GLASS EXPANSION
Quality By Design

Application Driven and Easy to Operate Sample Introduction Solutions

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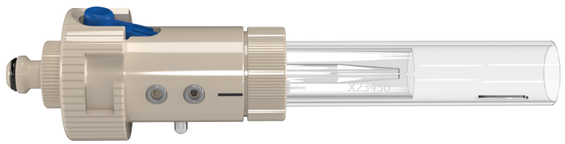
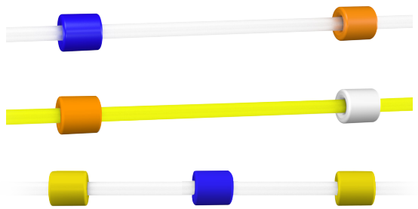
Who is Glass Expansion?

GE have been specializing in sample introduction components
from the probe to the cones — for ICPs since the early 1980s

- **Many ICP vendors package GE parts as part of the standard configuration.**
- **Manufacturers Supported:** Thermo®, Agilent®, PerkinElmer®, Shimadzu®, Analytik Jena®, Spectro™, Others

Products offered:





Is Your Sample Introduction Optimized for Your Application?

Your application works best with a tailored solution — not a default setting.

Optimization depends on your priorities:

- Maximum sensitivity
- Improved precision and reproducibility
- Robustness for high-matrix samples
- Minimal carryover
- Faster washout for high throughput
- Low-volume or low-flow sample compatibility
- Compatibility with challenging acids or solvents

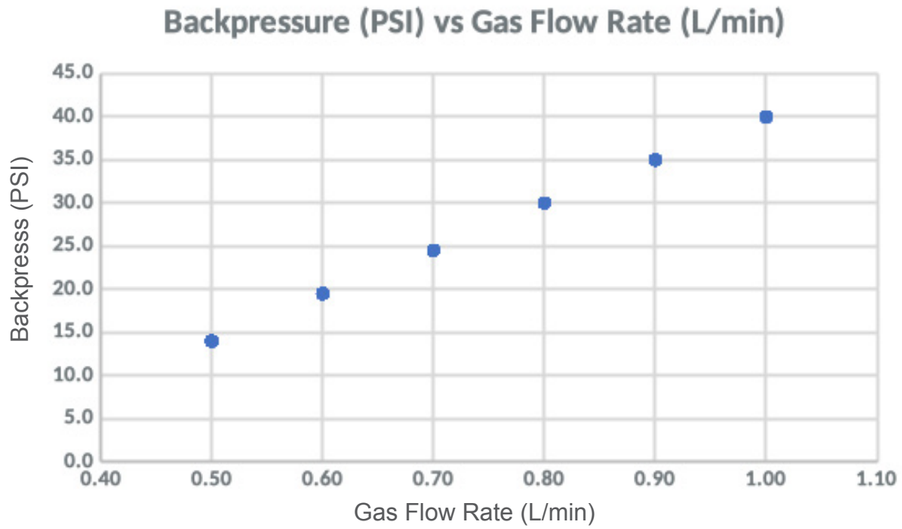
Note: 99% of analytical problems occur within the sample introduction configuration.

Nebulizer Selection

Selecting the right nebulizer requires careful consideration of various factors:

Nebulizer	TDS (%)	Particulates (µm)	HF	Precision	Purity	Material
SeaSpray™	20	75	No	High	Good	Glass
MicroMist™	15	40*	No	High	Good	Glass
Conikal™	5	75	No	High	Good	Glass
Slurry™	1	150	No	High	Good	Glass
Quartz SeaSpray™	20	75	No	High	Excellent	Quartz
OpalMist™	15	75*	Yes	High	Excellent	PFA
DuraMist™	30	75*	Yes	High	Good	PEEK
VeeSpray™	30	300	Yes	Moderate	Good	Ceramic

* Varies with nebulizer uptake



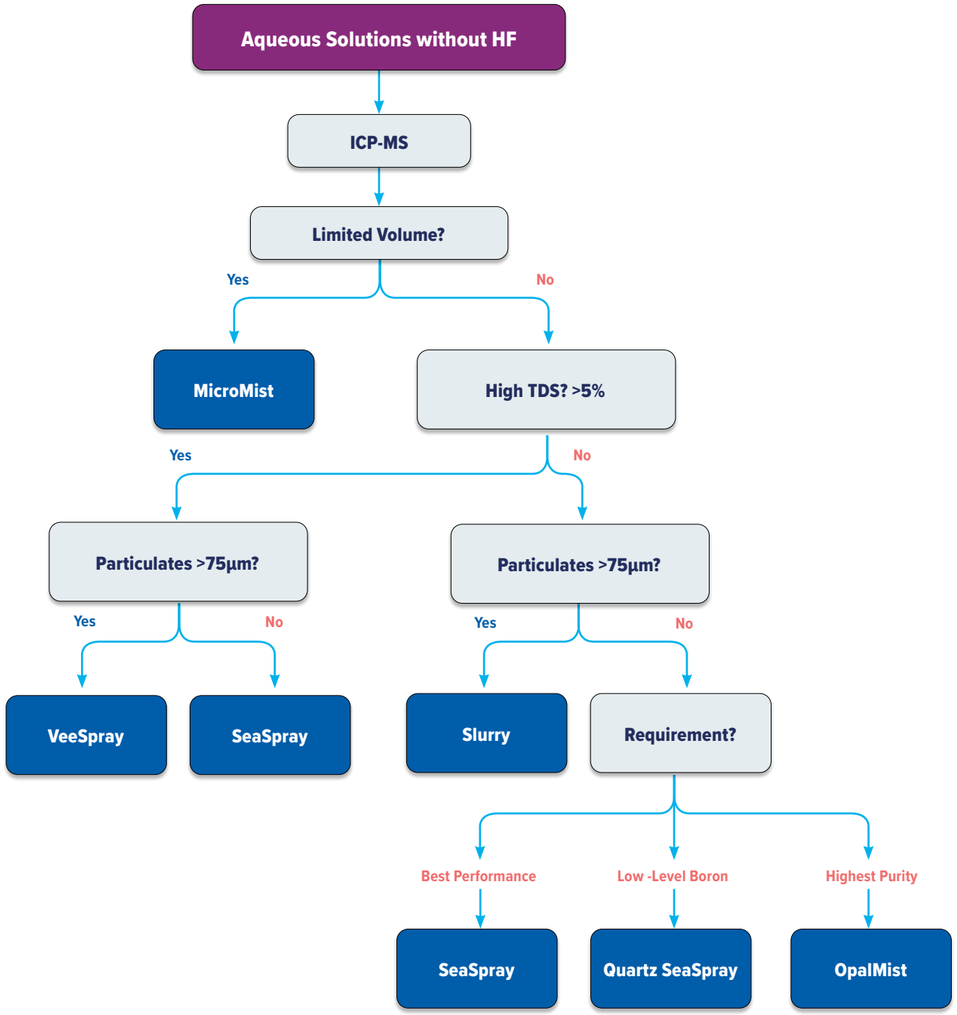
Important Nebulizer Operating Parameters

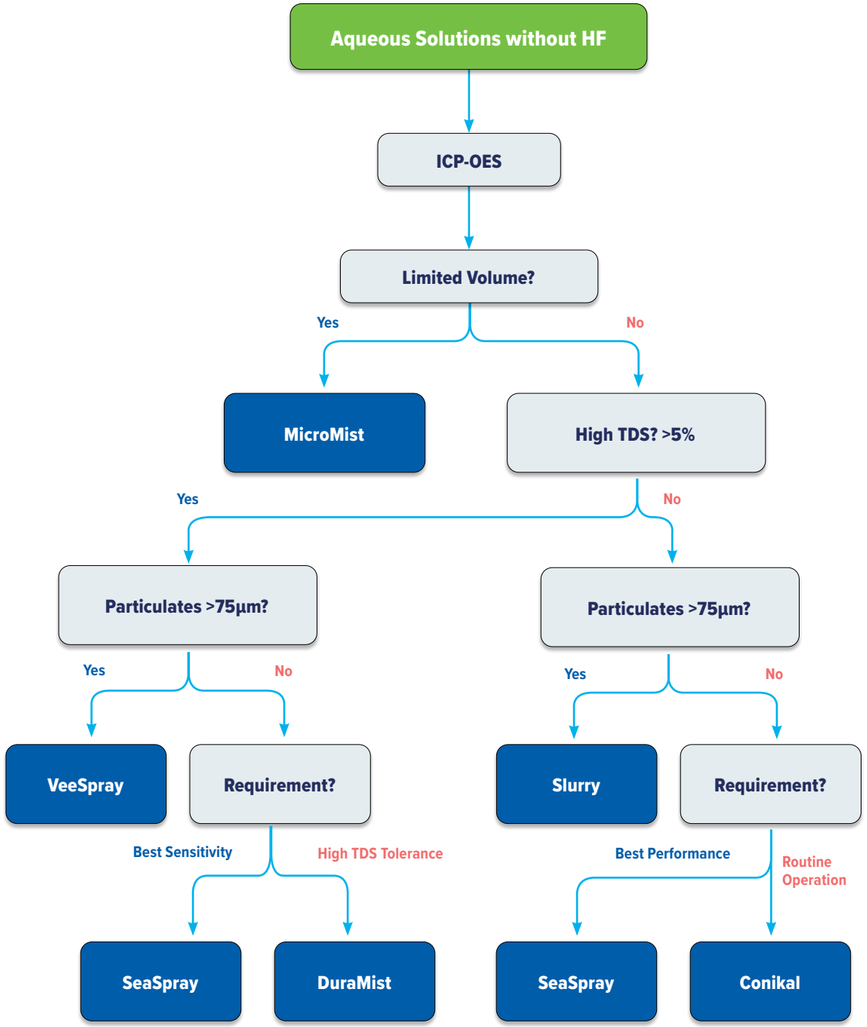
Example: GE P/N A13-1-UM04

- Optimum nebulizer gas flow = 1.0 L/min (40 psi)
- Sample uptake rate ≤ 0.4 mL/min

Optimal Nebulizer

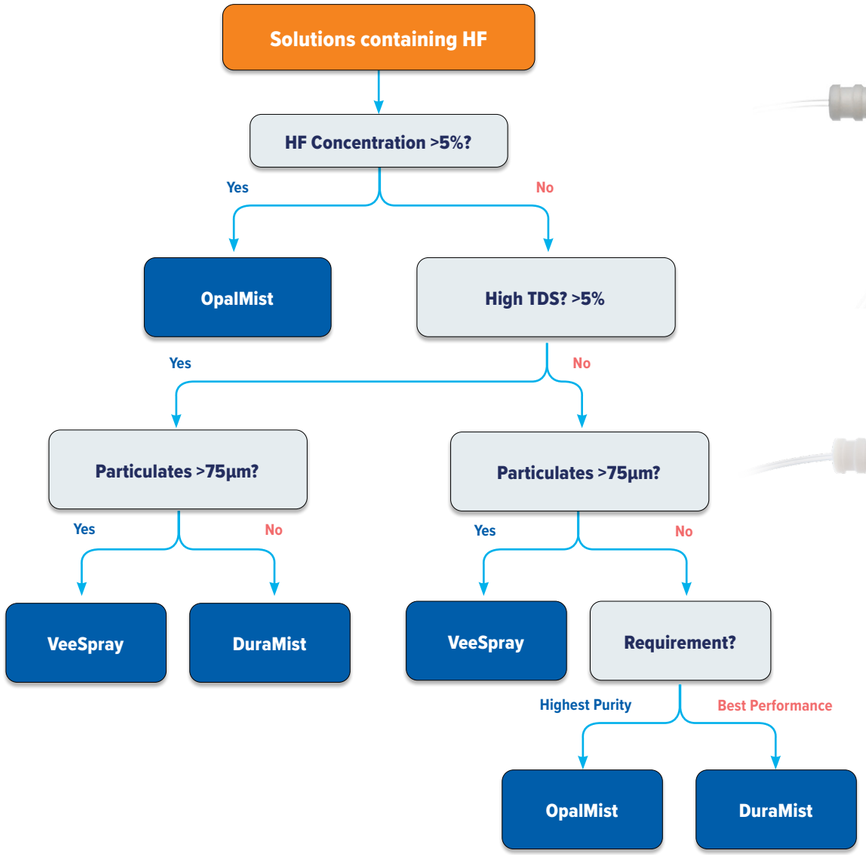
1. Solutions Without HF

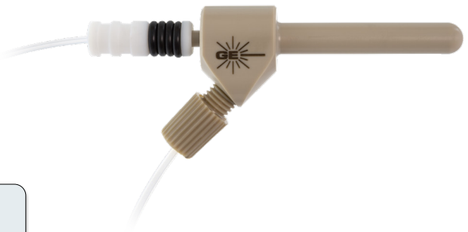




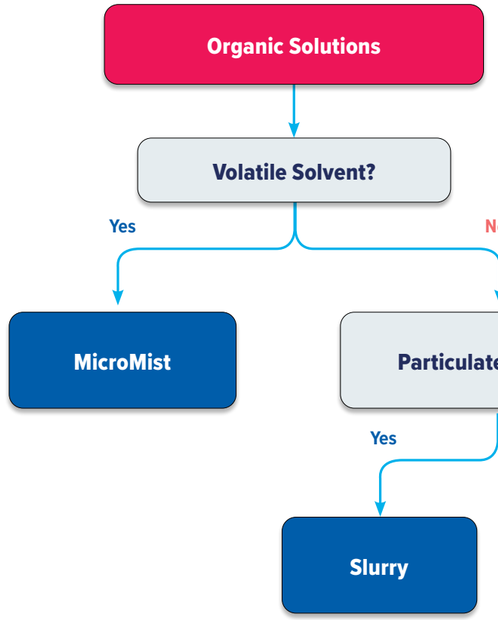
Optimal Nebulizer

2. Solutions Containing HF





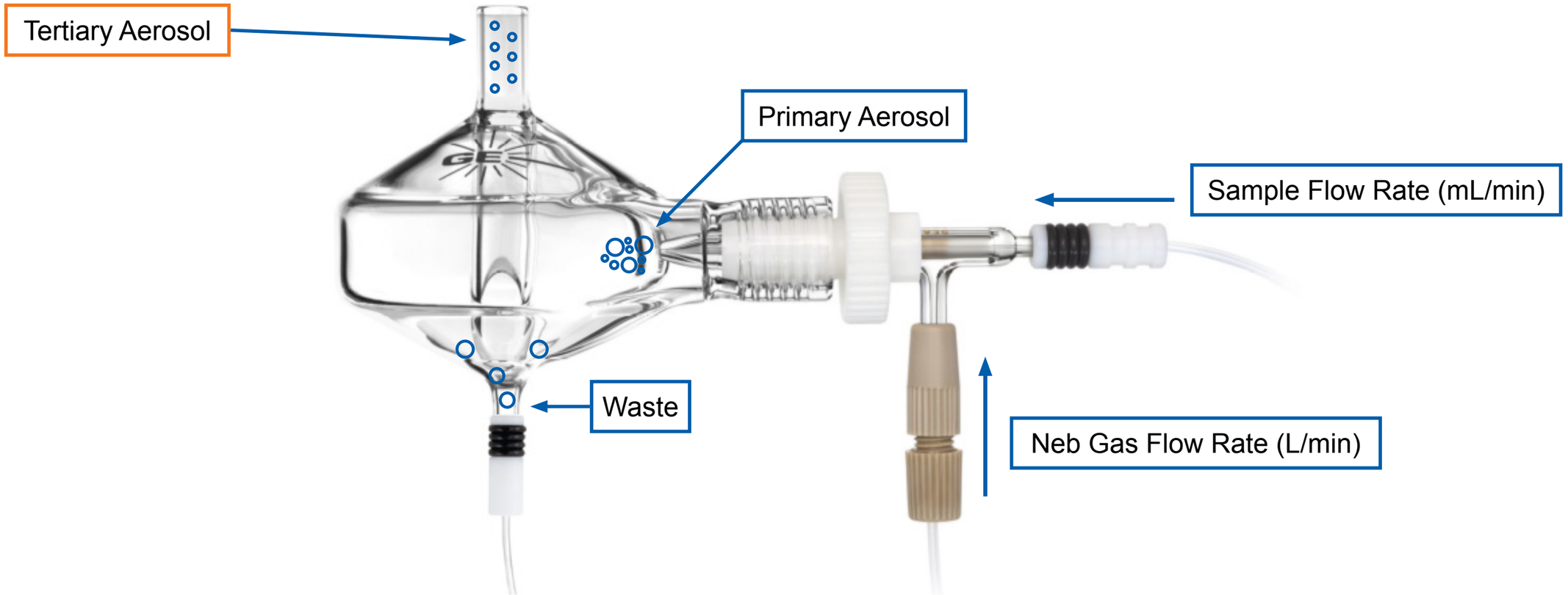
3. Organic Solutions



Click Here - Care of Nebulizers

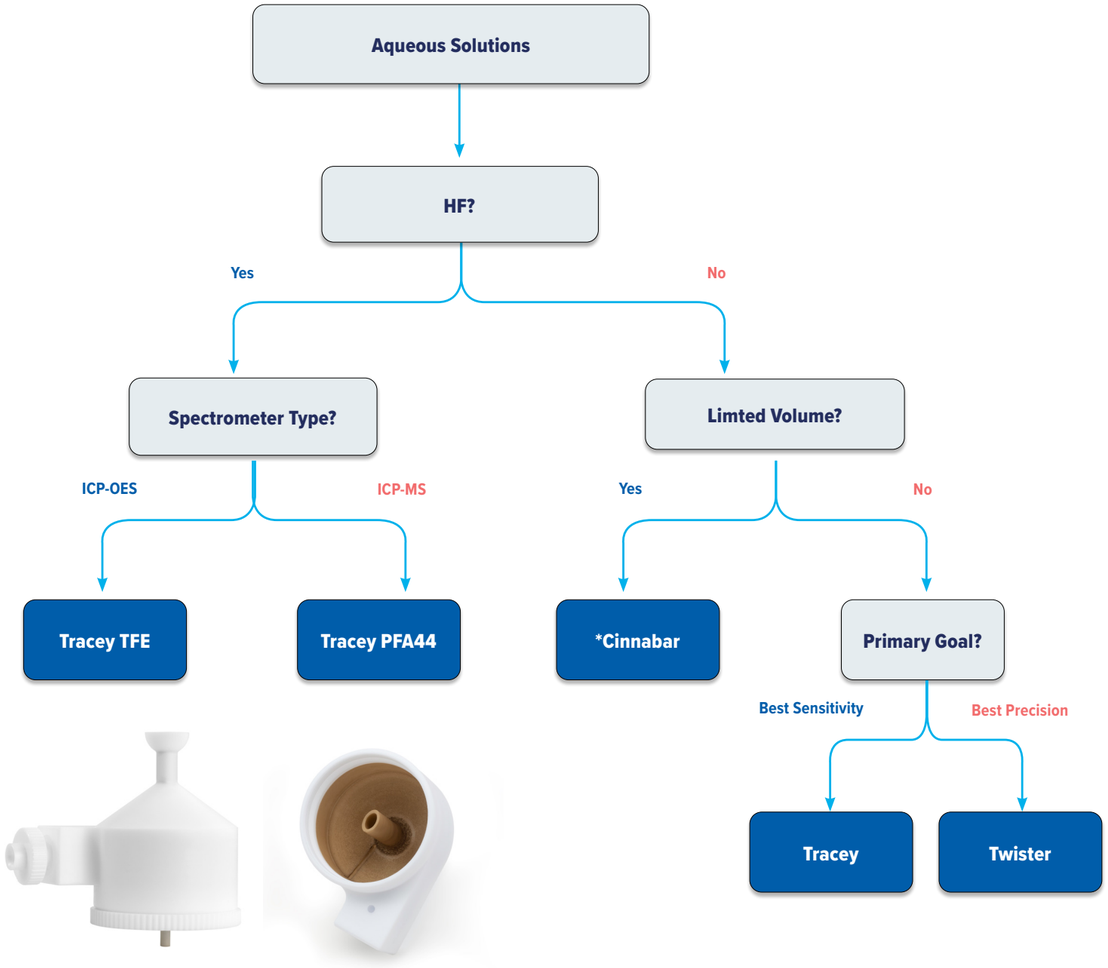
Precision & Sensitivity: Design Considerations

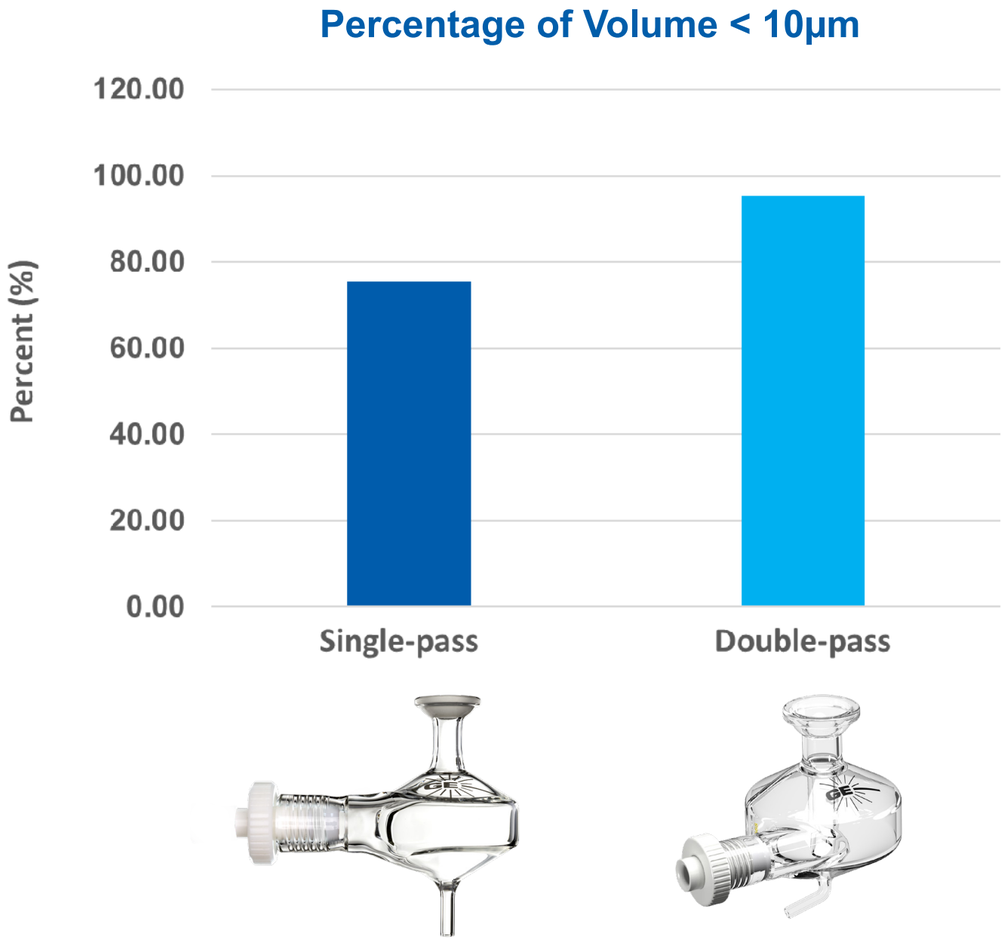
Quality of Aerosol ∝ Quality of Results



Smaller Droplets Require Less Energy = Efficient Ionization

Spray Chambers: Selection



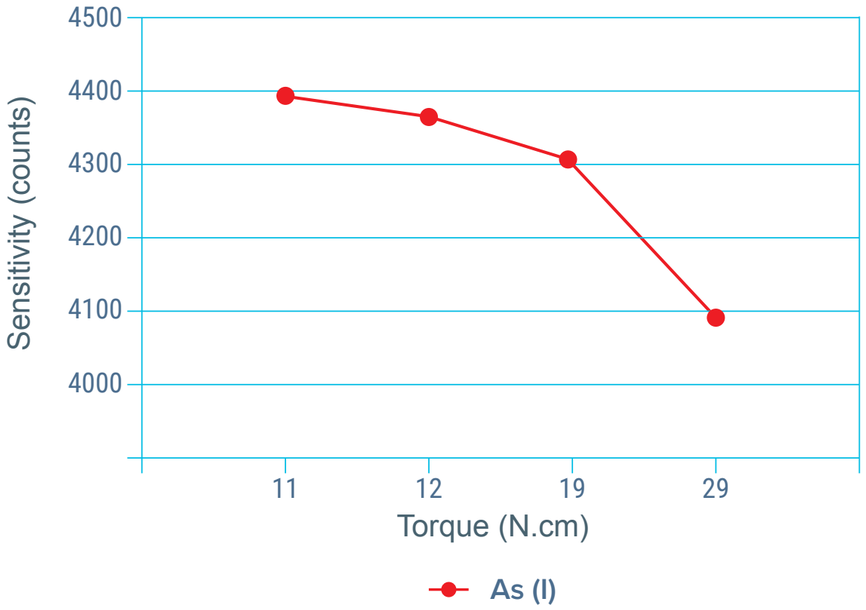


Click Here - Spray Chamber Solutions for Organic Applications

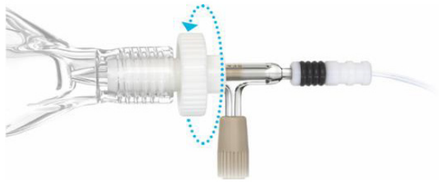
Spray Chambers: Helix CT Interface

Helix CT: Constant Torque = Reproducible day-to-day ICP Performance

Optimum Sensitivity

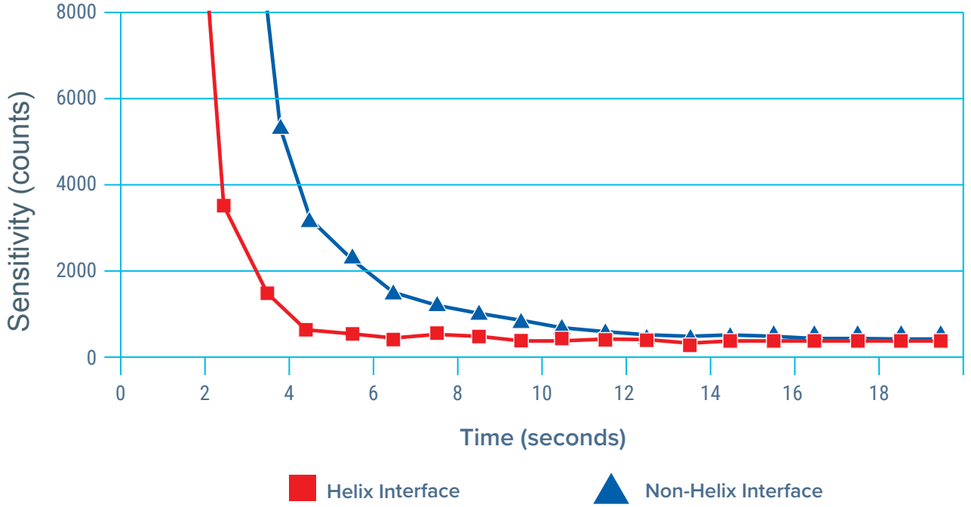


Built-in torque control mechanism



Non-Helix Interface

Improved Washout



Download the Helix CT ICP Spray Chamber Application Note

Click Here - Care of Spray Chambers

Tracey™ BC Spray Chamber: Design Considerations

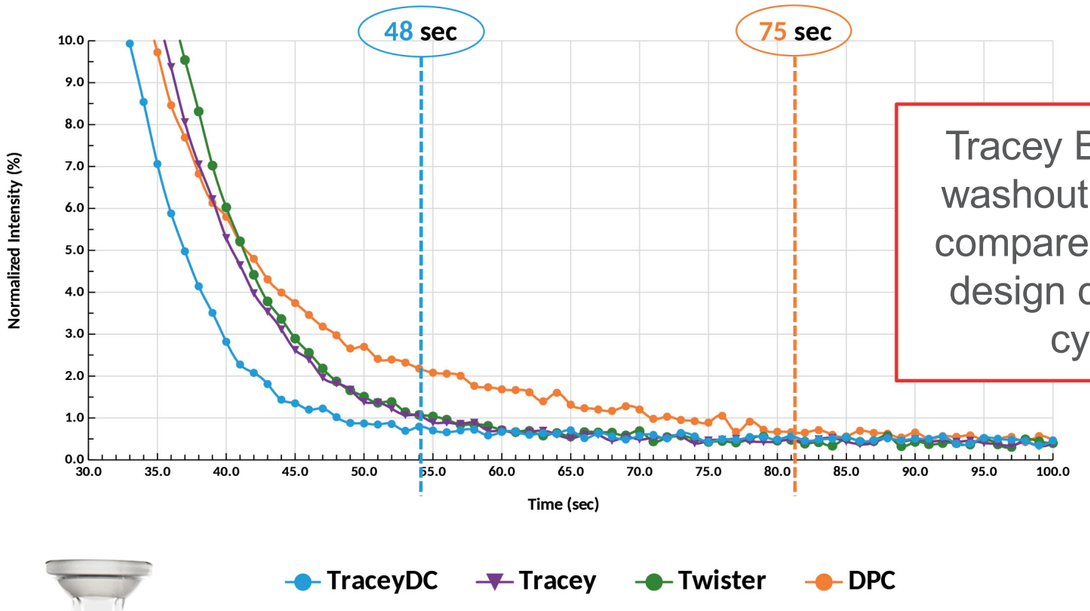
Challenges in Routine ICP Work

- Frequent O-ring wear and replacement
- Long washout times and memory effects
- Poor wetting or carryover with HF or harsh matrices

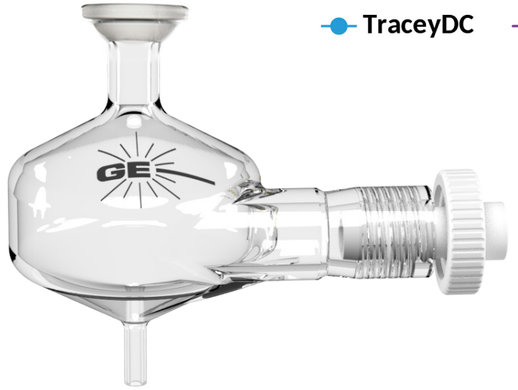
How the BC Design Helps

- **No O-Rings** → Less maintenance, faster washout
- **Low-Volume 30 mL Cyclonic** → Shorter stabilization, better throughput
- **Broad Compatibility** → Fits E-Torch, D-Torch, SDT/FDT
- **Cost-Effective** → Practical choice for routine analysis
- **Improved reproducibility** in maintaining tighter overall size specifications

Washout Profiles for 1 ppm Hg



Tracey BC achieves washout **64% faster** compared to non-GE design double pass cyclonic



Tracey™ Ball Joint Connection (BC) Spray Chambers

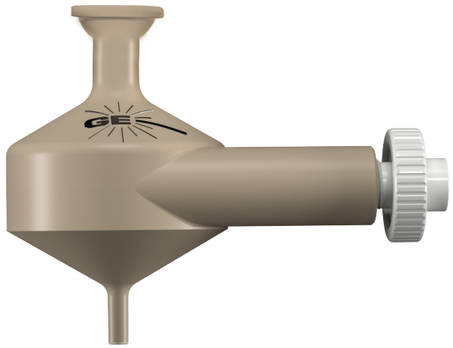
Exploring the Tracey™ BC PEEK Spray Chamber for Your Workflow

- **PEEK Construction**→ Good chemical resistance (up to 5% HF)
- **Superior Wetting:** PEEK material maintains excellent wetting properties with routine laboratory cleaning.
- **No Internal Surface Treatment:** Unlike TFE or PFA, this spray chamber requires no internal surface treatment.

Comparison of Tracey BC PEEK to the PTFE Tracey

Below are the average intensity and RSD results from 41 optimization checks using the PEEK and PTFE spray chambers.

- The Optimization Solution contains 2 ppm Pb, As, and Mn in 1% HNO_3.



	% Increase in intensity	%RSD
Pb	74%	0.65
As	90%	0.69
Mn	68%	0.68

**Comparison conducted by Specialty Chemicals Manufacturer - USA*

Aggressive Sample Matrices: Torch Selection

Examples: Soils, wastewater, brines, high-acid digests, organics, lithium fusions

Challenges:

- High salt deposits and plasma temperatures shorten quartz torch life
- Frequent torch replacement increases cost of ownership
- O-ring failures or gas leaks can destabilize plasma or prevent ignition

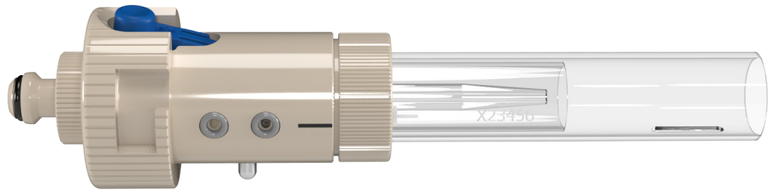
Mitigation:

- Use a Demountable Torch → replace only the outer tube, lowering cost of ownership
  - *Narrow bore quartz: 1.0mm or less:* volatile organics
  - *Large bore quartz: 2.0mm or greater:* High TDS
  - *Ceramic (alumina):* HF-containing samples
  - *Platinum/Sapphire Injectors:* Inert applications

- Ferrule-based design: Secure injector seating, fewer leak points

Upgrade: Optional ceramic outer tube → resists devitrification, lasts longer, and maintains plasma stability

Benefits: Ideal for high-TDS, salty, or organic samples; hotter, more robust plasma improves sensitivity



P/N 30-808-4388
E-Torch for Thermo® PRO Duo

Comparison of Quartz Tube set to Ceramic Outer tube set		
Element	**% Increase in Sensitivity**	**%RSD**
Zn (213) λ	17%	0.36
Ni (231) λ	19%	0.57
Mn (257) λ	14%	0.52

Ceramic Outer Tube Set
P/N 31-808-4502

Samples That Contain Particulates (1/2):

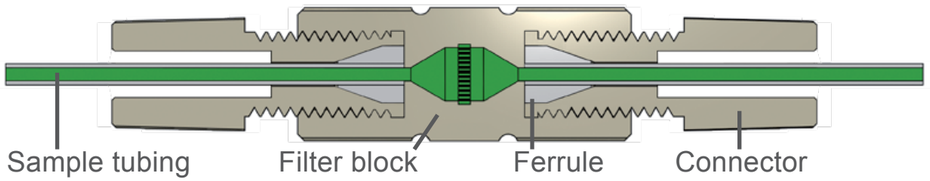
Why address particulates issue?

- Particulates can clog fine sample lines or nebulizer channels, disrupting analysis
- Preventing blockages reduces downtime and maintains performance

How to solve it?

1a. Guardian In-Line Particle Filter (P/N 70-803-1108) between probe and nebulizer

- **120µm filter** with seals for both 1.6mm and 1.3mm OD tubing
- **Clog-resistant PEEK** design — easily cleaned by back-flushing or ultrasonics



In-Line particle filter: *"By the way, the particle filters that we have purchased are working out very well with our soil sample analyses on our ICP-OES units, have saved a lot of headaches with blocked nebulisers!"*

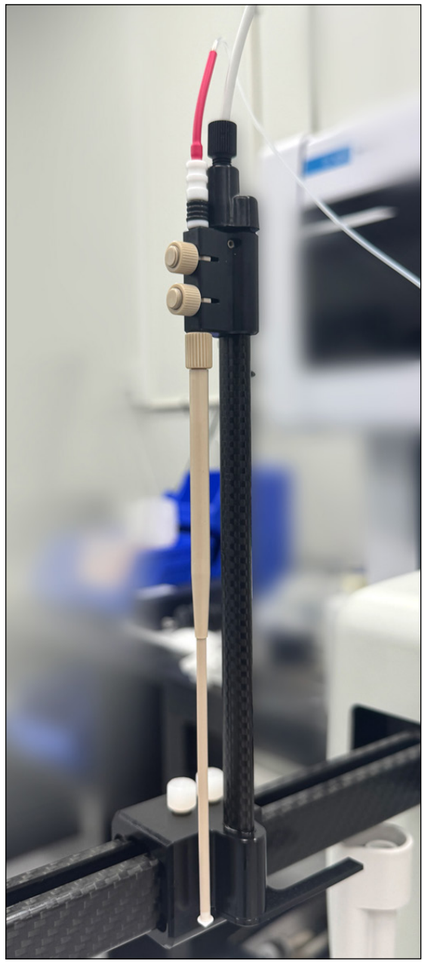
Soil & Plant Laboratory - Australia

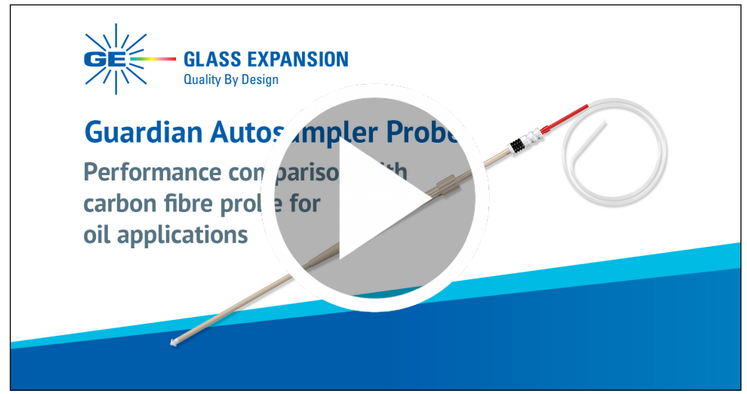
1b. Guardian Sample Probe

Samples That Contain Particulates (2/2):

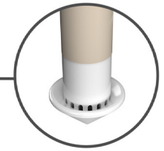
Guardian Sample Probe:

- Proprietary mechanical finish for superior wetting characteristics
- **Drip-resistant** to minimize cross-contamination, especially with oils.
- **Unique inbuilt particle filtering** prevents blockages in your nebulizer and capillary tubing.
- **Completely inert construction** (Ceramic, PEEK, and PTFE) for strong acid/solvent resistance.
- **PEEK sheath** designed to ensure precise alignment within the middle of the vial every time.
- **Interchangeable UniFit sample lines** (3000mm in length) to accommodate various IDs (e.g. 0.3, 0.50, 0.75 & 1.0mm)





Guardian Probe Assembly
for ASX-200, 500, 800 Series
P/N 70-803-1787



Samples With High TDS: Argon Humidifier

Why address high TDS issues?

- Salt deposits form at the nebulizer and injector tip
- Leads to analytical drift or even plasma extinguishing

How to solve it?

1. Elegra™ Argon Humidifier to prevent salt build-up

- Adds moisture to argon gas → prevents salt build-up and reduces maintenance
- Maintains stable plasma and consistent results during high TDS analysis
- **Elegra:** No power, heat, or pressurization required – compact, inert, and easy to integrate
- Flexible configurations: single- or dual-channel versions with custom gas fittings
- Complements a high-TDS sample intro setup: **SeaSpray™ / DuraMist™ nebulizer, Twister™ spray chamber, and wide-bore injector**

SeaSpray™

DuraMist™

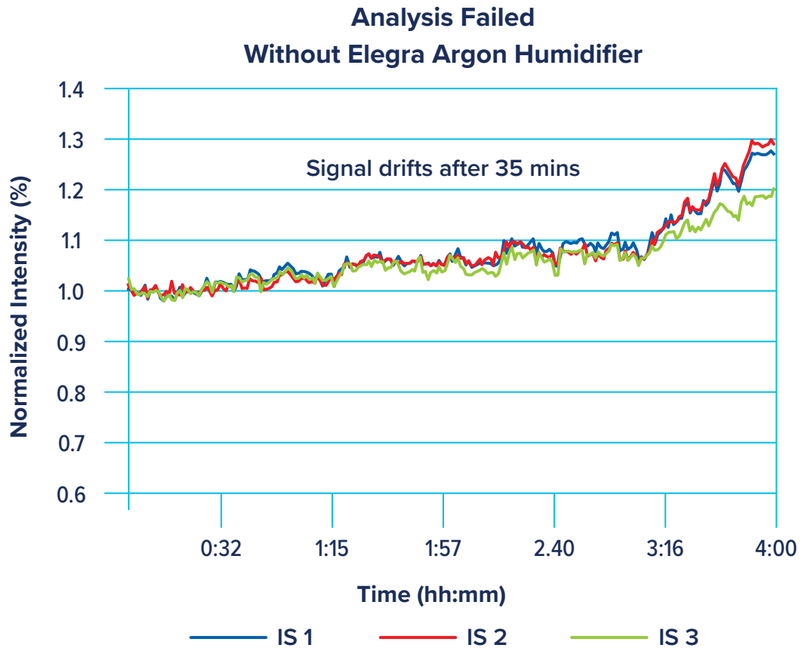
(In reference to the Elegra: *"Talking with my operators that are here today neither of them has changed a nebulizer since we put it on... We had been replacing nebulizers after about a week and a half... I will be ordering 2 more.*

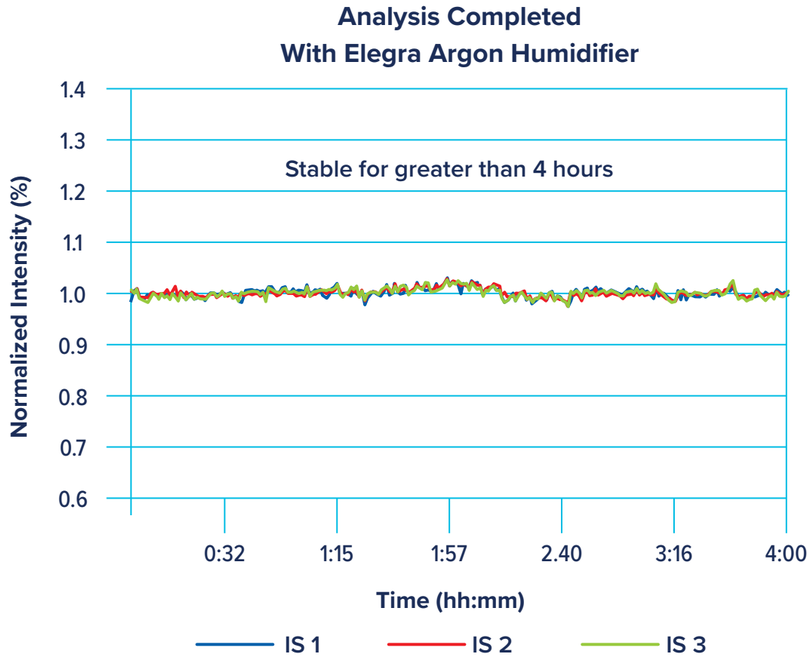
Contract Laboratory - USA

Samples With High TDS: Argon Humidifier

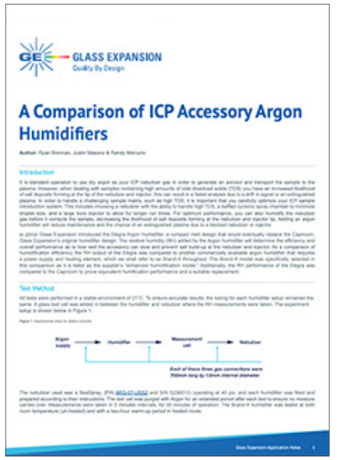
Performance

- Includes easy-use bypass switch to disable humidification without disconnecting lines
- Tested to deliver over **4 hours** of stable internal standard signal with high-salt samples, outperforming other humidifiers
- Superior performance: up to 60% more effective relative humidity than competing models





Elegra Application Note



General Guidelines On Cone Materials

Nickel Cones:

- **Balanced cost & performance;** standard for many applications
- Good **thermal & chemical resistance;** less prone to corrosion and deposition
- Runs **hotter** than copper, stays cleaner longer, more stable signals
- Suitable **for routine aqueous samples** (<5% acid, non-HF, non-organic)

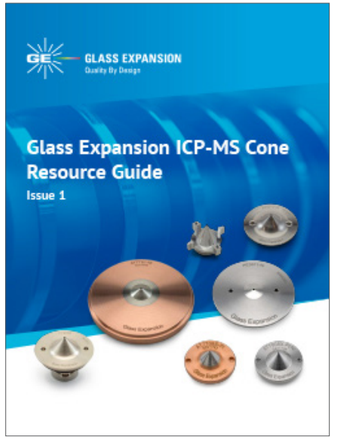
Nickel-Plated Cones:

- Ideal for samples with >5% acid concentration
- Nickel plating boosts chemical resistance while **retaining copper's efficienct heat transfer**
- **Helps prevent overheating** and rapid orifice degradation, preserving sensitivity and stability

Platinum Cones:

- Most durable, longest-lasting, but highest cost
- Excellent chemical resistance - ideal for **high-matrix, high-acid,** or organic **solvent samples**
- **Least efficient** heat transfer → runs **hotter**, but stays **cleaner longer**
- Can be **refurbished 2-3 times** and **recycled** for reclaim value towards future purchases

ICP-MS Cone Resource Guide



Summary: Steps to Overcome SIS Challenges

1. Improve Data Quality:

- Select appropriate nebulizer, spray chambger, torch/injector, and cones
- Tailor components to sample type for accuracy, precision & sensitivity

2. Maximize Sample Throughput:

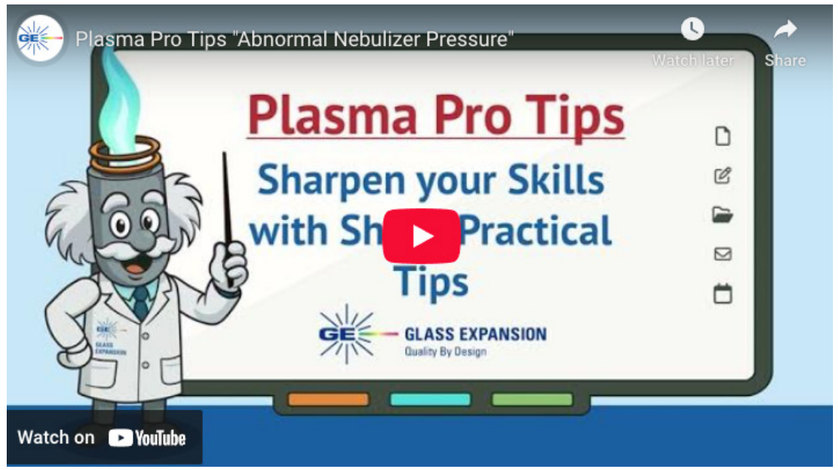
- Address carryover and washout issues to improve efficiency

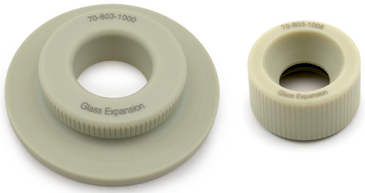
3. Enhance Performance with Accessories

- Use tools like Elegra, Trident CT, or Guardian In-Line Filter to improve stability

4. Ensure Longevity & Consistency

- Implement proper care and cleaning routines
- Reduce downtime through preventive maintenance





Click here to view our Product Care Page

Thank You

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