# Rapid Sample Assessment and Assisted Method Development for ICPOES Analysis Using the Agilent IntelliQuant Tool

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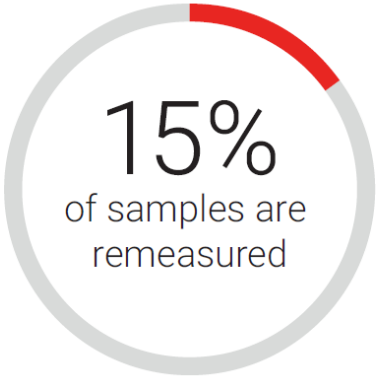
# All labs remeasure some of their ICP-OES samples.
# **Do you know how much remeasurement is costing you?**

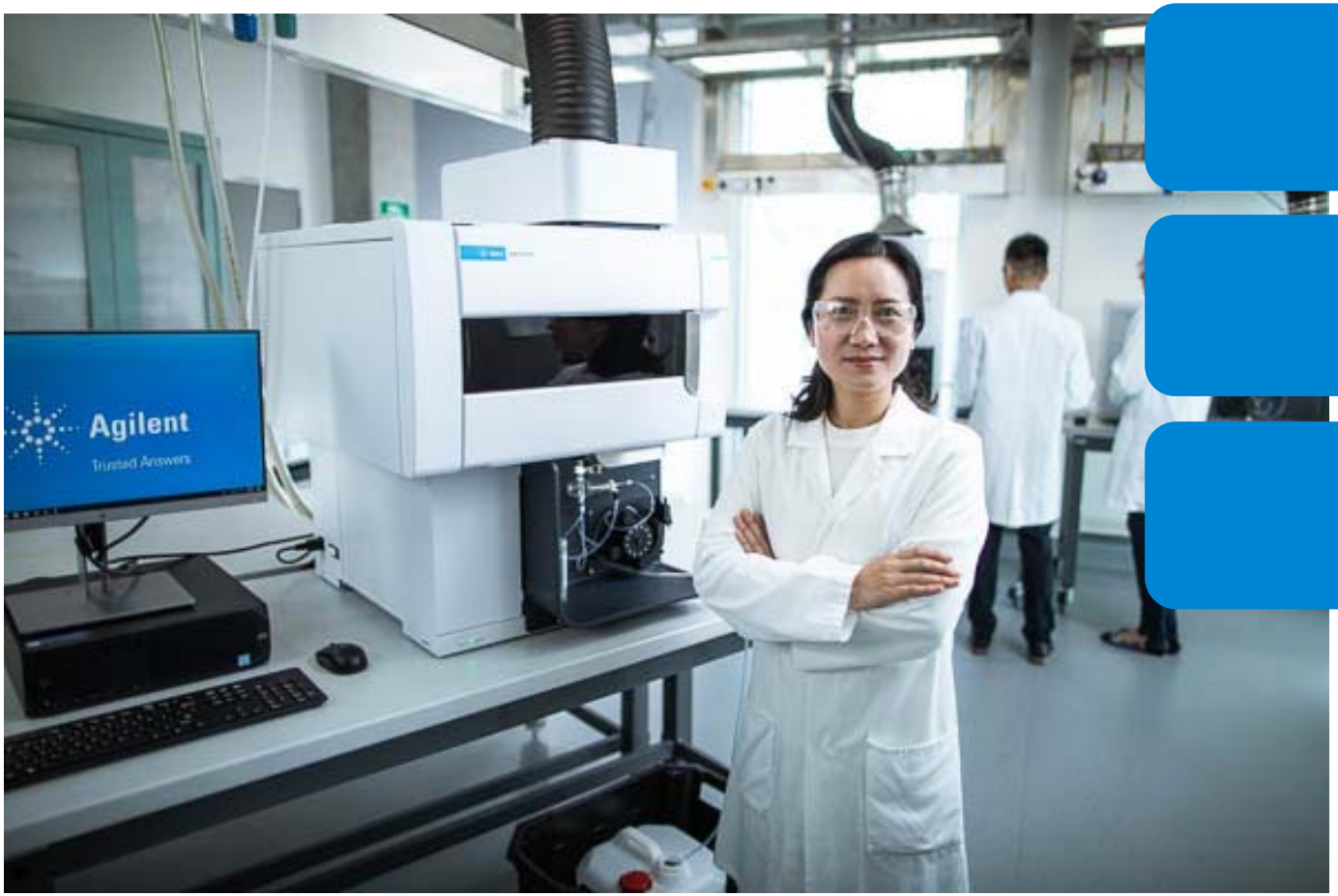
A recent online poll showed the average amount of remeasurement is 15%.




For a small to medium lab* this will consume almost 2 additional weeks per year

* 250 samples per week, 2.5 minutes ICP-OES analysis time per sample

# Agilent Smart Tools reduce your remeasurement




Intelligent

Efficient

Confident

# What issues lead to sample remeasurement?

## Sample Related

## Operation Related

# 5800 ICP-OES introduces smart tools to reclaim your wasted time

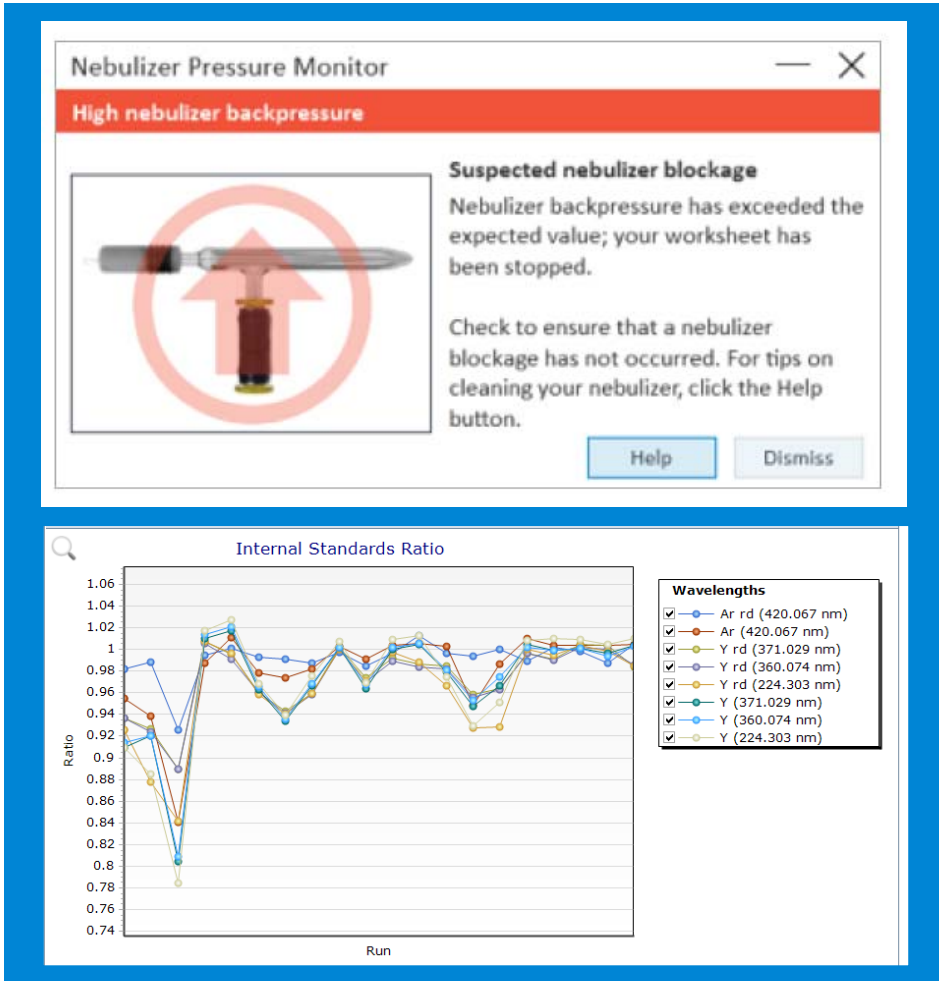
Use Smart Tools to gain insights into your **instrument operation** to reduce remeasurement

- NebAlert
- Outlier Conditional Formatting (OCF)
- Early Maintenance Feedback (EMF)
- Automated air filter blockage alert
- Automated instrument performance tests
- Intelligent rinse
- Plasma ignition optimization
- Internal standard monitor

Smart Tools

Operational Insights

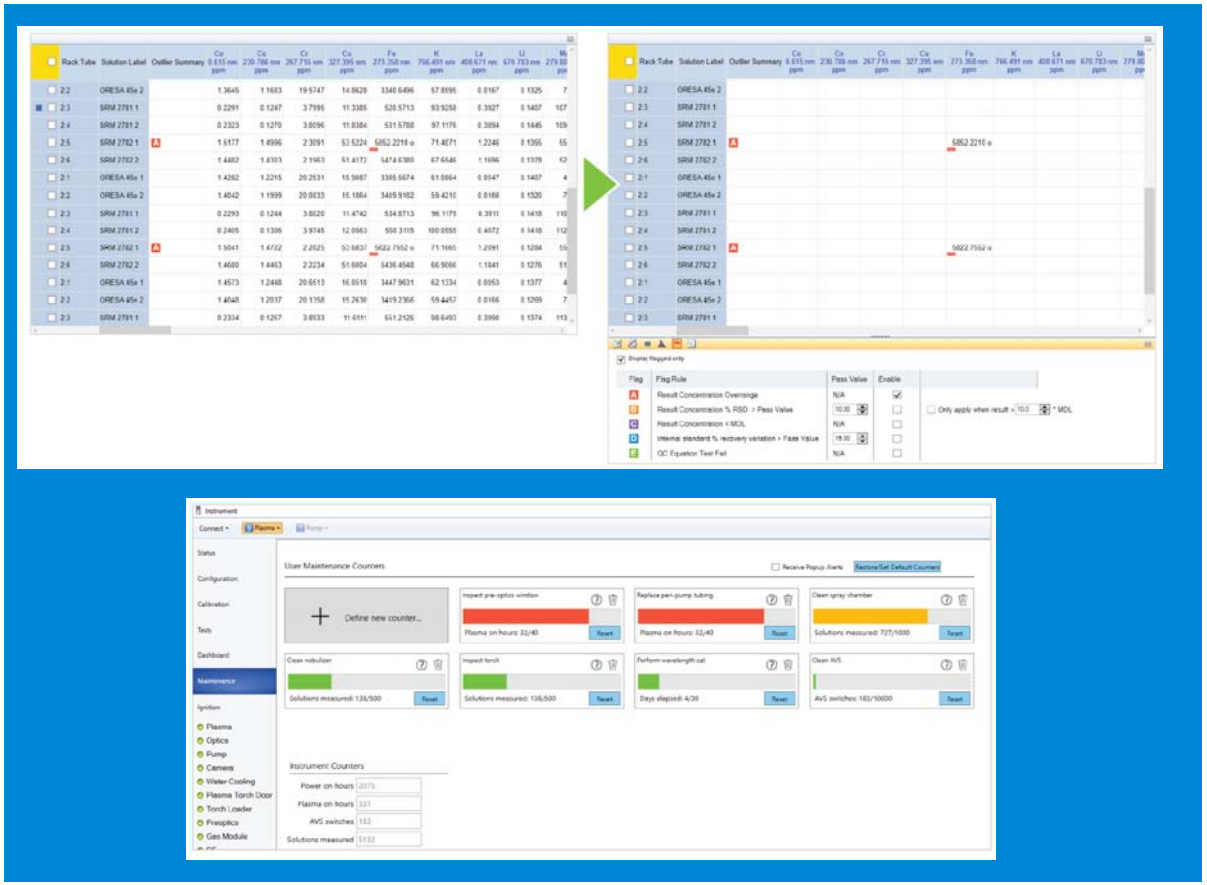
# Smart tools for operational insight




NebAlert

Internal Standard monitor

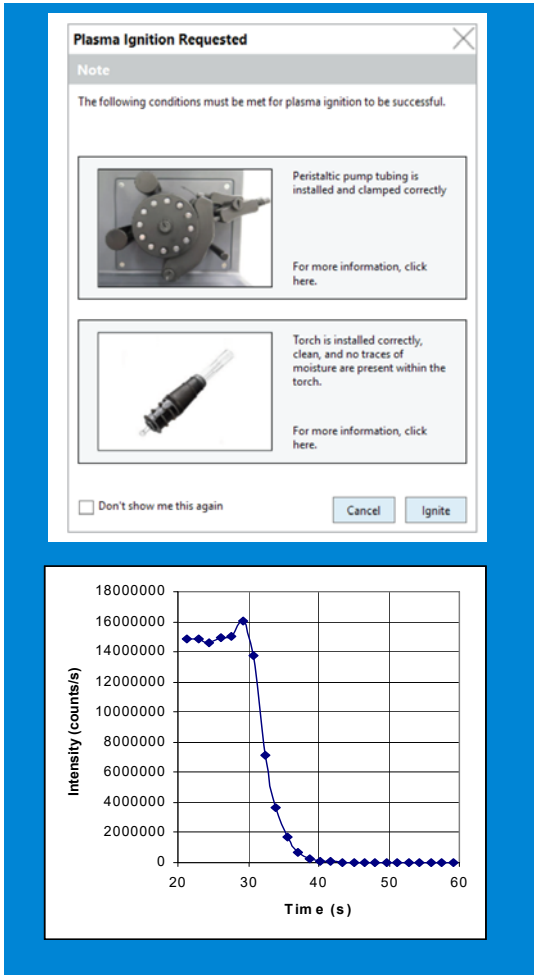
# Smart tools for operational insight



Outlier Conditional Formatting (OCF)

Early Maintenance Feedback (EMF)

# Smart tools for operational insight







Optimized plasma ignition

Intelligent Rinse

# What issues lead to sample remeasurement?

**Sample Related**

**Operation Related**

# Smart tools that reduce your remeasurement

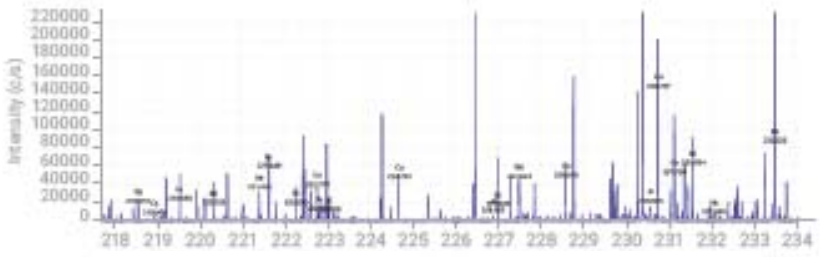
Use Smart Tools to gain **insights into your samples**

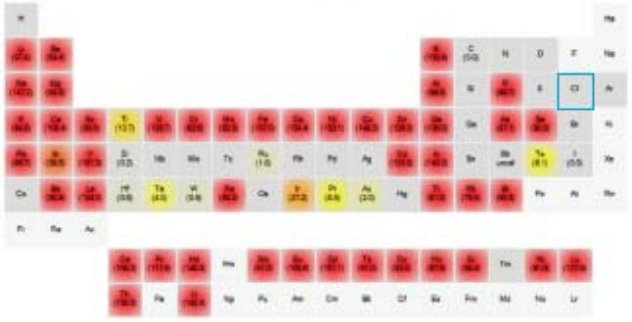
- IntelliQuant *2.0*
  - Full spectrum scan
  - Identify sample preparation and chemical compatibility mistakes
  - Automated spectral interference identification
  - Understand sample composition
- IntelliQuant Screening
- Internal Standard Monitor
- Argon Emission Monitor

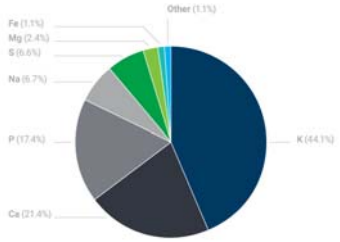
Smart Tools

Sample Insights

# IntelliQuant 2.0 features to help reduce re-measurement





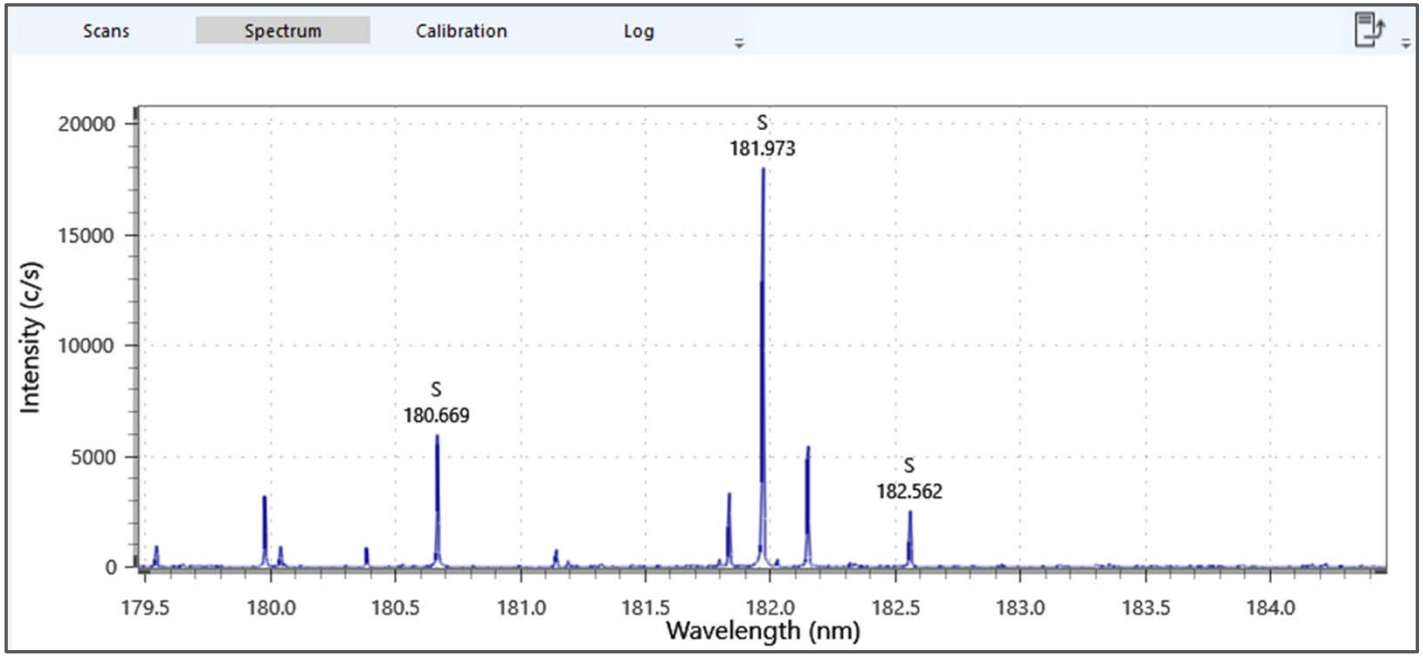

Full spectrum scan shows everything that is in the sample

Periodic table heat map with semi-quant values to quickly identify sample preparation mistakes.

Smart view to identify composition of a sample

# IntelliQuant 2.0 features to help reduce re-measurement

Full spectrum scan shows everything that is in the sample



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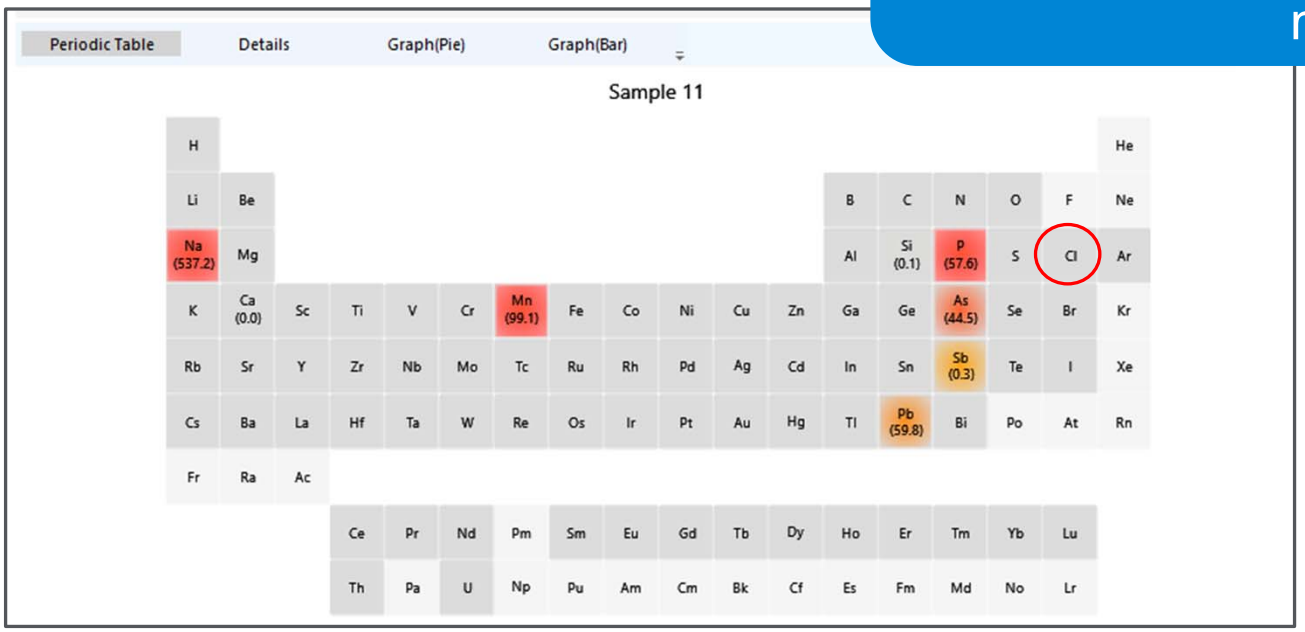
# IntelliQuant 2.0 features to help reduce re-measurement

Periodic table heat map with semi-quant values to quickly identify potential spectral interferences and sample preparation mistakes.



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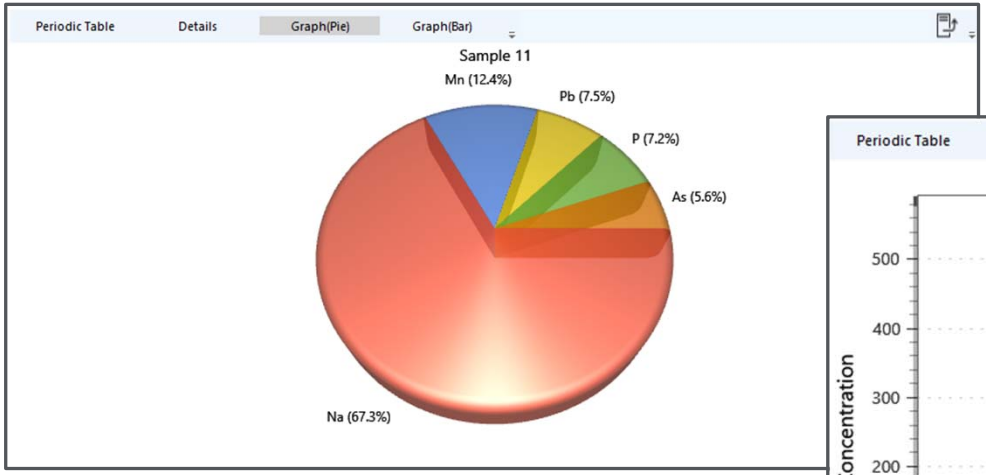
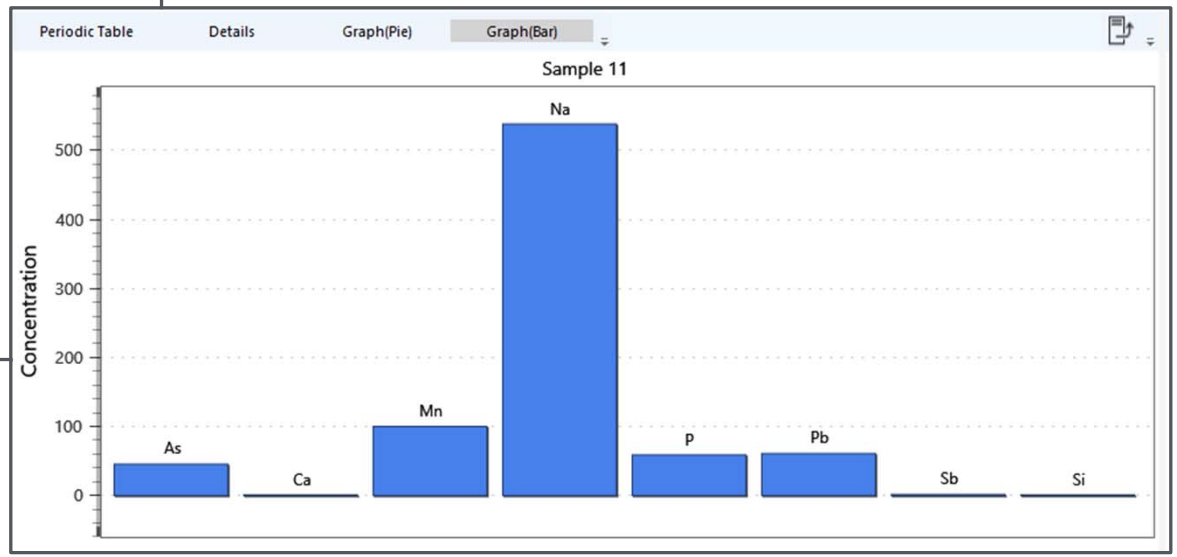
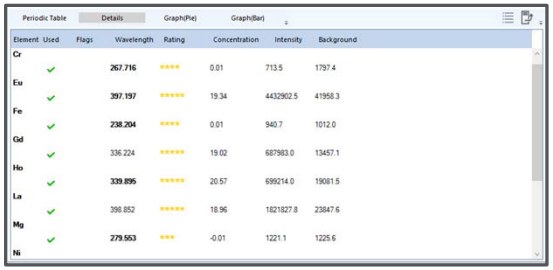
# IntelliQuant 2.0 features to help reduce re-measurement

Smart view to identify composition of a sample

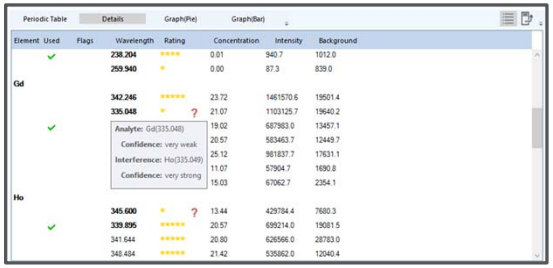


# IntelliQuant 2.0 features to help with method development




List of recommended wavelengths based on standard IntelliQuant analysis or IntelliQuant screening

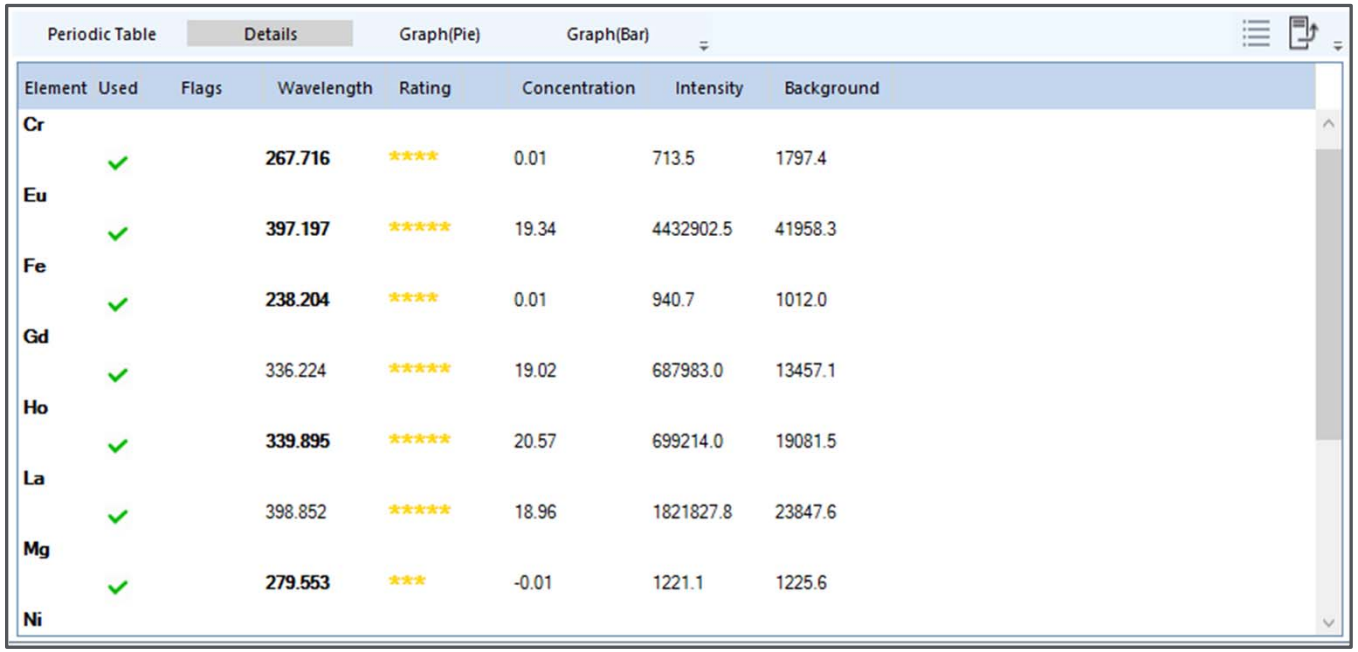



Star rating system for analyte wavelengths along with question marks next to concentration outliers or those with spectral interferences

Background-corrected scans at multiple wavelengths to confirm presence or absence

# IntelliQuant 2.0 features to help with method development

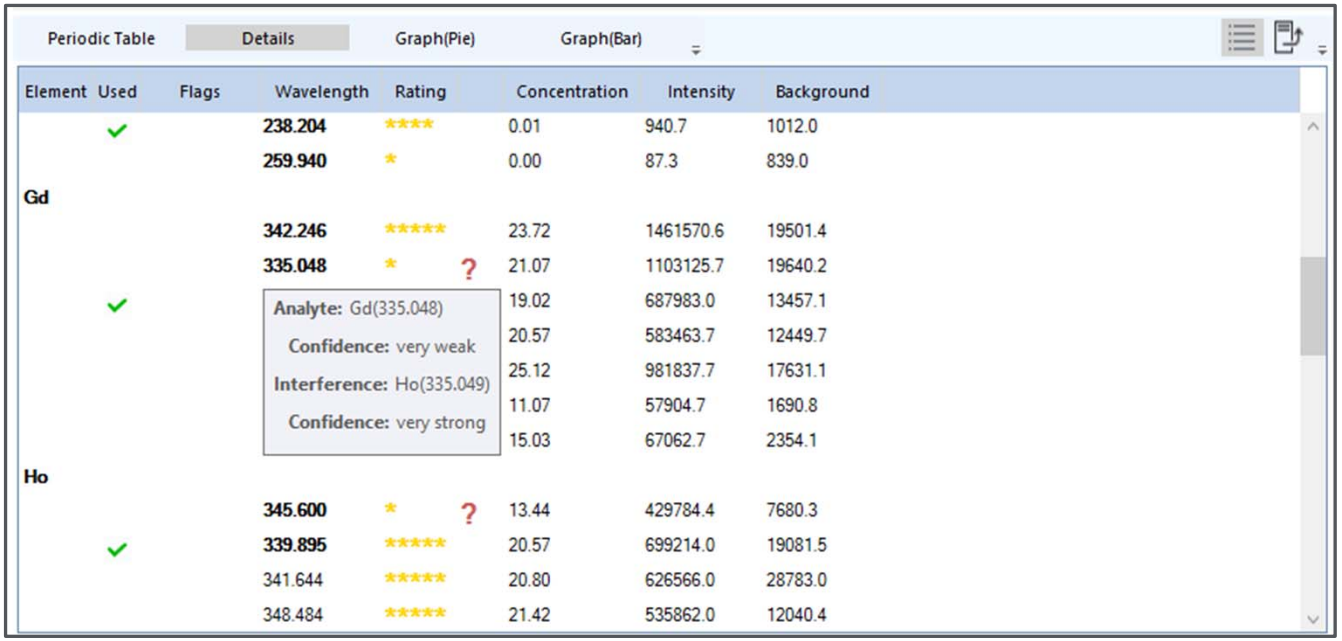
List of recommended wavelengths based on standard IntelliQuant analysis or IntelliQuant screening




| Element | Used | Flags | Wavelength | Rating | Concentration | Intensity | Background |
|---|---|---|---|---|---|---|---|
| Cr | | | | | | | |
| | ✓ | | **267.716** | **** | 0.01 | 713.5 | 1797.4 |
| Eu | | | | | | | |
| | ✓ | | **397.197** | ***** | 19.34 | 4432902.5 | 41958.3 |
| Fe | | | | | | | |
| | ✓ | | **238.204** | **** | 0.01 | 940.7 | 1012.0 |
| Gd | | | | | | | |
| | ✓ | | 336.224 | ***** | 19.02 | 687983.0 | 13457.1 |
| Ho | | | | | | | |
| | ✓ | | **339.895** | ***** | 20.57 | 699214.0 | 19081.5 |
| La | | | | | | | |
| | ✓ | | 398.852 | ***** | 18.96 | 1821827.8 | 23847.6 |
| Mg | | | | | | | |
| | ✓ | | **279.553** | *** | -0.01 | 1221.1 | 1225.6 |
| Ni | | | | | | | |

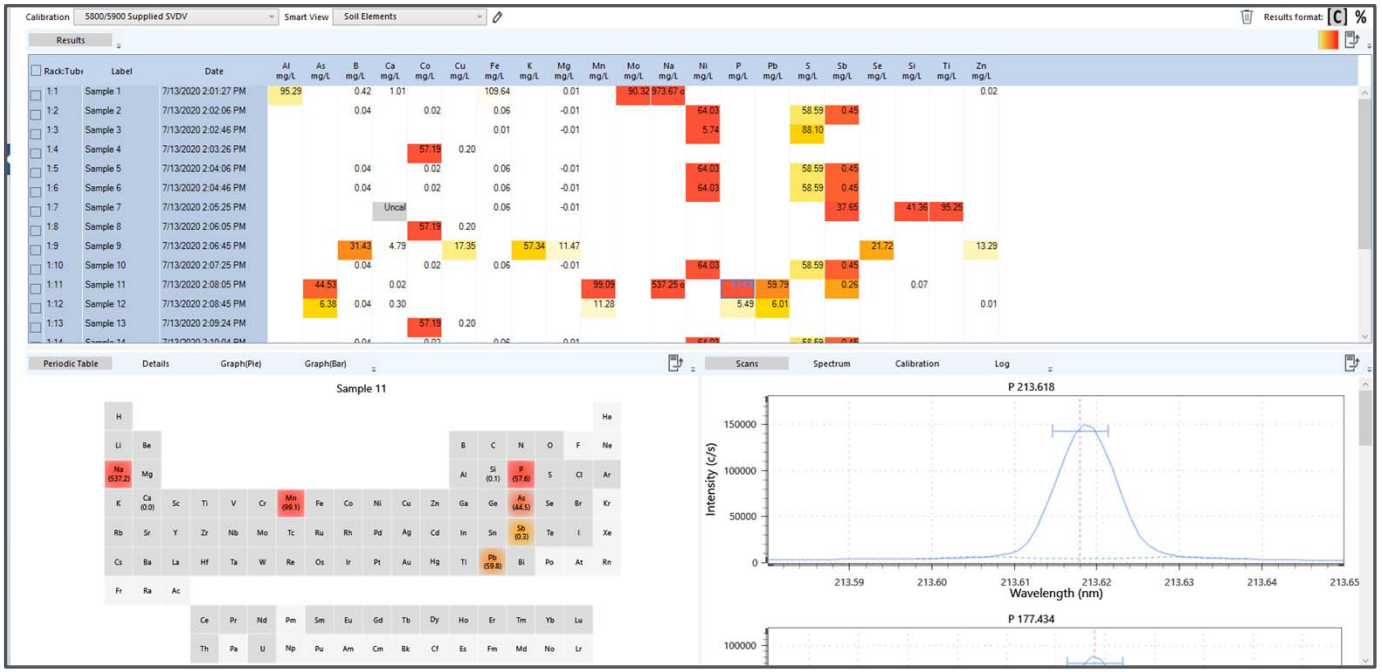
# IntelliQuant 2.0 features to help with method development

Star rating system for analyte wavelengths along with question marks next to concentration outliers or those with spectral interferences



# IntelliQuant 2.0 features to help with method development

Background-corrected scans at multiple wavelengths to confirm presence or absence



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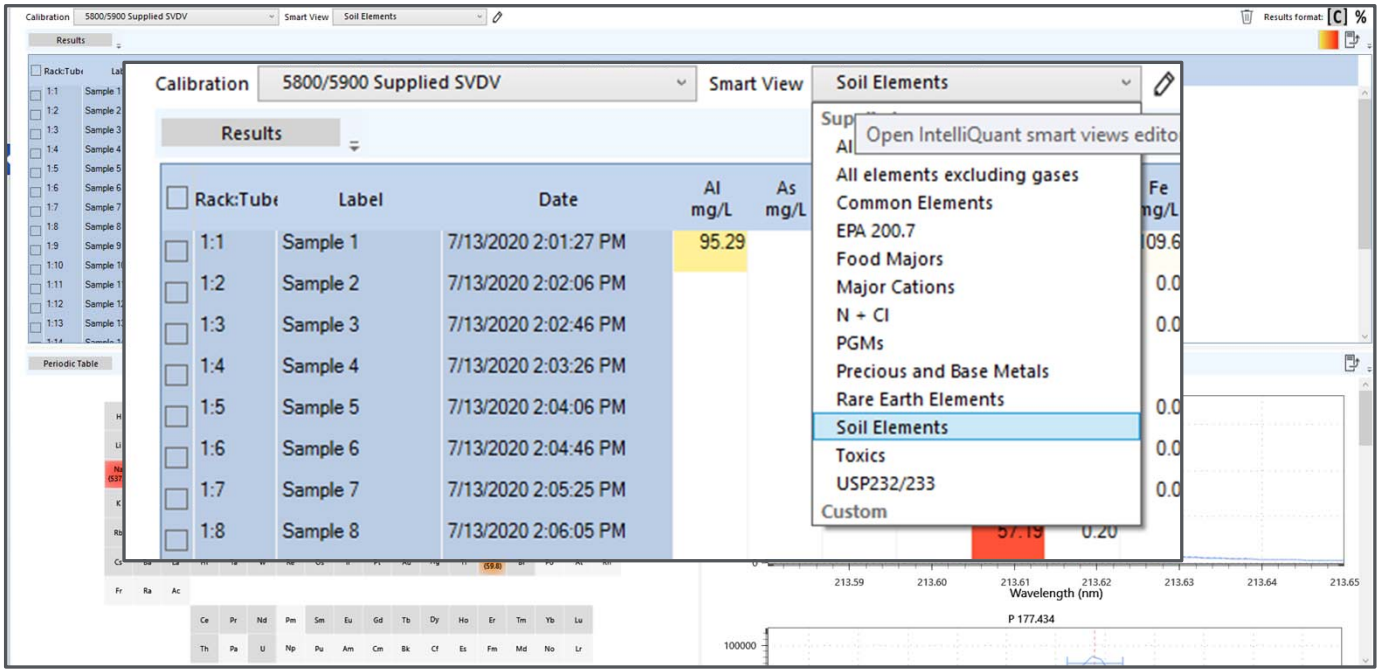
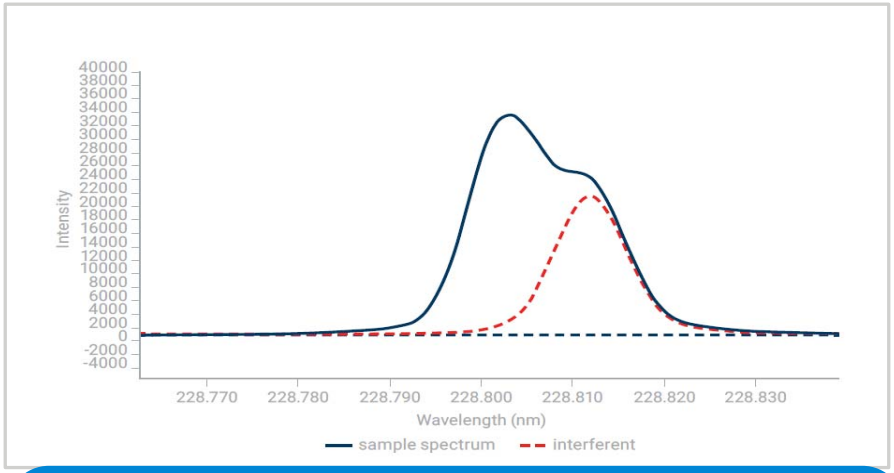


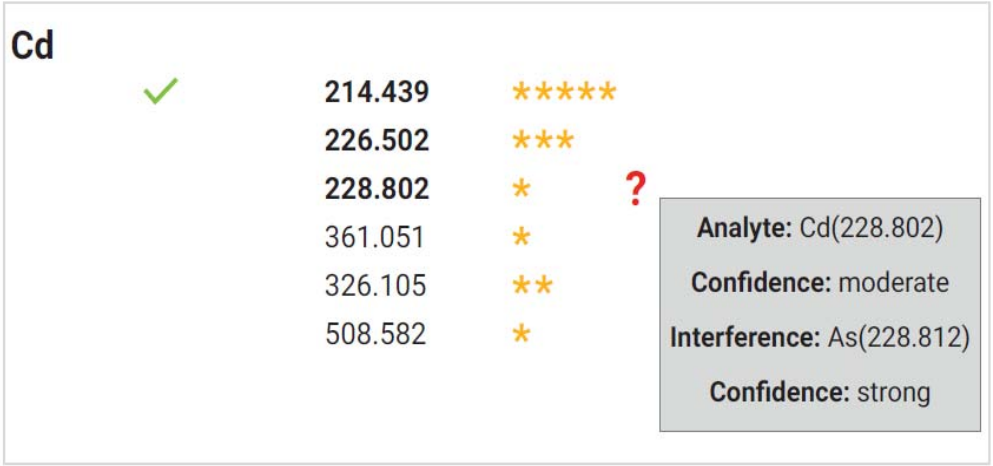

- Customizable element lists
- Customizable calibrations

# How does IntelliQuant *2.0* reduce your remeasurements?

Get greater **sample insight** by automatically detecting spectral overlap.




Cd 228.802nm has unusual peak shape. User is unsure about this result. (User will not see red interferent spectrum, this was added in to help understand existence of overlap)




IntelliQuant automatically identifies Cd 228 had a spectral overlap and ranked it low with one star. IntelliQuant identified that Cd 214.439nm was the best wavelength to report a result with five stars. Data analytics is used to rank the wavelengths.

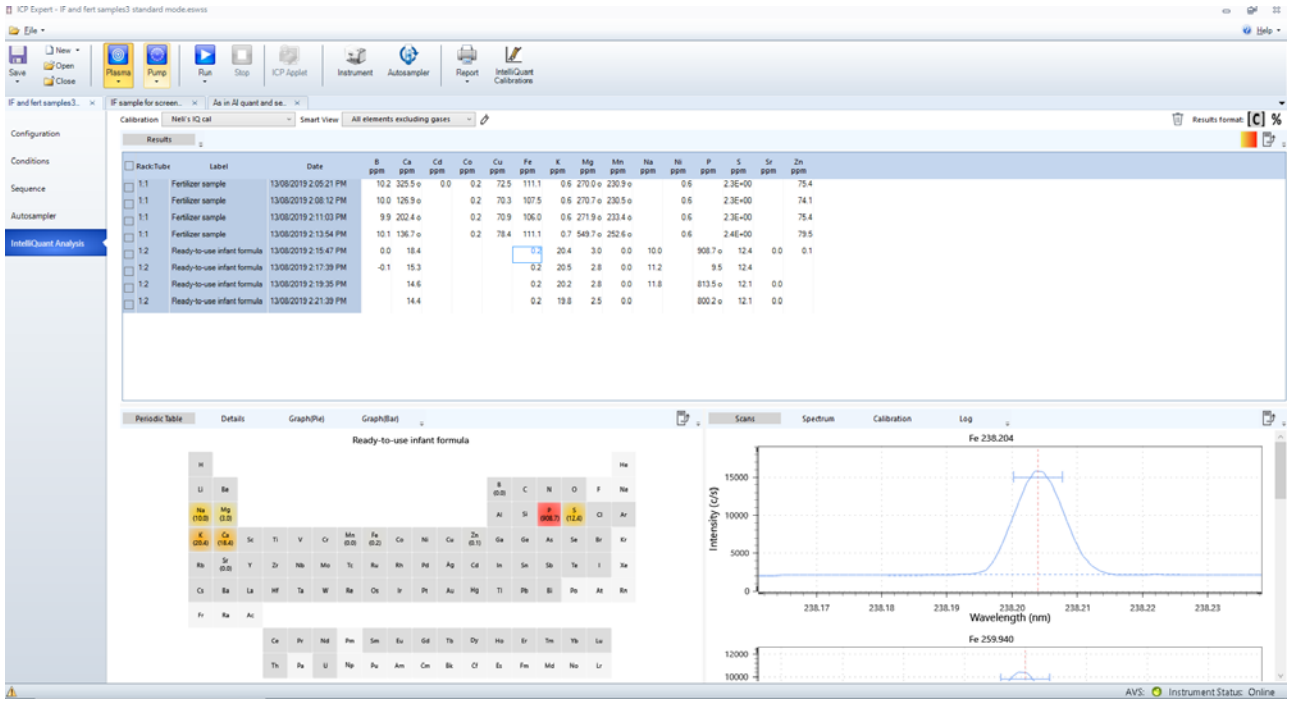
*Based on a user inserted %RSD threshold in OCF smart tool

# How does IntelliQuant *2.0* reduce your remeasurements?

Have semi quant result in ~20s*

Know what is in the sample to avoid interference

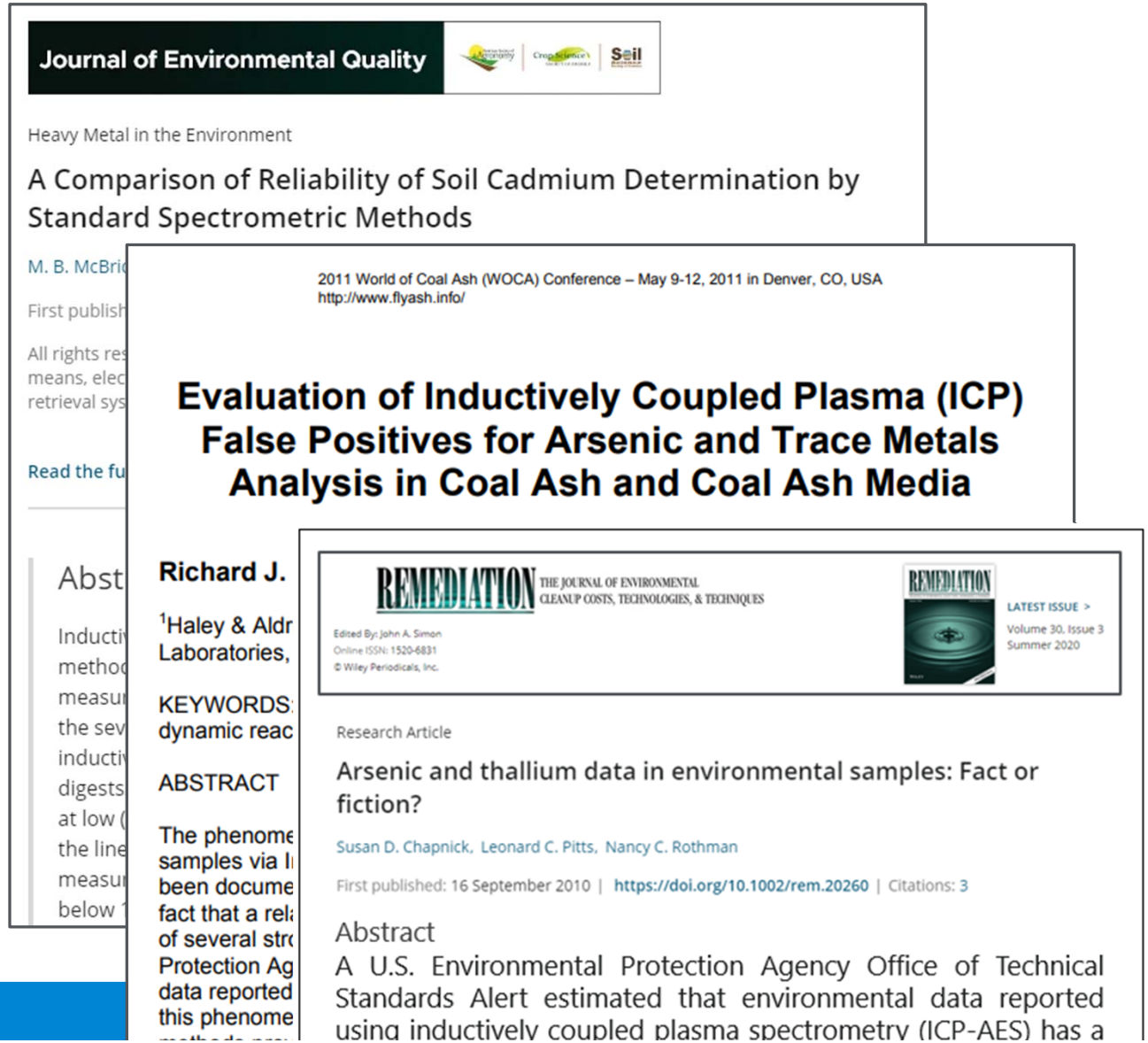
Know what concentration to make the calibration standards




*20s achieved using automation

# Real World Examples:

- EPA OTS report estimated that ICP has a 99.9% false positive rate for Tl and 25-50% for As
- Similar observations have been made regarding Cd data in soils containing significant amounts of As
- This can lead to expensive and unnecessary remediation and possible exposure to legal action

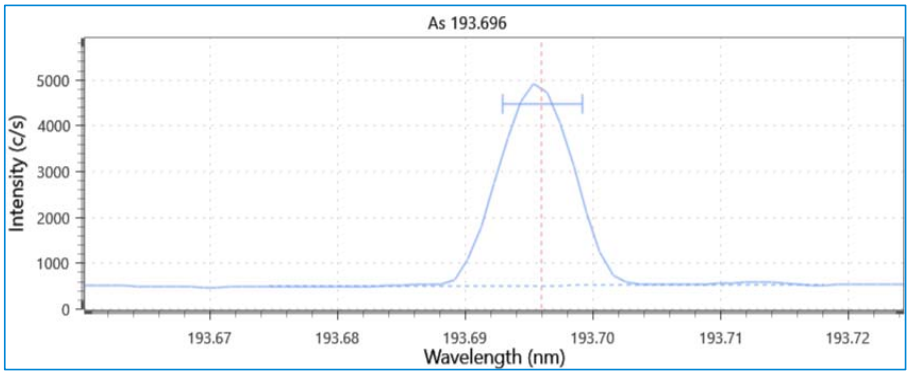


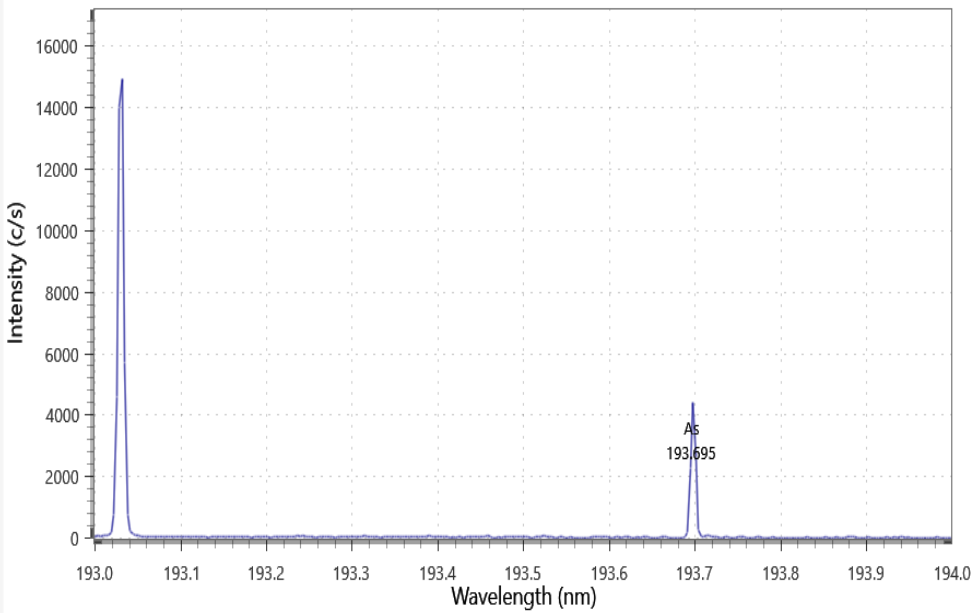
# Real World Examples

## Al interference on As in earth sample

US EPA method 6010 recommends the As193.696 nm emission line

| Element | Used | Flags | Wavelength | Rating | Concentration | Intensity | Background |
|---|---|---|---|---|---|---|---|
| As | | | | | | | |
| | | | **188.980** | ***** | 1.82 | 5841.9 | 495.6 |
| | | | 193.696 | **** | 1.80 | 4278.1 | 502.2 |
| | | | 197.198 | ***** | 1.85 | 4129.4 | 771.9 |
| | | | 228.812 | **** | 1.86 | 2452.8 | 973.9 |
| | | | 234.984 | **** | 1.84 | 4687.7 | 2419.7 |




2 mg/L As in 0ppm Al (minimal background signal). Carbon emission line at 193.028 nm)

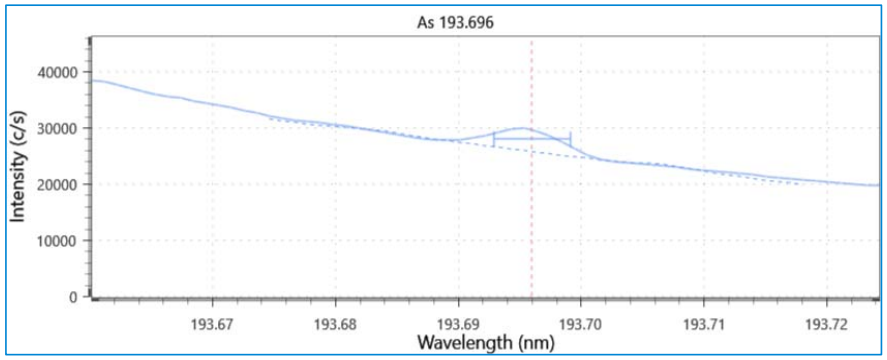
INSET – As wavelength scan at 193.696 nm

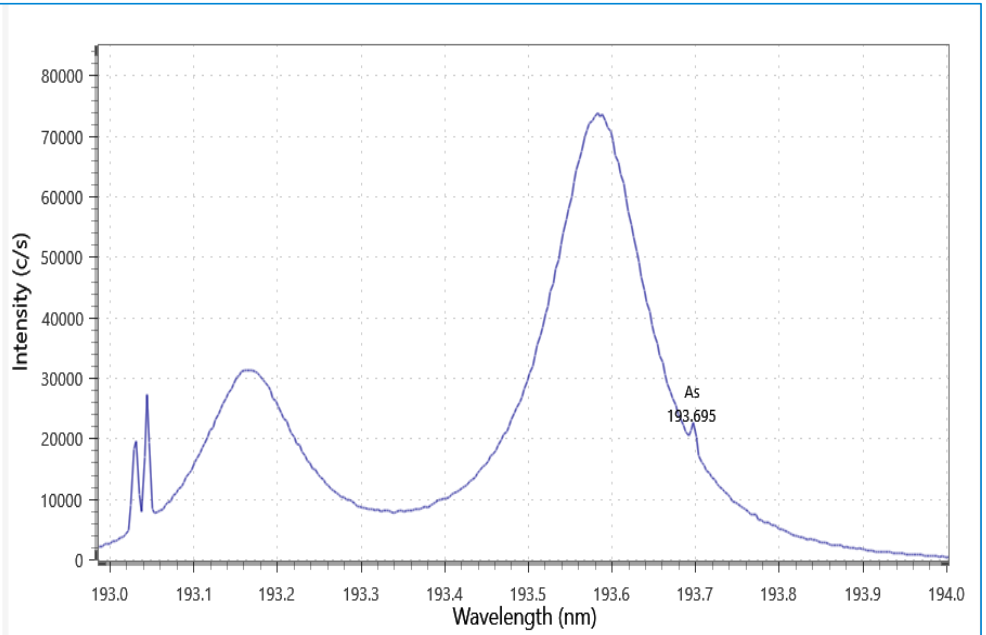
# Real World Examples

## Al interference on As in earth sample

US EPA method 6010 recommends the As193.696 nm emission line

| Element | Used | Flags | Wavelength | Rating | Concentration | Intensity | Background |
|---|---|---|---|---|---|---|---|
| As | | | | | | | |
| | | | 188.980 | **** | 1.72 | 5516.1 | 4549.7 |
| | | | 193.696 | * | 1.65 | 3919.9 | 25746.2 |
| | | | 197.198 | *** | 1.80 | 4014.5 | 9379.9 |
| | | | 228.812 | *** | 1.72 | 2274.6 | 1589.1 |
| | ✓ | | 234.984 | ***** | 1.67 | 4268.1 | 2919.1 |




2 mg/L As in 5,000ppm Al (broad aluminum auto-ionizing doublet is clearly visible)

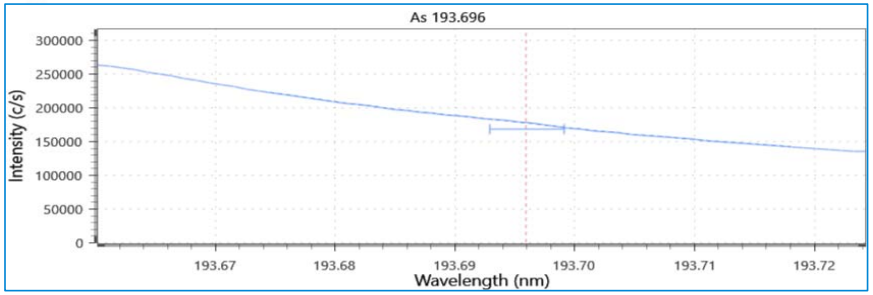
INSET – As wavelength scan at 193.696 nm

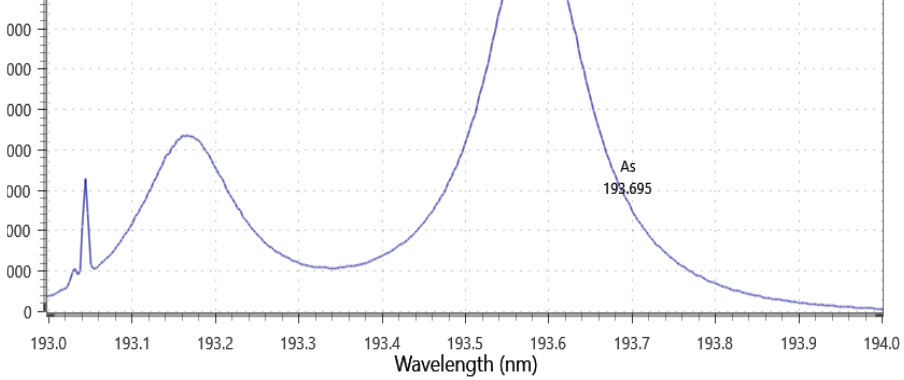
# Real World Examples

## Al interference on As in earth sample

US EPA method 6010 recommends the As193.696 nm emission line

| Element | Used | Flags | Wavelength | Rating | Concentration | Intensity | Background |
|---|---|---|---|---|---|---|---|
| As | | | | | | | |
| | | | 188.980 | ** | 1.07 | 3453.6 | 27500.3 |
| | | | 193.696 | * | 0.56 | 1334.1 | 176791.4 |
| | | | 197.198 | * | 1.32 | 2952.9 | 61540.7 |
| | | | 228.812 | *** | 1.00 | 1336.4 | 4824.7 |



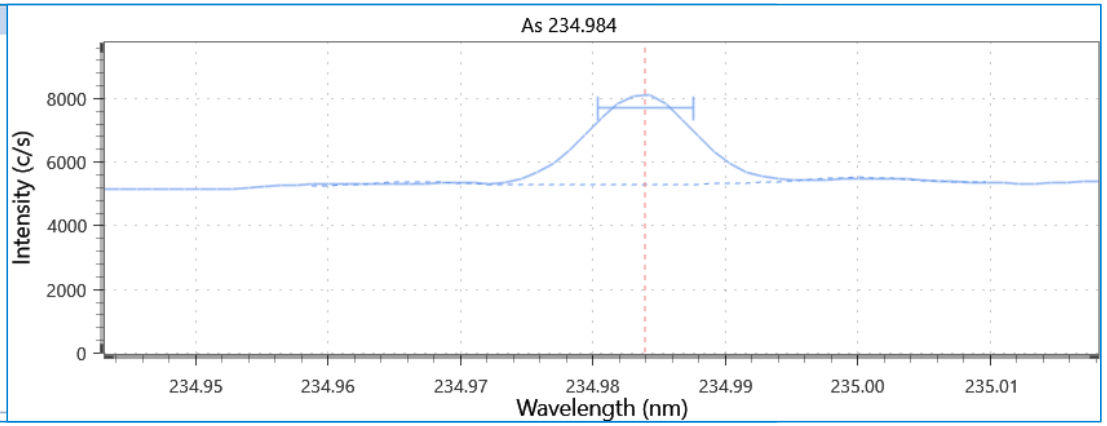




2 mg/L As in 50,000ppm Al
INSET – As wavelength scan at 193.696 nm

# The Solution: IntelliQuant for High Aluminium on As

## How do I recognize when Al is affecting my results?

| Element | Used | Flags | Wavelength | Rating | Concentration | Intensity | Background |
|---|---|---|---|---|---|---|---|
| As | | | | | | | |
| | | | 188.980 | ** | 1.07 | 3453.6 | 27500.3 |
| | | | 193.696 | * | 0.56 | 1334.1 | 176791.4 |
| | | | 197.198 | * | 1.32 | 2952.9 | 61540.7 |
| | | | 228.812 | *** | 1.00 | 1336.4 | 4824.7 |
| | ✓ | | 234.984 | *** | 1.07 | 2801.8 | 5278.0 |

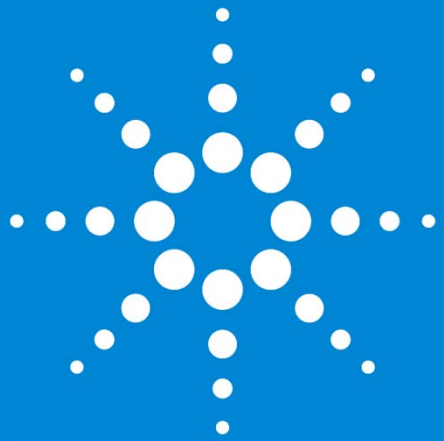



2 mg/L As in 50,000ppm Al

IntelliQuant analyzes a suite of As lines for SRBR and recommends As 234.984nml line in the presence of high Al.

IntelliQuant informs the operator that the result from the As 193 line is of poor quality for this particular sample and recommends a suitable alternative wavelength with a lower MDL.

# Thank you for your attention!
# Questions?



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