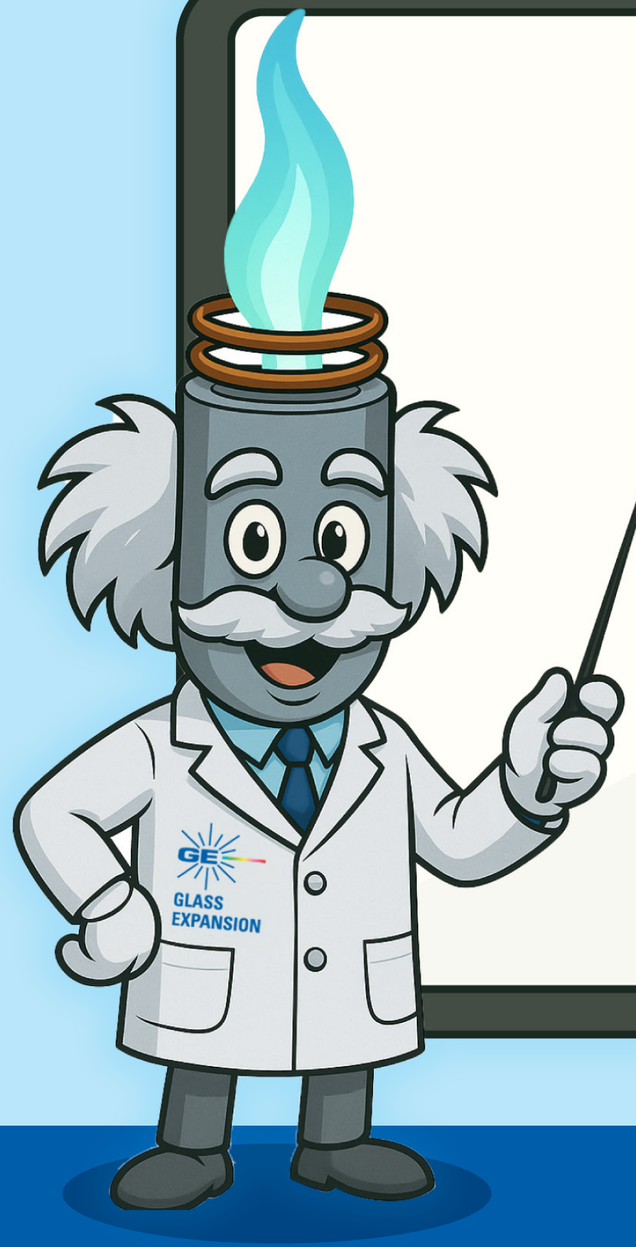
Plasma Pro Tips

Spray Chamber Secrets, Part 1:

What's Torque Got to Do with It?



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Today’s Class

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*Let’s learn how the spray chamber is really a filter, and how you can turn your method from **standard** to **superior.***

01

Aerosol filtration

How the spray chamber turns the primary aerosol from the nebulizer into the tertiary aerosol the plasma can actually use.

02

Design features that do the filtering

Droplet separation, chamber volume, geometry, and drainage – and how each one shows up in your data.

03

Why torque matters

How hard you tighten the nebulizer changes sensitivity. Most labs never think about it.

04

Helix CT “click-to-seal”

The same inert seal, at the same depth, every time. One less variable, and one less thing to think about.

The Spray Chamber Is a Filter

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Quality of aerosol ∝ quality of results

Primary aerosol

Produced by the nebulizer. Contains a wide mix of droplet sizes formed by high-velocity argon interacting with the liquid sample.

The filter step

The spray chamber rejects droplets that are too large or too fast. Those droplets become waste, they never reach the plasma.

Tertiary aerosol

The final aerosol that exits the chamber and enters the plasma.

The goal is to achieve a higher fraction of droplets under 10 µm.



Why large droplets are a problem

A smaller, more uniform tertiary aerosol needs less energy from the plasma. Larger droplets can cool and destabilize the plasma, and in general will pass through the entire plasma, never fully desolvating, vaporizing, atomizing. In the worst case, this can extinguish the plasma if the load gets too high.

For the best transport efficiency, you want a higher concentration of droplets with a diameter of 10 µm or less.

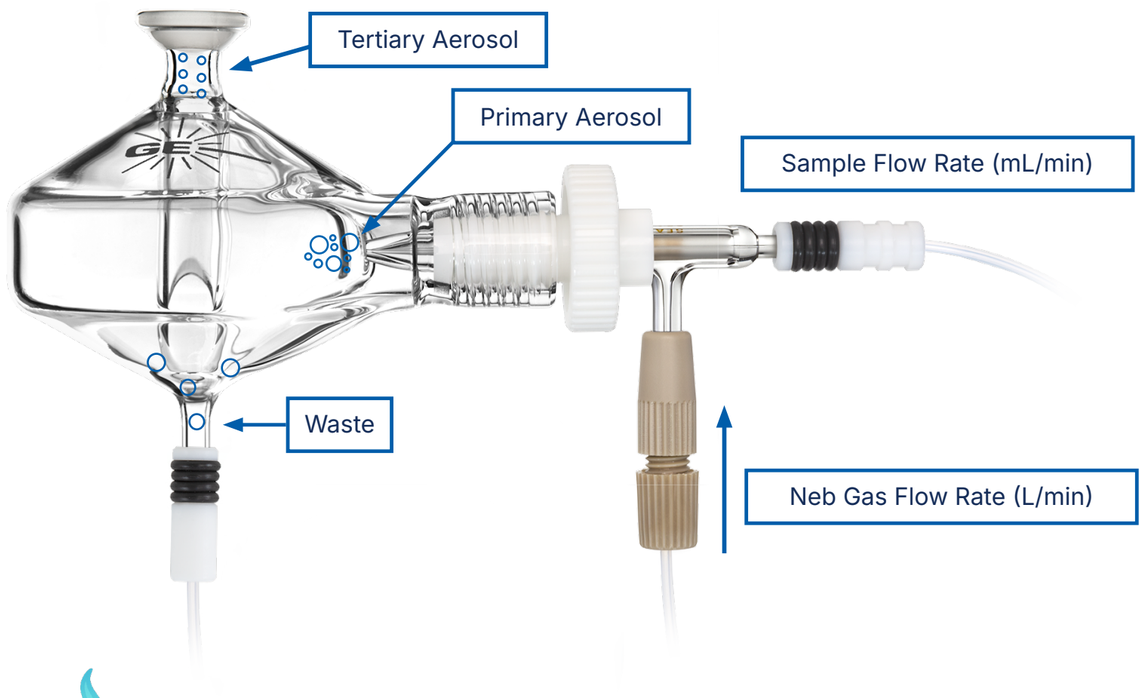
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How Cyclonic Design Does the Filtering

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Engineering parameter → analytical impact

Droplet separation

Removes large and fast droplets

Improved plasma stability

Internal volume

Controls aerosol residence time

Stabilization time and washout efficiency

Chamber geometry

Governs aerosol circulation

Precision and transport efficiency

Drainage

Removes excess liquid cleanly

Reduced pulsation and drift

How Design Impacts Analytical Performance

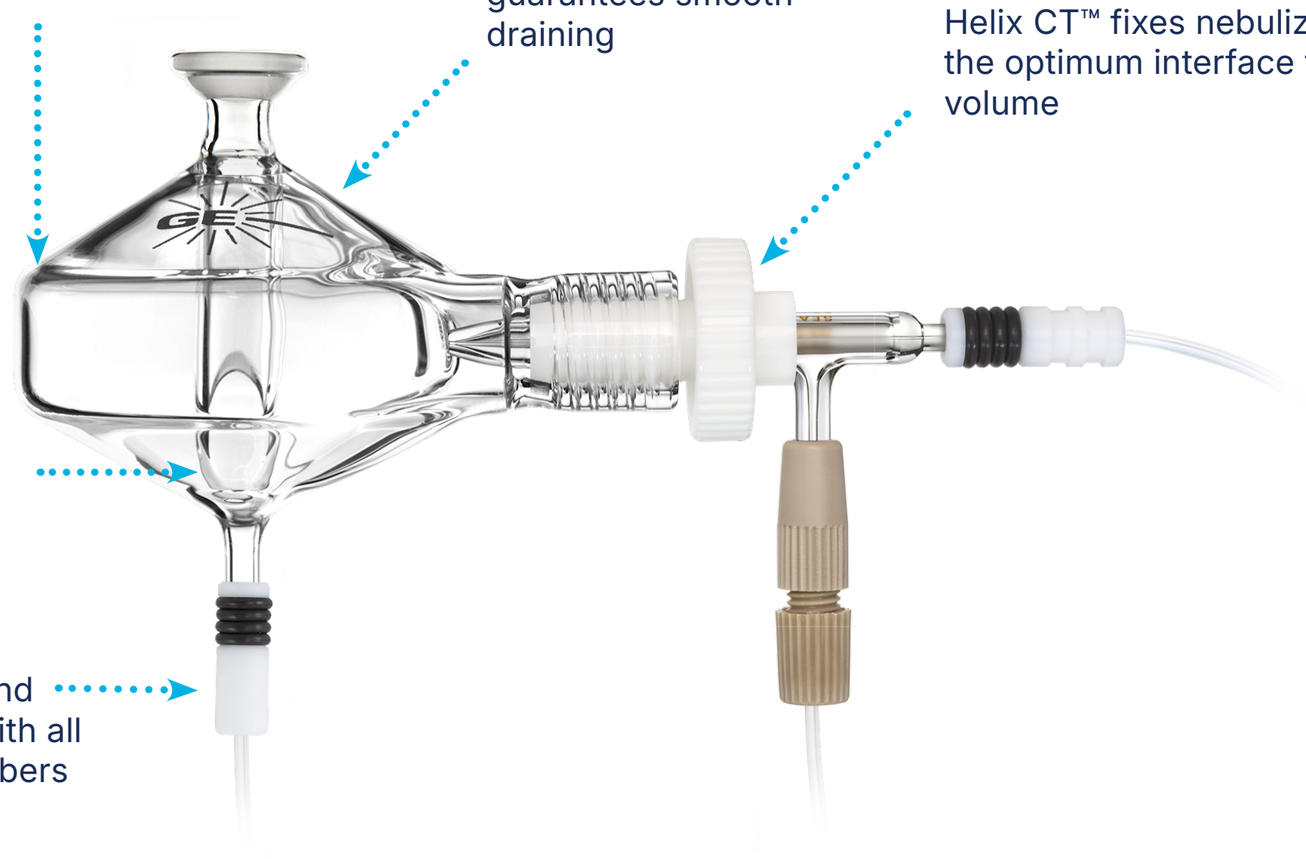
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Each of these features is there for a reason, when one falls short, it shows up in your data!

Vertical wall ensures maximum transport efficiency

Precisely placed groove guarantees smooth draining

Helix CT™ fixes nebulizer depth and provides the optimum interface for minimizing dead volume



Baffle cut at angle and fused to bottom prevents droplet formation

UniFit™ connector and capillary included with all pumped drain chambers

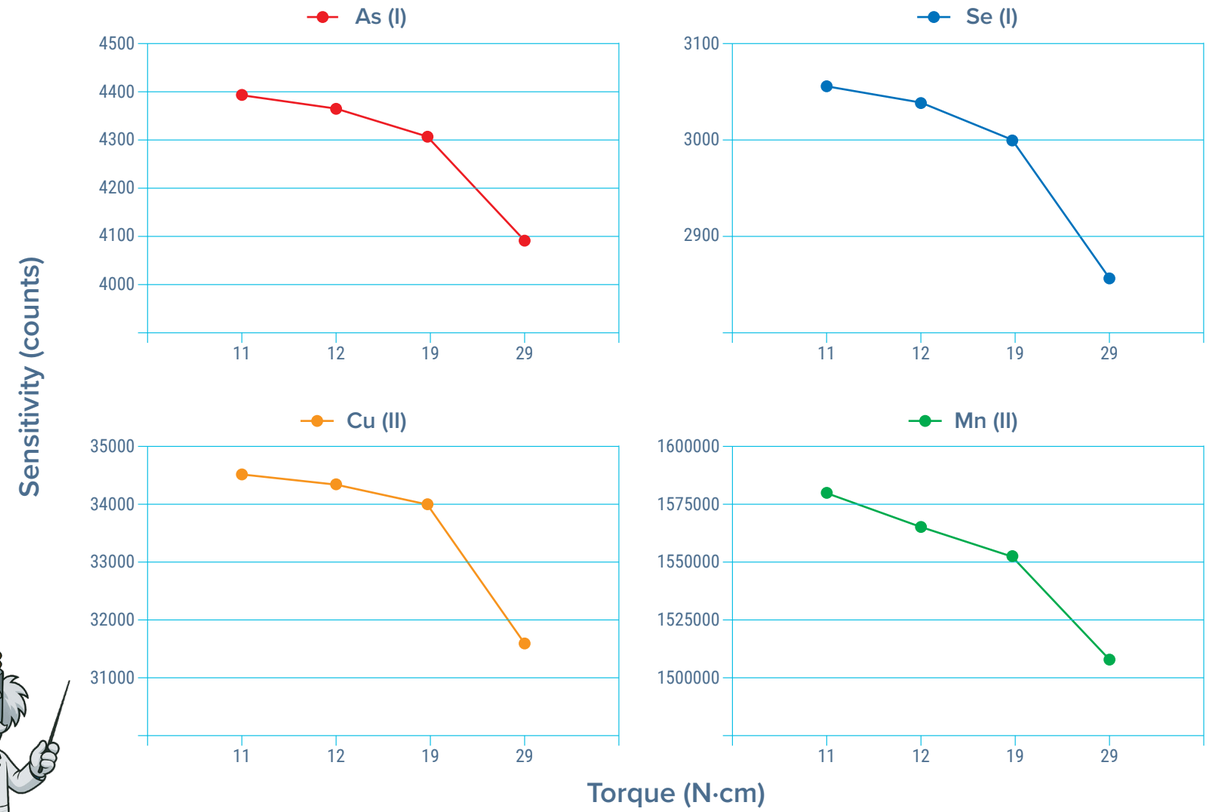


The Hidden Variable: Installation Torque

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How hard you tighten the nebulizer changes your result.

As torque rises from 11 to 29 N·cm, **sensitivity drops on every element measured.** That is not related to the sample matrix or the instrument. That is an installation issue.





"By feel" is not a method!

Two analysts, two torques, two sensitivities on the same instrument, same day.

Depth matters too

Over-insertion or under-insertion changes the aerosol path. A positive stop removes the guesswork.

One Click. Same Seal. Same Depth.

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Two-step installation

01

Insert to the stop

Fully insert the nebulizer until the side-arm contacts the molded-in positive stop.

02

Tighten to the click

Hand-tighten the Helix CT locking screw until the ConstantTorque mechanism clicks. That click is the optimum seal.

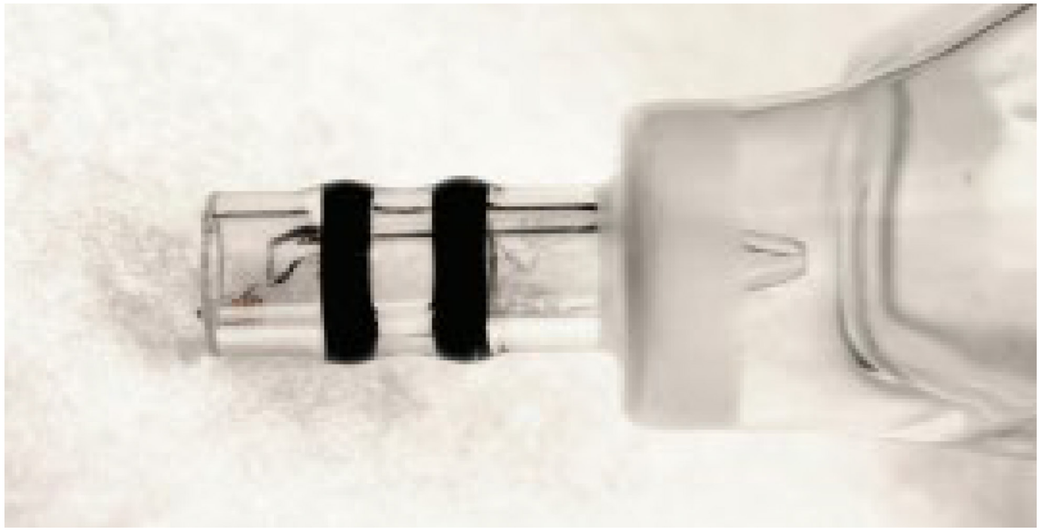
Peace of mind, by design

The click-to-seal stop gives every analyst the same seal, at the same depth, every time. The Helix CT eliminates a common cause of drift and broken nebulizers, and gives the analyst one less thing to think about.



Say Goodbye to O-ring Headaches

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O-ring Headaches

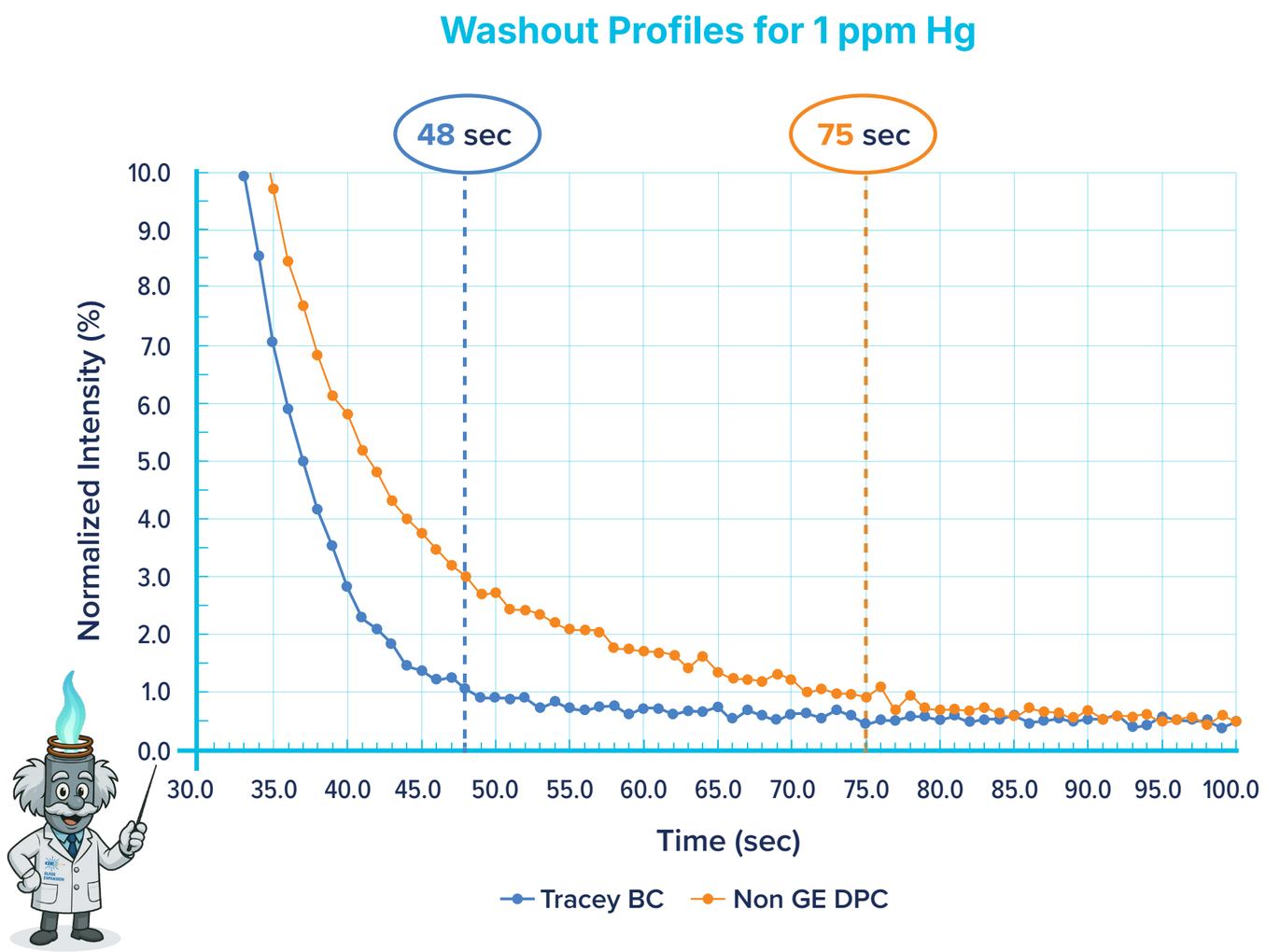
- Poor lifetime and resistance to strong acids and organic solvents
- Bonding to the nebulizer, causing breakage
- Contamination risk from dead volume
- Difficult, tool-required replacement
- Optional fittings for convenient connections to a valve or pump tubing



Zero Dead Volume: The Proof is in the Washout

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Tracey™ BC with Helix CT™ reaches blank in 48 seconds...not 75 seconds! That's a savings of 27 seconds per sample.



56%
Faster Washout

Mercury is sticky on both ICP-OES and ICP-MS. Washout is where carry-over becomes a batch failure.

Less dead volume around the nebulizer means the rinse actually reaches the surface that held the last sample.

Faster washout = fewer out-of-range QC checks = fewer re-runs of an entire sample batch.

The 30 mL Tracey BC also shortens aerosol residence time, so stabilization is faster too.

Recap: What to Remember, and Why Design Matters!

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Helix CT: *Industry-first since 2018. Standard on Glass Expansion cyclonic spray chambers.*

What to remember	How Glass Expansion design delivers
Your spray chamber is a filter. More droplets under 10 µm means a more stable plasma.	Cyclonic geometry, volume, and drainage designed for stable signals and better RSDs.
Torque is a method variable. Tighter is not better.	ConstantTorque click-to-seal and a molded positive stop. Same seal, same depth, every analyst.
Dead volume costs you time. Carry-over leads to re-runs.	Zero dead volume interface. Tracey BC reaches blank in 48 seconds, not 75.
O-rings wear, stick, and break nebulizers.	Inert PTFE PressFit seal. No O-rings, no bonding, no tools.

Part 2 Coming Soon... and How to Reach Us

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Coming up in Spray Chamber – Part 2

How to assess spray chamber problems. Eliminating drift, high RSDs, memory effects, and a drain that is not draining. Plus, maintenance guidance and what not to do with HF.

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See you next time!



Scan to submit a question!