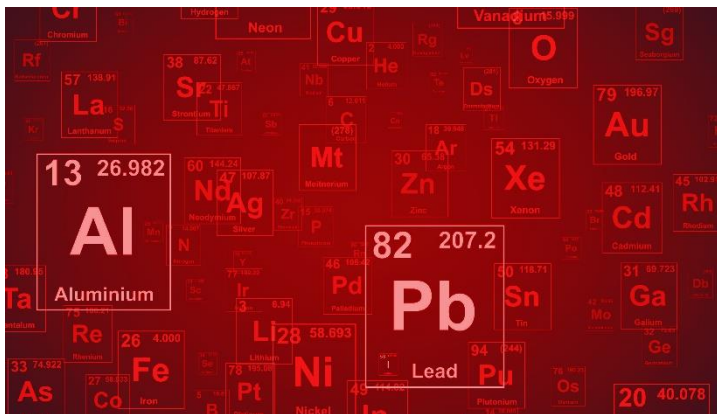
# Let's have a look at throughput



	SQ-ICP-MS		TQ-ICP-MS TQ-O <sub>2</sub>	
	KED Single Mode	KED and H <sub>2</sub>	TQ-O <sub>2</sub> Single Mode	SQ-KED and TQ-O <sub>2</sub>
Analysis time per sample including uptake/wash [s]	200	239	200	217
Total Runtime [min] and time saving for 100 samples	333 + 0 minutes	398 + 65 minutes	333 + 0 minutes	362 + 31 minutes
Polyatomic interferences	✓			
Other interferences (e.g. REE)?	✗		✓	
Confidence all interferences are under control	✗		✓	

- The data shown corresponds to a sequence containing 40 individual elements
- For 100 samples, a time saving of at least 30 minutes can be realized when using a single mode
- Compared to methods using additional gases, the time savings can be even more significant

# Advantages of TQ-ICP-MS over SQ-ICP-MS



## Better Interference Removal

- There are many elements that could be biased unexpectedly
- Existing methods can be combined with TQ modes where needed!



## Better Sensitivity and LOD's

- New applications come with new challenges (i.e. interferences)
- Especially critical contaminants can benefit from a TQ-ICP-MS



## Option to increase productivity

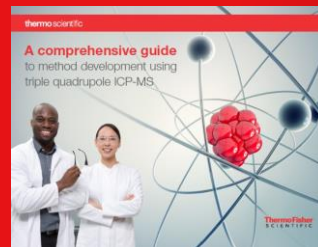
- Sample turnover times can be as fast as a single quad – or faster
- Method development can't be easier!

**There are good reasons for TQ-ICP-MS in a busy laboratory**



# Summary and Conclusion

- **There are many reasons why a TQ-ICP-MS should be found in a laboratory**
  - Superior interference removal avoids unnecessary interruptions
  - Better detection limits and increased confidence
- **TQ-ICP-MS is all but complicated**
  - Straightforward method development using Reaction Finder Method Development Assistant
  - Easy install and cost-efficient operation with He and O<sub>2</sub> as collision/reaction gases only
- **It has never been easier to future-proof**
  - Similar and often faster turnover times can be achieved compared to SQ-ICP-MS methods
  - Increase productivity and performance



Download our TQ-ICP-MS toolkit including a Method Development Guide under  
[www.thermofisher.com/tqtoolkit](http://www.thermofisher.com/tqtoolkit)

# New Resource

## Guide for environmental sample analysis by ICP-MS

### If your laboratory is

- Experiencing analytical challenges, inaccurate results, and sample reruns
- Seeking to streamline current methodologies and workflows
- Starting up or preparing for environmental sample analysis by ICP-MS

our eBook, ***“Guide for Environmental Sample Analysis by ICP-MS: Recommendations for Getting Started and Best Practices to Streamline Workflow,”*** serves as a helpful resource

### Topics include:

- Considerations and tips for selecting laboratory apparatus, equipment, reagents, and standard solutions
- Best practices for the entire elemental analysis workflow
- Best practices and tips to streamline sample and standard preparations
- Recommended pre-calibration routines and instrument inspections
- General instrument maintenance and troubleshooting tips and tricks

<https://www.thermofisher.com/us/en/home/global/forms/industrial/environmental-sample-analysis-by-icp-ms-ebook.html>



### Guide for environmental sample analysis by ICP-MS:

Recommendations for getting started and best practices to streamline workflow

by Sabrina Antonio



Visit this page or scan  
the QR code to  
download the eBook



# New Story - The Flint Community Lab

## Turning The Taps On Without Fear

The Flint Community Lab was born from the Flint water crisis where tens of thousands of residents were exposed to dangerous levels of lead in their tap water. The consequences were devastating and to this day basic use of tap water is not possible. To restore trust in the water supply and maintain vigilance, an old school was converted to the Flint Community Lab where water samples collected from homes are tested for lead, copper, and other metal contaminants. Thermo Fisher Scientific assisted with this initiative and donated an [ICP-MS instrument](#) enabling high school and college chemistry students to learn about the technology and perform the testing.

To learn more and watch a video about this compelling story, please visit the following pages:

Webpage: <https://www.thermofisher.com/us/en/home/step-beyond/turning-the-taps-on-without-fear.html>

YouTube: <https://www.youtube.com/watch?v=NWMhgRrPG1I>

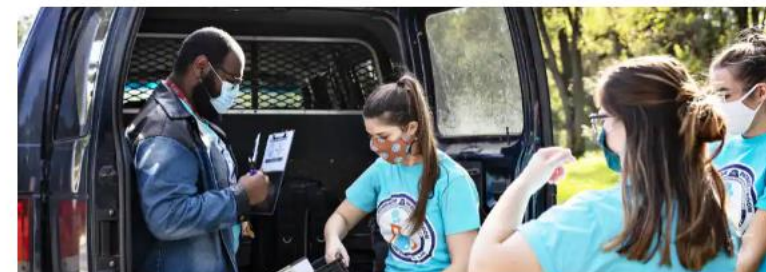
[www.thermofisher.com/flint-michigan](https://www.thermofisher.com/flint-michigan)



Bathing your child. Drinking a glass of water. Even brushing your teeth with tap water is no longer possible for the community of Flint, Michigan. "It can't be done," says Michael Harris, founder of The McKenzie Patrice-Groom Flint Community Lab.

In 2014, the city of Flint failed to treat its water with corrosion inhibitors, resulting in lead leaching out of the water pipes and into the water that supplied the homes of tens of thousands of people. The consequences were devastating. Once lead enters your system, it stays in your blood for around two weeks, before seeping into your bones and brain, where it can cause neurological disorders, behavioral issues in children, and sterilization and miscarriages in women. "What happened in Flint was a huge breakdown of trust," Candice Mushatt, head of the Flint Community Lab, explains. "We needed a way to restore the trust in our water and we needed a way for our residents to be empowered."

And so, the Flint Community Lab was born.



# Thank you

