Successfully restarting lab operations

Managing impacts from the current crisis and helping labs get back up and running

After the shutdown: Back to business as Unusual	Wednesday, May 6th
GC and GCMS	Thursday, May 7th
ICP and ICP-MS	Wednesday, May 13th
HPLC and LC/MSD	Thursday, May 14th
LC/QQQ and LC/Q-TOF	Friday, May 15th
Automated liquid handling	Tuesday, May 19th
Consumables, Sample prep and Supplies Strategies	Wednesday, May 20th
Support for business operations: Alternative buying solutions	Thursday, May 28th

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If you missed it…

After the shutdown: Back to business as <u>Unusual</u>

Live webinars from May 6th -28th – available on-demand.

Covers a wide range of topics

- Changing dynamics in the lab
- Short term and long term impacts to lab operations
- Considerations for efficiently and effectively bringing lab's back online
- Lab instrumentation life cycle, utilization, and asset management
- Shift to digital
- And other important operational topics

Powering up: ICP-OES and ICP-MS

Part-1: ICP-OES

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Recommended Shutdown Procedures – Short Term

1. Rinse the sample Intro System with dilute acid/DI water
2. Drain the liquid
3. Turn off Plasma
4. Unclamp the pressure bars and remove peri pump tubings from the pump
5. Turn off Chiller

ICP-OES

Recommended Shutdown Procedures – Long Term

6. Turn off Argon gas
7. Shut down the PC
8. Switch off the instrument power
9. Turn off Exhaust
10. Turn off Autosampler
11. Empty the waste container to prevent rust from acid fume
12. Cover the instrument (if possible – to prevent dust build-up)

ICP-OES

Restarting the ICP-OES

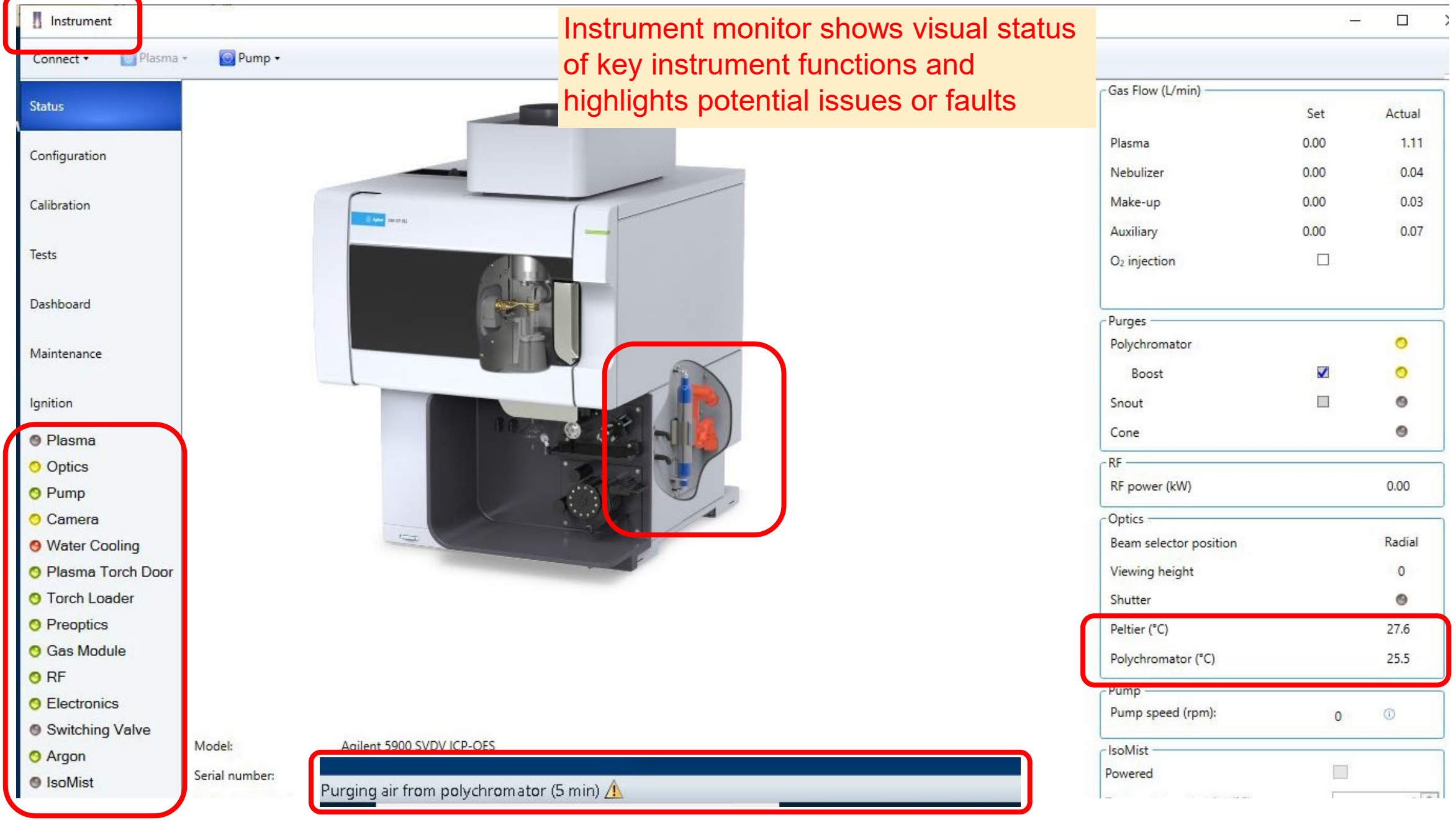
If the instrument has been in long term storage:

At least 1 day before:

1. Remove covers and wipe down instrument to remove any dust build-up
2. Restore the mains power and switch the instrument back on again
3. Open the argon gas cylinder and ensure the supply is connected to the instrument (enable argon purge of the optics)

Don’t turn the chiller on

Instrument monitor shows visual status of key instrument functions and highlights potential issues or faults



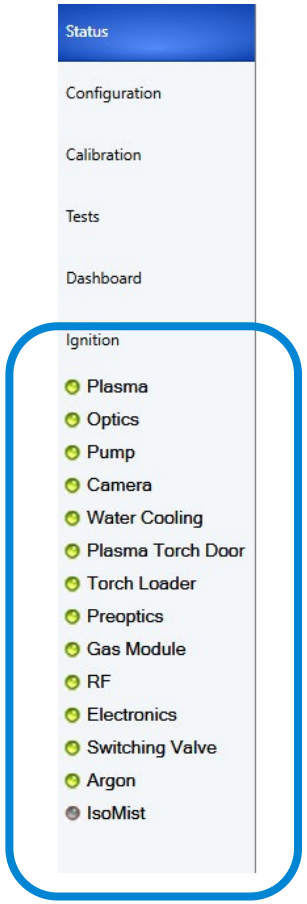
Restarting the ICP-OES

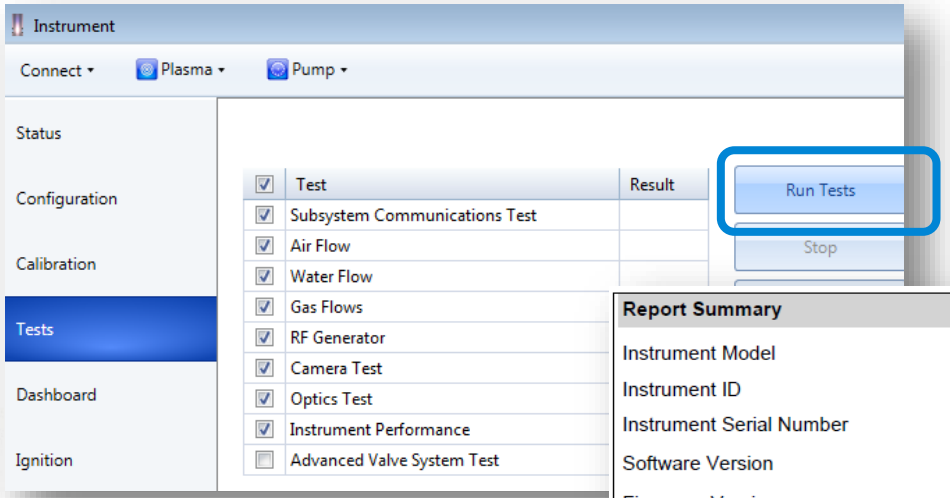
On the day of analysis:

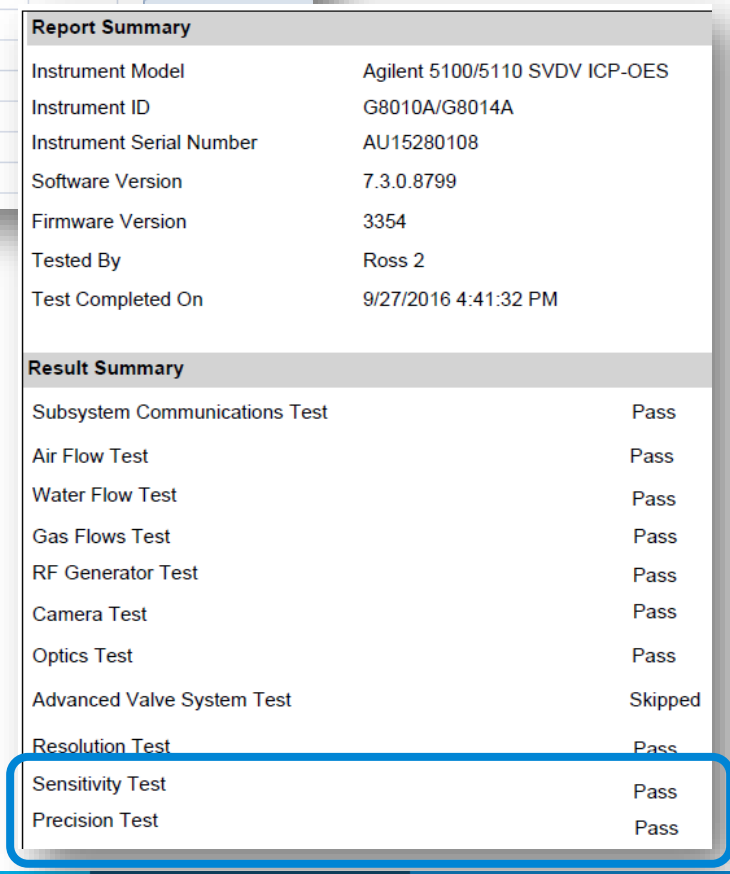
1. Clean all the sample introduction components
2. Clean pre-optics windows (ICP-OES)
3. Turn the chiller on
4. Fit new peristaltic pump tubing
5. Ignite plasma, warm-up system and complete a performance test to verify everything is working

ICP-OES – Performance Testing

You can run the instrument performance and check instrument status anytime by running automated instrument tests

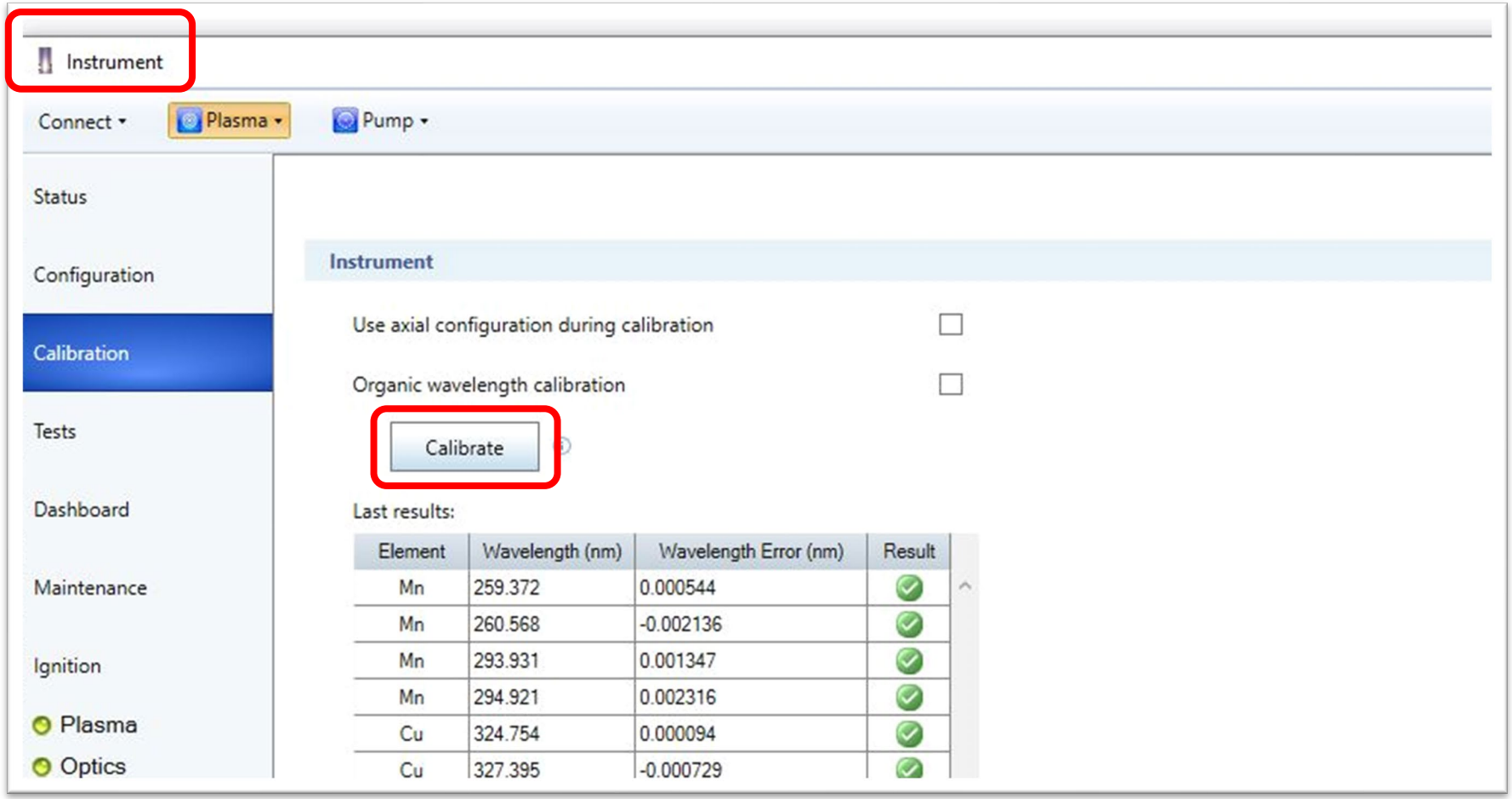






Example screenshot of wavelength calibration

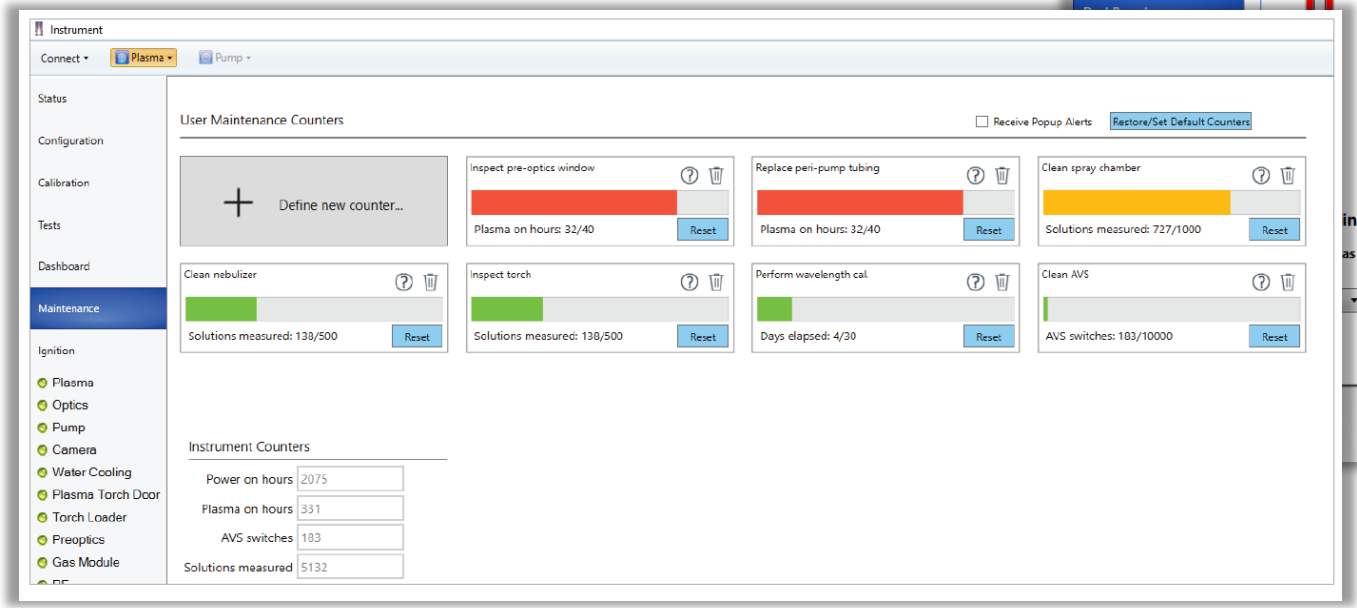
- Aspirate Wavelength Calibration Solution



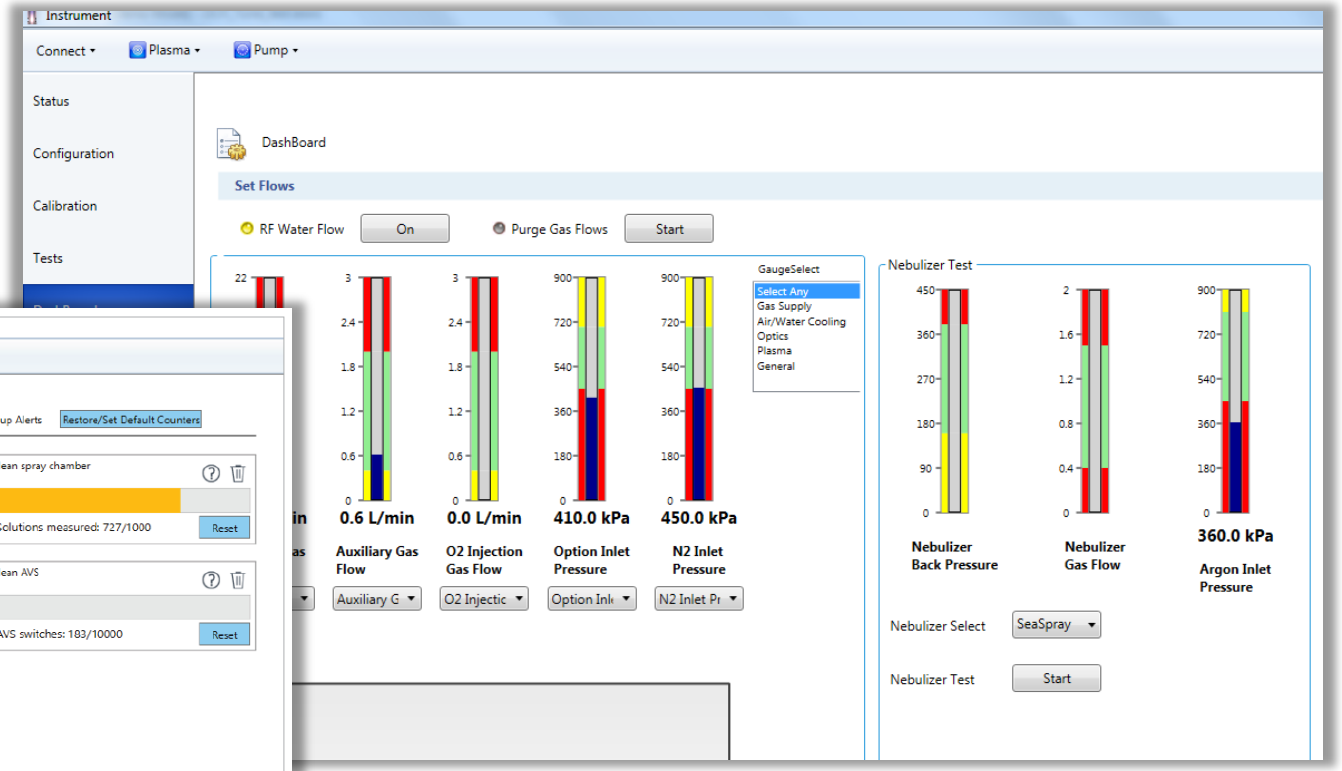
Keep Your Instrument Happy and Healthy

System Diagnostics

- Sensors throughout the instrument deliver diagnostic information that makes it easy to find and correct problems
- Automated health checks maximize up time



Early Maintenance Feedback



Instrument Dashboard provides live information

Cleaning the Torch (5000 Series ICP)

3 easy steps to cleaning the torch
(see the torch cleaning instructions in the on-line Help for more details):

1. Soak in 50% aqua regia for 1 hour
2. Thoroughly flush inside & outside using de-ionized water
3. Blow clean compressed air or nitrogen through the three gas supply ports

CAUTION

Ensure torch is dry before re-installation

Do not sonicate!

Agilent torch cleaning stand
p/n G8010-68021

Cleaning the Glass Nebulizer

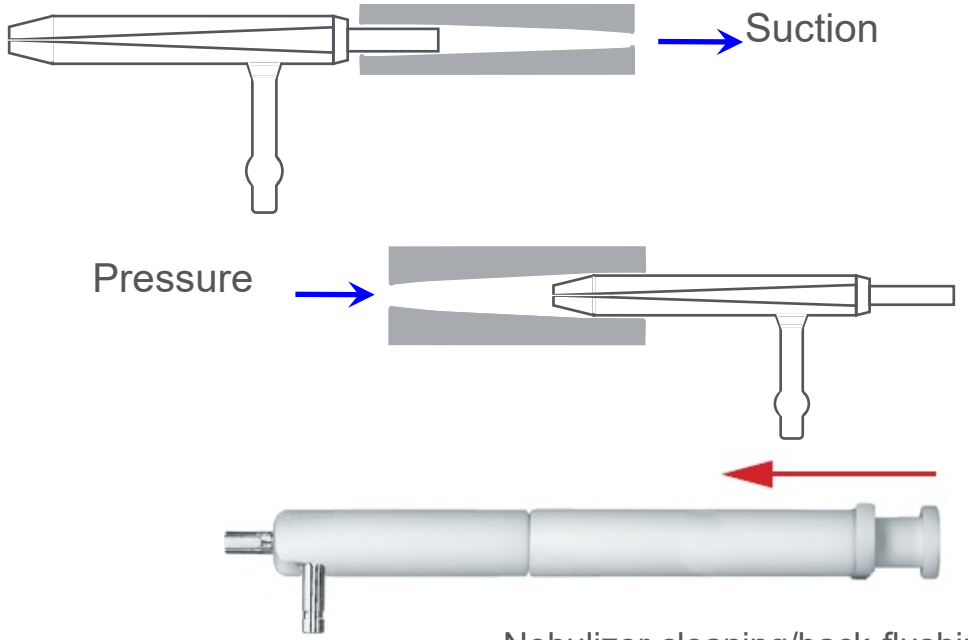
Never sonicate or attempt to inspect with wire.

For salt deposits:

- Soak the nebulizer overnight in a beaker of 25% Fluka RBS-25 detergent. Rinse with pure water.

For “stubborn” deposits:

- Soak the nebulizer overnight in concentrated nitric acid. Use a pipette to ensure there are no air bubbles in the capillary. Rinse with pure water.

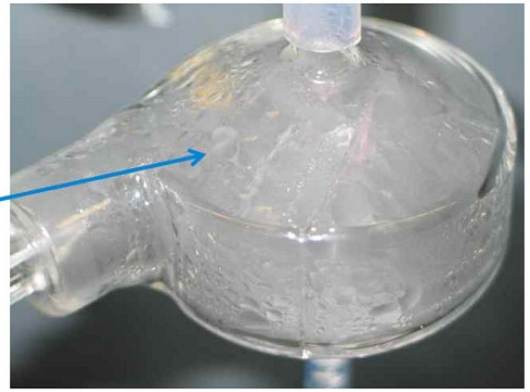


Nebulizer cleaning/back-flushing tool
p/n G3266-80020

https://www.agilent.com/en/products/lab-supplies/nebulizertips

Cleaning the Spray Chamber

Beading in the spray chamber



Remedy:

- Aspirate dilute RBS-25 solution
- Clean the spray chamber using acid

RBS-25

Contrad 70

Top 5 Tips to Ensure a Successful Restart of Your ICP-OES

Clean/verify nebulizer performance

Check/clean pre-optics

Clean your sample introduction system

Fit new peri pump tubing

Run an Instrument Calibration Test

Powering up: ICP-OES and ICP-MS

Part-2: ICP-MS

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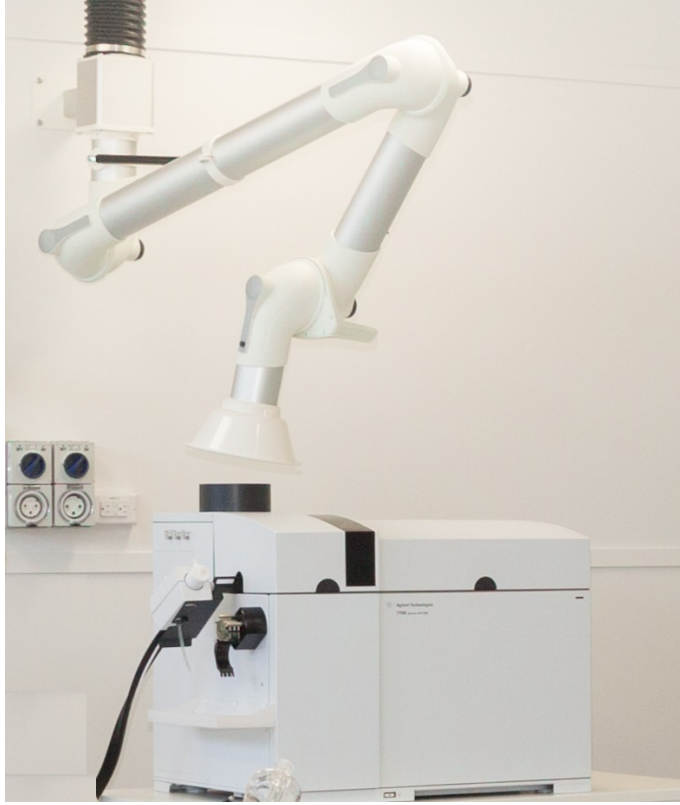
Recommended Shut-down Procedures – ICP-MS

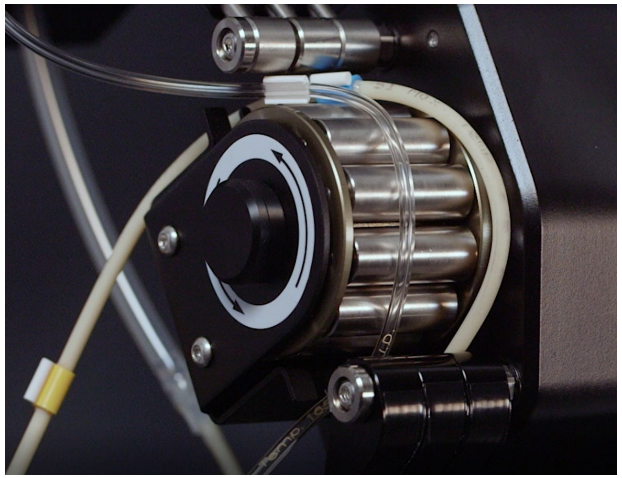
To shut-down the instrument:

1. Switch the water chiller off
2. Turn off the argon gas (and any reaction/cell gas) supplies at the cylinder
3. Leave the instrument ON – but shut down the controlling PC
4. Leave the vacuum system (rough pump) ON (maintain vacuum in the quadrupole)
5. Rinse all sample lines with water and wash all sample introduction components (including interface cones)
6. Drain all waste vessels (and ensure any acid rinse or other solutions are all sealed/closed)
7. Remove peri pump tubing from the pump and leave pressure bars open
8. Leave exhaust/fume extraction ON

For long term storage – perform these additional actions:

1. Switch OFF the vacuum system (rough pump)
2. Switch exhaust/fume extraction off
3. Switch the mains supply to the instrument OFF
4. Cover the instrument (if possible – to prevent dust build-up)





Restarting the ICP-MS Instrument Again

If the instrument has been in long term storage:

ICP-MS –At least 1 day before:

1. Restore the mains power and switch the instrument back on again
2. Restart the vacuum system (enable quadrupole to pump down)
3. Purge Argon Lines (if ORS He, H2 tanks were turned off, purge as well)

Then the next day:

1. Remove covers and wipe down instrument to remove any dust build-up
2. Reclean all the sample introduction components (remove any dust build-up)
3. Clean interface cones (ICP-MS)
4. Fit new peristaltic pump tubing
5. Ignite plasma, warm-up system and complete a performance test to verify everything is working

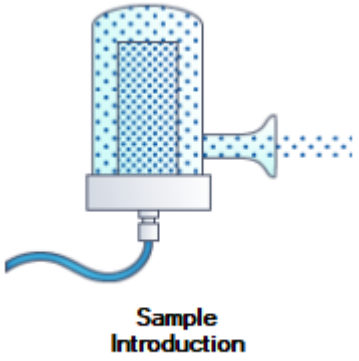
Purging the Ar and/or ORS cell lines

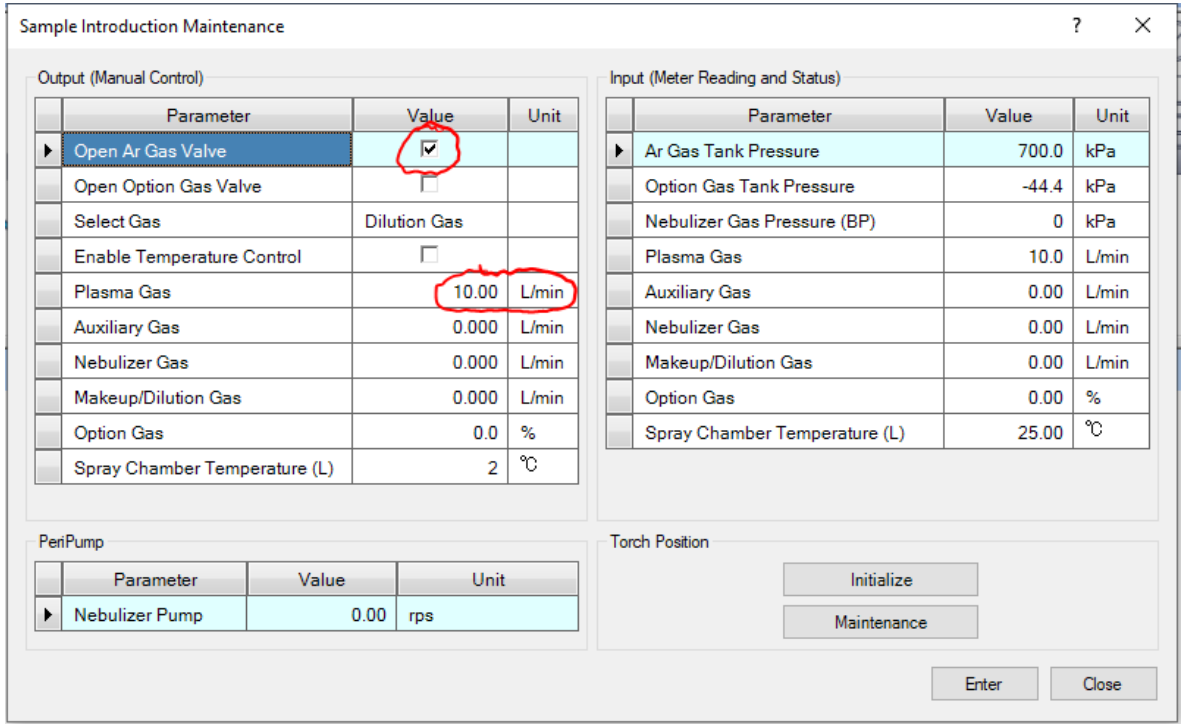
Go to Sample Introduction:

Right Click on the Spray Chamber Icon, then the Maintenance screen appears

Check the ‘Open Ar Gas Valve’

Set Plasma Gas to 10 L/min & let purge for ~10-15 minutes

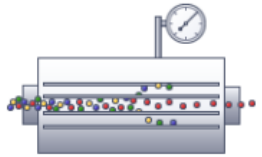




Purging the ORS lines (If necessary)

After the Argon has been purged, if the ORS lines have been completely shut off, good idea to purge the ORS lines.

Right Click on the ‘Collision Reaction Cell’ Icon



Collision/
Reaction Cell

Then Select Maintenance and Confirm your exhaust system is working –

Then set He and/or H2 flow – purge 1.5 mL/min overnight or at 5.0 mL/min for about 30 minutes

Open Bypass Valve | OctPole Matching | Autosampler | Nebulizer Pump Speed

Parameter	Output (Manual Control)	Input (Meter Reading and Status)	Unit
H2 Gas Flow	1.50	1.50	mL/
He Gas Flow	1.50	1.50	mL/
3rd Cell Gas	0.0	0.0	%
IF/BK Pressur		4.60E+0	Pa
Analyzer Pres		8.50E-5	Pa
TMP Rotation		100.0	%
TMP Current		0.000	A

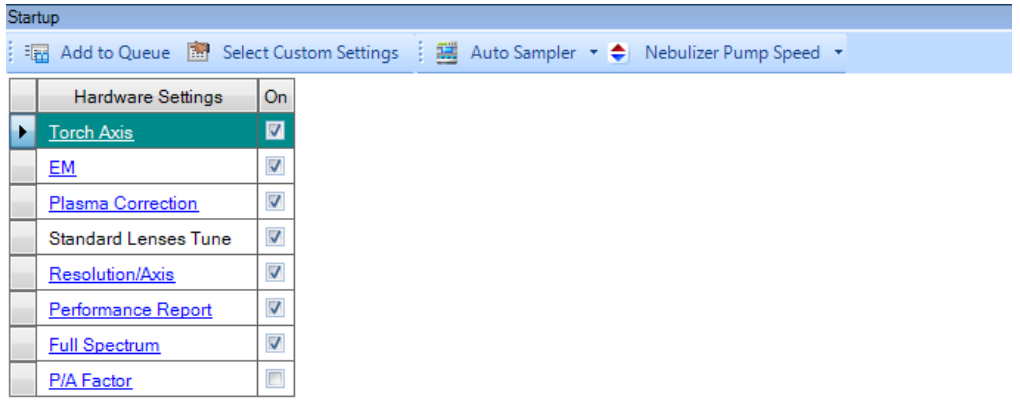
ICP-MS – Performance Testing

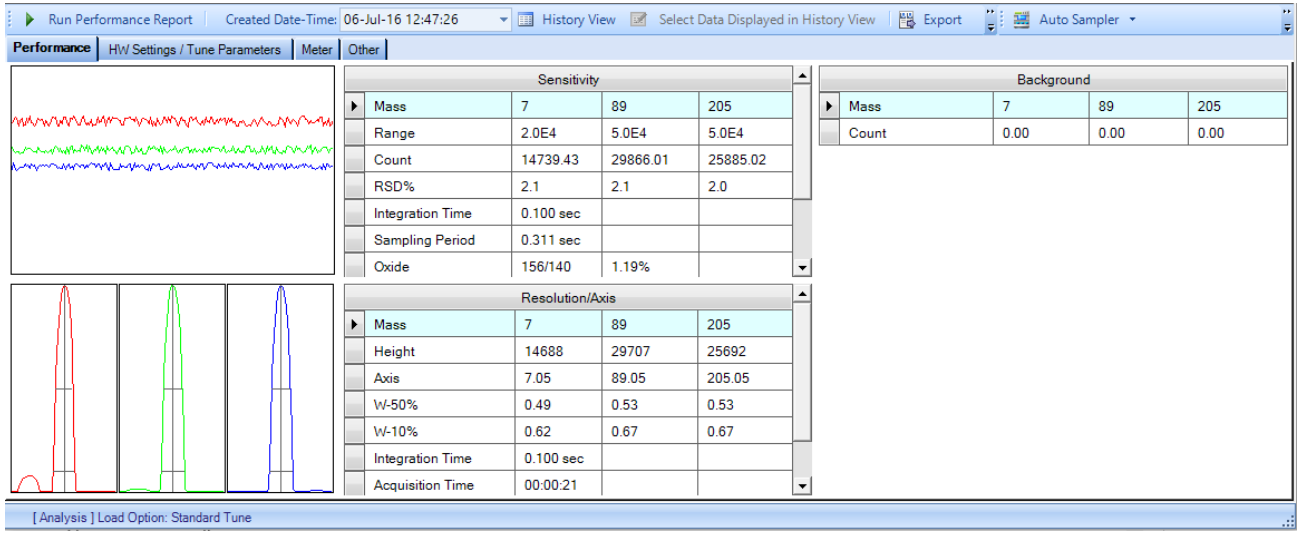
Startup provides a simple, user-configured schedule so you can check system optimization and performance

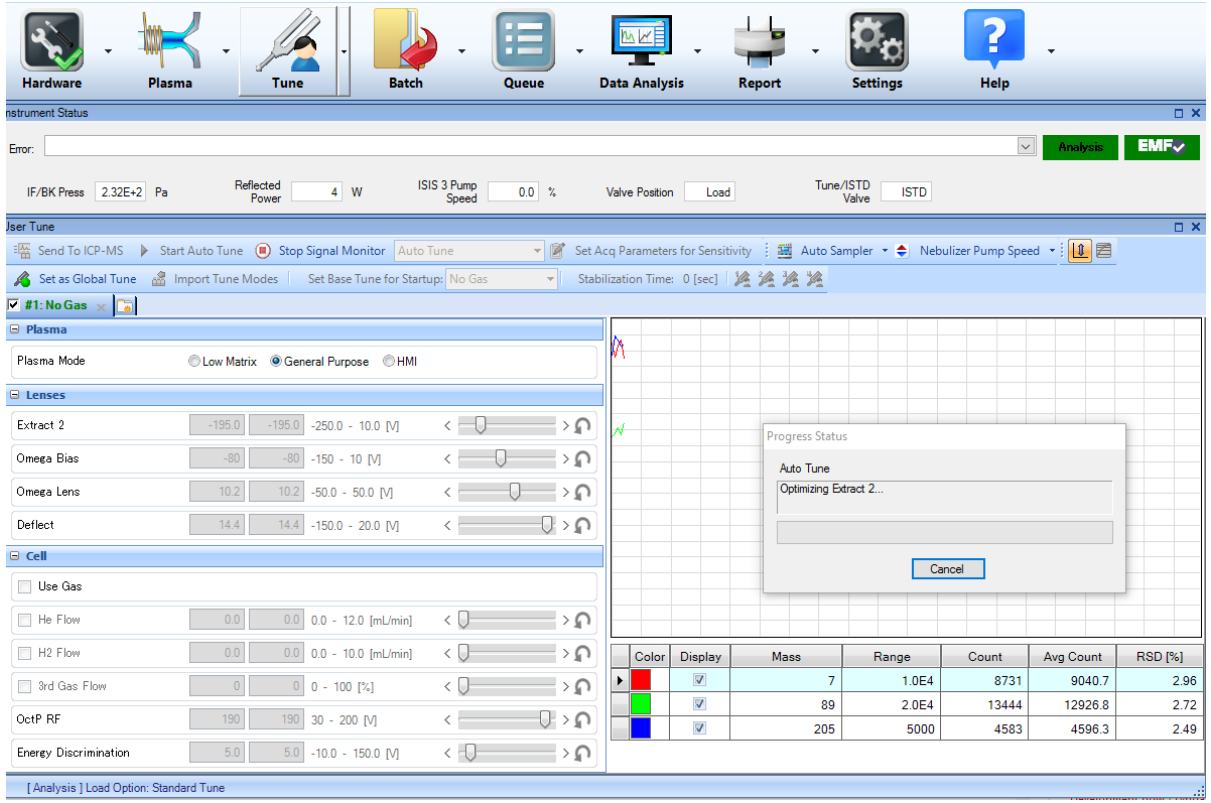
- Automatically generate a Performance Report
- Provides a continuing record of system performance

One-click expert AutoTune for simple optimization

- Ensures consistent performance from day to day
- Independent of operator experience







Cleaning the Glass Nebulizer

Never sonicate or attempt to inspect with wire.

For normal cleaning:

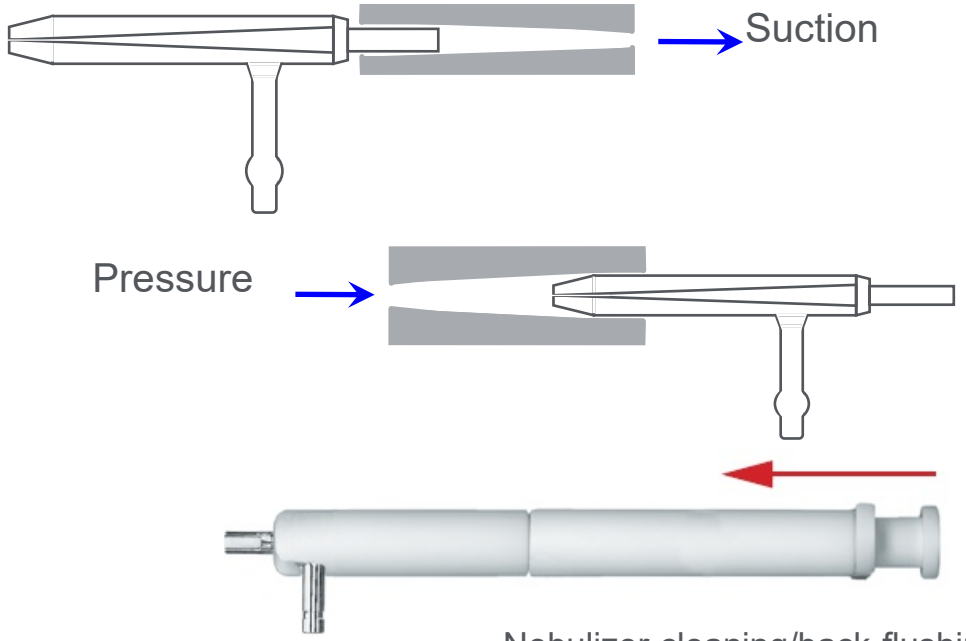
- Back-flush with methanol through the tip using a dedicated nebulizer cleaning/back-flushing tool; **or**
- Reverse pump the nebulizer with the tip in solvent; **or**
- Apply suction from the wide end of the capillary using a vacuum aspirator; **or**
- Apply high pressure inspect air via a tubing snugly fitted over the nebulizer tip (use with caution!); **or**
- Soak in a 5% nitric acid bath for ~10 mins.

For salt deposits:

- Soak the nebulizer overnight in a beaker of 25% Fluka RBS-25 detergent. Rinse with pure water.

For “stubborn” deposits:

- Soak the nebulizer overnight in concentrated nitric acid. Use a pipette to ensure there are no air bubbles in the capillary. Rinse with pure water.



Nebulizer cleaning/back-flushing tool
p/n G3266-80020

https://www.agilent.com/en/products/lab-supplies/nebulizertips

Cleaning the ICP-MS Spray Chamber

Spray chamber

Routine cleaning:

- Soak the end cap and spray chamber in 5% nitric acid or Citranox for >30 mins
- Rinse, dry and refit

If you see precision problems or droplet formation on the walls of the spray chamber (beading):

- Soak overnight in a 25% detergent solution
  - Best to leave it soaking for 24 hours
  - Use any laboratory detergent
    e.g. Fluka RBS25, Triton X-100, Decon 90 etc.

Cleaning the ICP-MS Torch

Visually check the torch, bonnet and shield when removing the torch

- Replace if deformed or chipped

Do not sonicate!

For routine cleaning:

- Soak in >5% nitric acid for ~30 mins

For more stubborn stains:

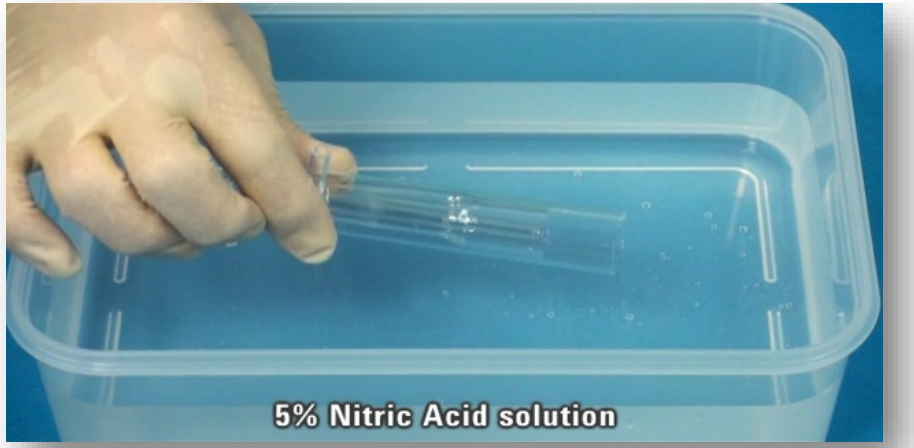
- Soak in bleach (e.g. Chlorox ©) overnight
- Soak in aqua regia (1:3 HNO_3:HCl)

For salt deposits:

- Rinse with water to remove deposits
- Soak the torch overnight in a beaker of 25% Fluka RBS-25 detergent

Rinse and allow to dry

Caution! Reinstall only when dry



Torch damage due to incomplete drying

Cleaning the ICP-MS Interface Cones – the Right Way

Routine Cleaning:

Simple clean with pure water

- Dip a cotton swab (pn 9300-2574) in pure water and clean both sides of the cone
- Rinse with pure water
- Ultrasonicate the cones in pure water for >5 mins (typ. 20 mins)
- Repeat as required (aim for water to stay clean)

Only if performance is still not satisfactory, clean with a 2% Citranox solution (pn 5188-5359)
(NOT MORE THAN 2%)

- Ultrasonicate in a 2% Citranox solution for max. 2-3 mins
- Rinse with pure water
- Ultrasonicate in pure water for >5 mins

http://www.agilent.com/en-us/promotions/icp-ms-resource

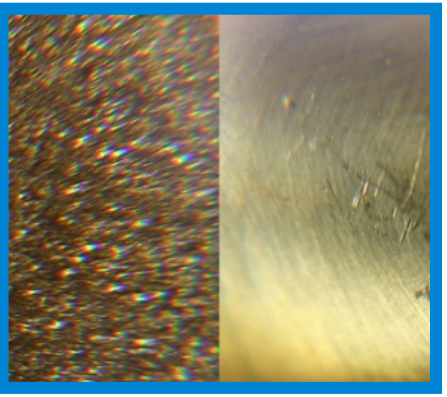
Cleaning the ICP-MS Interface Cones

ONLY For more severe contamination:

Clean with a 2% nitric acid solution

- Dip a cotton swab in 2% HNO_3 and clean both sides of the cone
  (DO NOT SOAK IN ACID)
- Rinse with pure water
- Ultrasonicate in pure water for 2 - 3 mins
- Rinse with pure water
- Ultrasonicate again in pure water for an additional 2 - 3 mins

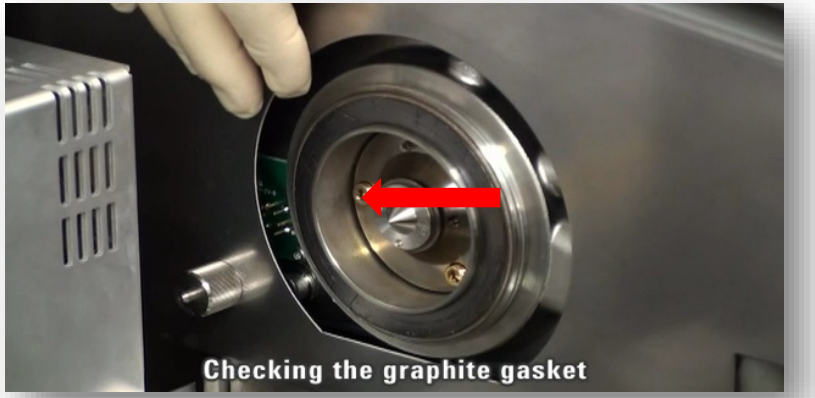
Pitted nickel cone from effect of HNO_3 soak (left side) and clean machined metal on right.

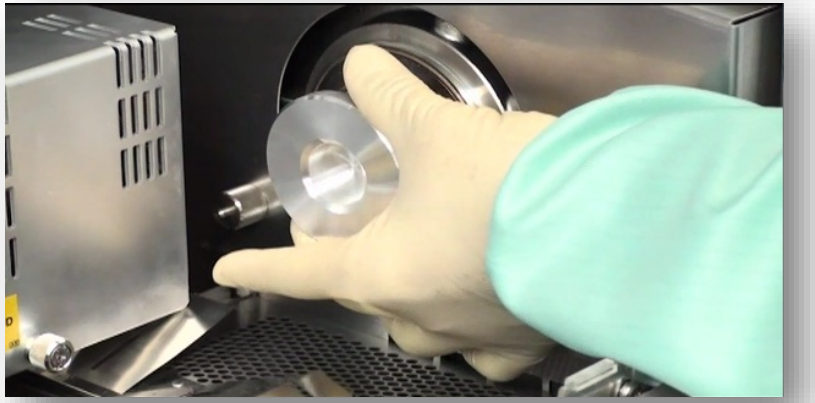


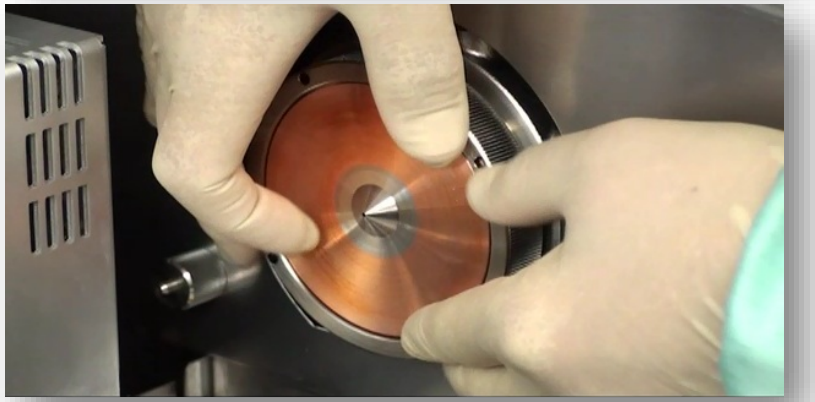
http://www.agilent.com/en-us/promotions/icp-ms-resource

Re-installing the Cleaned Cones

- Check the condition of the graphite gasket and replace if necessary
- Refit the skimmer cone using the removal tool
- Refit the sample cone and tighten by hand
- Check the vacuum levels to confirm correct installation
  - Interface pressure: 500 Pa (~4 torr, 0.005 atm)
  - Analyzer pressure: 0.002 Pa (~1.5 x10^{-5} torr, 2 x10^{-8} atm)







Conditioning Interface Cones

Condition new or cleaned cones prior to use

- Reduces drift due to initial deposition of sample matrix on the clean cone surface
- A thin insulating layer on the surface of the cone can lead to improved sensitivity (BEC) in your analysis

Default Recommendation

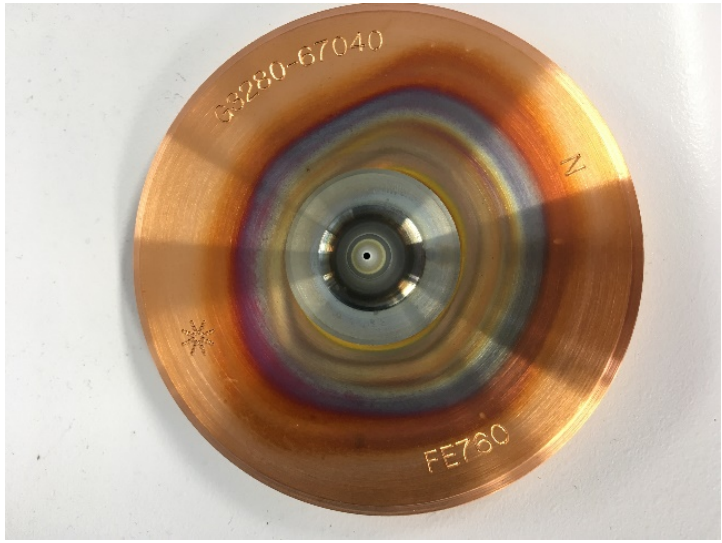
- Aspirate 50 ppm Ca in 1% HNO_3 for 10 minutes
- Follow with a 1% HNO_3 rinse solution for 10 mins

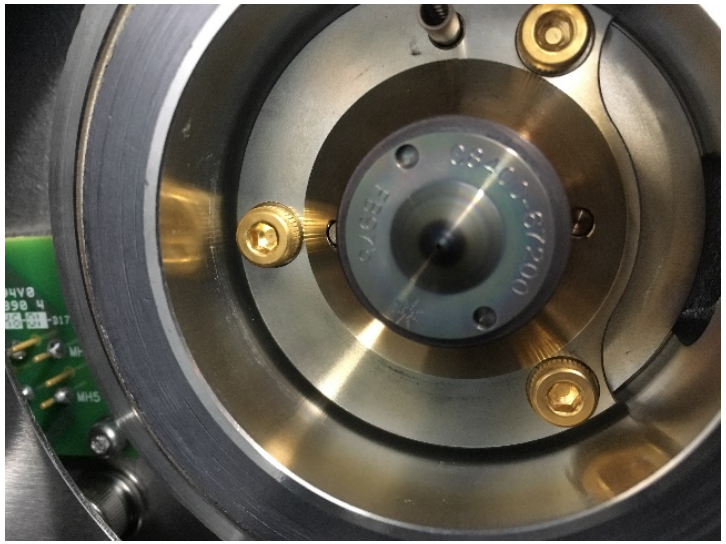
Practical Recommendation

- Aspirate your highest matrix sample for ~15 mins (warm up) and then your blank / rinse solution for 10 mins.

Environmental Laboratories

- Aspirate 6020 Interference Check solution A (5188-6526) diluted 10 times by volume with Ultrapure Water for 30 mins
- General Purpose auto tuning, no gas mode
- Follow with a 5% HNO_3 rinse solution for 10 mins





Make use of the instrument warm up time!

Top 5 Tips to Ensure a Successful Restart of Your ICP

Clean/verify nebulizer performance

Check/clean pre-optics or interface cones

Clean your sample introduction system

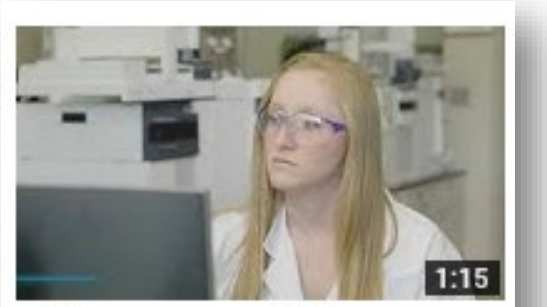
Fit new peri pump tubing

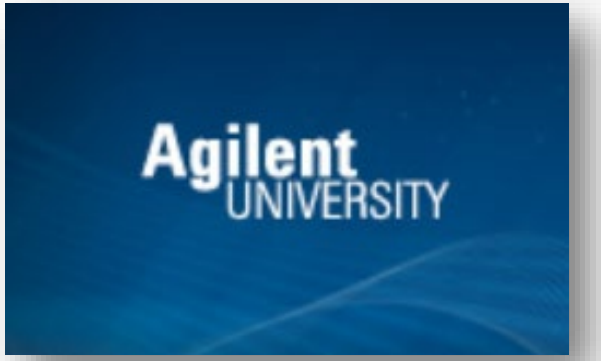
Run a performance report

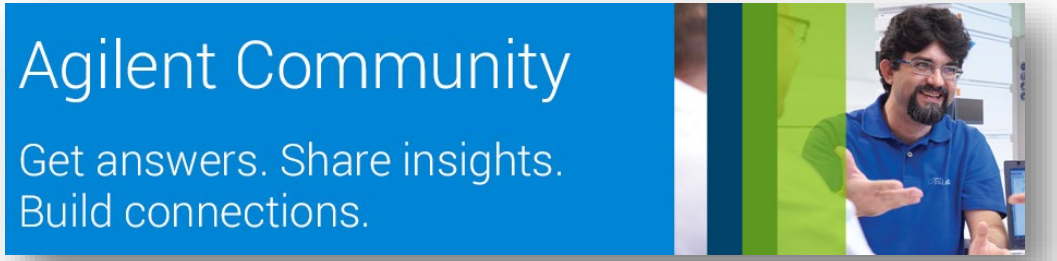
Resources for Support

https://community.agilent.com/

- Agilent support resources: https://community.agilent.com/community/resources
- Collection of support material https://community.agilent.com/docs/DOC-1856
- Agilent chemistries and supplies information: http://www.agilent.com/chem/agilentresources
- Agilent University http://www.agilent.com/crosslab/university
- Youtube – Agilent Channel

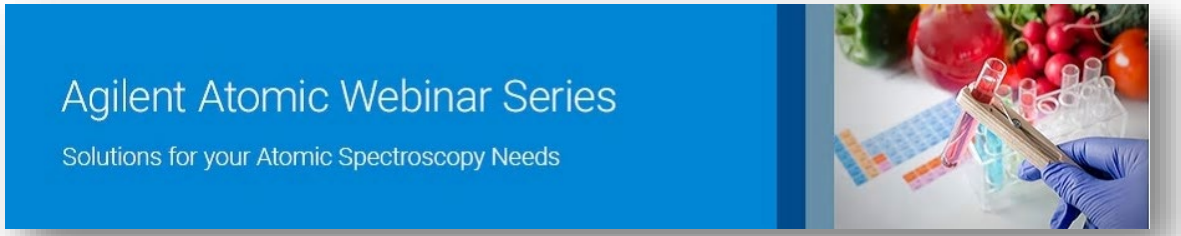






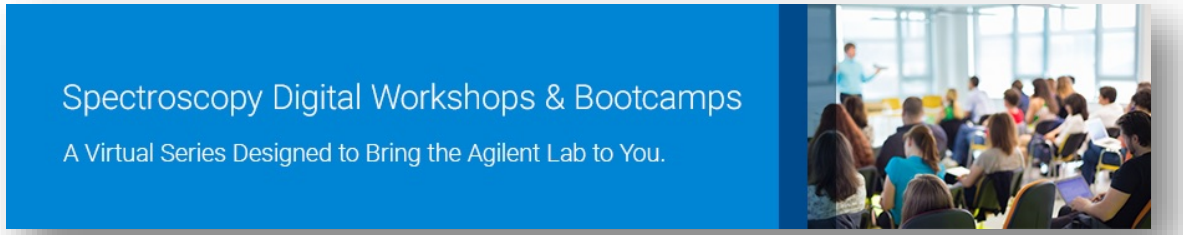
Additional online e-seminars and educational material

https://www.agilent.com/en/training-events/eseminars



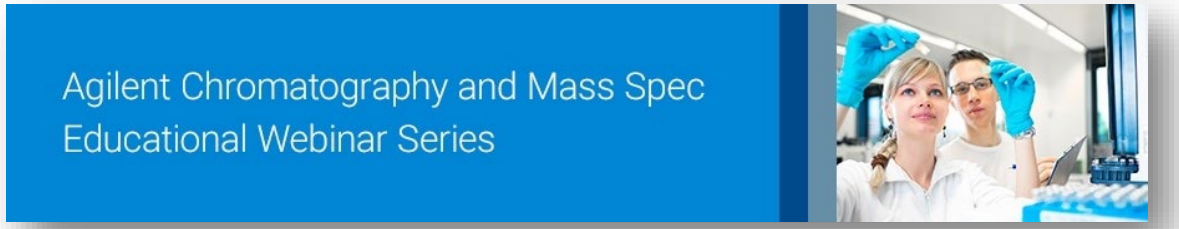
https://www.agilent.com/en/training-events/eseminars/atomic-spectroscopy

https://www.agilent.com/en/training-events/eseminars/openlab2



Register here

https://www.agilent.com/en/training-events/eseminars/lc-lc-ms-column-e-seminars
https://www.agilent.com/en/training-events/eseminars/gc-gc-ms-webinars



https://www.agilent.com/en/training-events/eseminars/832

https://www.agilent.com/en/training-events/eseminars/etff-webinars

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Get individualized assistance. Our remote service engineers are available by **phone or video conference** to answer your questions – including support on compliance issues or performing risk assessments. Contact us or explore online resources to do-it-yourself.

Connect, collaborate, and share insights. Quickly ask and find answers to your questions **live and online**. Build connections and access instrument resources in the Agilent Community.

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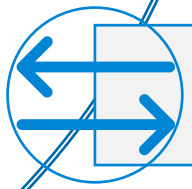
Check-in with your Agilent instruments remotely. Receive real-time status alerts with critical instrument information with Smart Alerts for your Agilent LC, GC and GC/MS instruments. The Remote Assist feature also provides priority response service for faster uptime. No professional installation needed!



Keep your lab up and running. With over 400 instrument modules in stock and ready to ship, utilize our Instrument Exchange Services to replace defective modules. Or if you need to retain your instrument, use the Return to Agilent Program to ship us your defective unit. **We'll repair it and return your instrument back to you.**

Agilent University Online Education

Customer Training without the Travel: *Self-paced Courses*

Learning Paths

Agilent offers over 400 online, self-paced courses of which over half are free. Find training for specific instruments using Agilent University Learning Paths.

Running Start

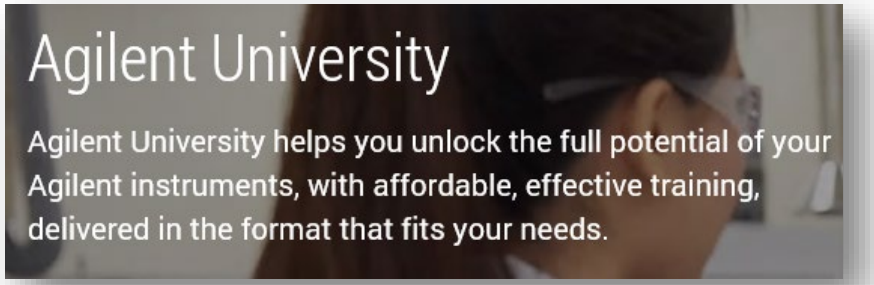
Train beginners using comprehensive Running Start courses at a value price. These five- to eleven-hour courses have no pre-requisites and are designed to make you productive quickly.

Cloud Lab Online Courses

For the ultimate in online, self-paced training with real hands on software labs, try Agilent quant courses with *cloud laboratory*. An Agilent exclusive offering that delivers better retention of complex learning.

Agilent University ePass

For the most thorough and cost-effective approach to extensive online training in English, the Agilent University ePass provides each user unlimited online training for 3- or 12-months.



https://www.agilent.com/en/training-events/events/agilent-university

Agilent University Online Education

Training without the Travel: *Virtual Instructor-led Training*

Remote Custom Training

Agilent offers customized live Instructor-led Training delivered remotely to a single customer site at a time of your choosing. For additional information, please reach out to your Regional Customer Education Coordinator team.

Virtual Instructor Led Training

Agilent has now introduced Live Instructor-led Training; delivered remotely to a group of customers covering standardized contents (https://inter.viewcentral.com/events/cust/catalog2.aspx?cid=agilent&pid=1&lid=1&app_id=3). This live e-Learning offers many of the benefits of classroom training without the need to travel.

Contact Agilent Technical Support

1-800-227-9770 Option 3, Option 3:

Option 1 for GC/GCMS Columns and Supplies

Option 2 for LC/LCMS Columns and Supplies

Option 3 for Sample Preparation, Filtration and QuEChERS

Option 4 for Spectroscopy Supplies

Option 5 for Chemical Standards

800 Phone lines available 8-5 in all US time zones

Phone Tree Navigation Assistance

gc-column-support@Agilent.com

lc-column-support@agilent.com

spp-support@agilent.com

spectro-supplies-support@agilent.com

chem-standards-support@agilent.com

In Summary

We at Agilent understand the restrictions and hardship many of you are going through because we're experiencing them as well

Given all that we are going through, Agilent remains a stable and continuing resource to meet and exceed your analytical measurement needs

We are open for business and here to help

Any questions?

All unanswered chat questions will be followed up post-event.

Slides will be distributed to the email address you registered with.