

A background image showing a close-up of laboratory glassware, including several round-bottom flasks and beakers, arranged on a surface. The image is heavily blurred and has a strong cyan/blue color cast, creating a bokeh effect with soft, out-of-focus light spots.

My instrument does not work
properly what should I do?

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Overview

- Common problems
- Troubleshooting
- Instrument specifics, OES/MS
- Questions



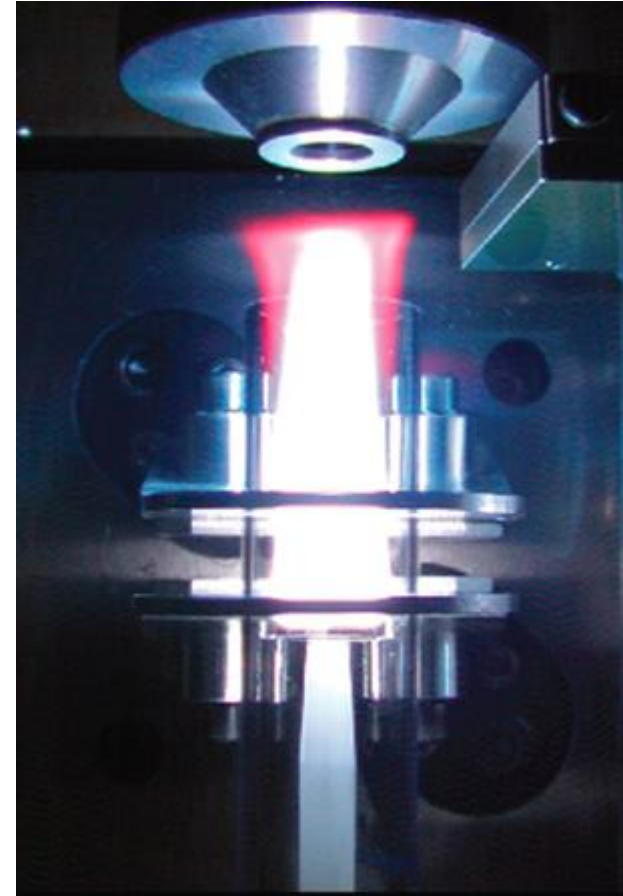
Common problem areas

- Plasma
- Signal intensity
- Stability



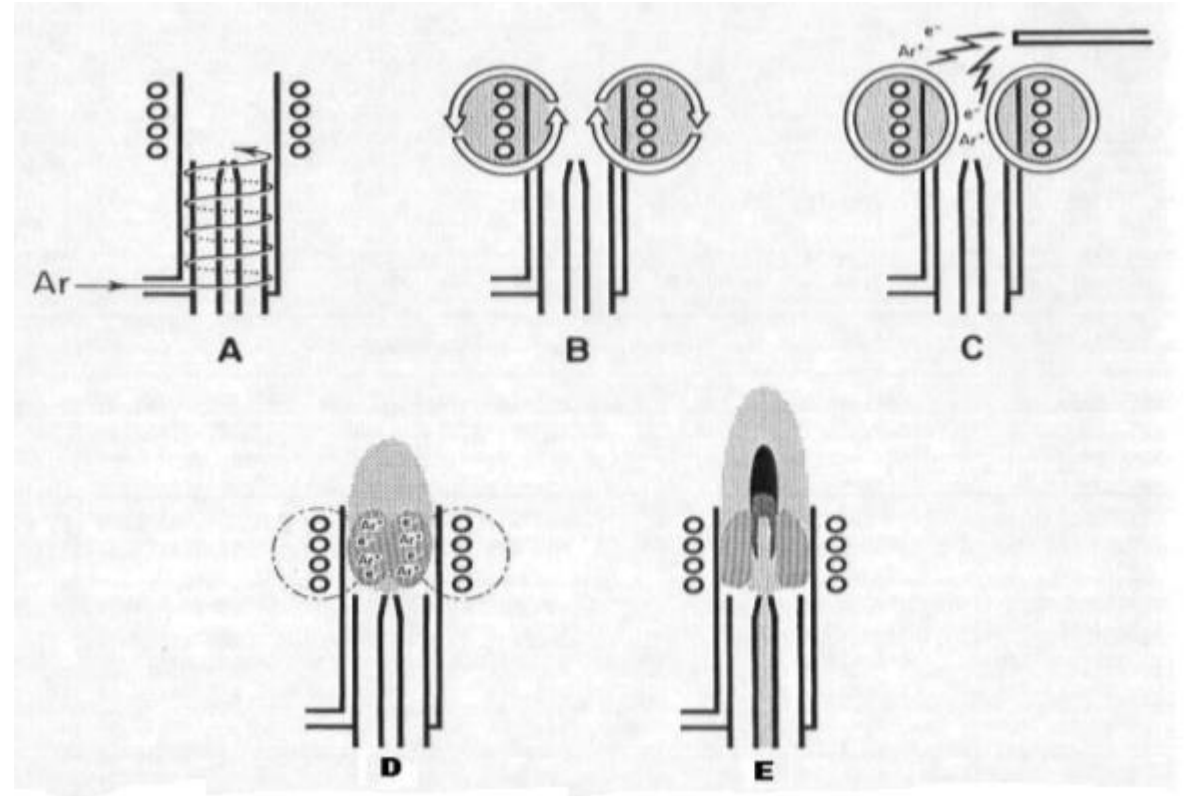
Plasma

- Will not ignite
- Ignites and extinguishes
- Goes out during samples



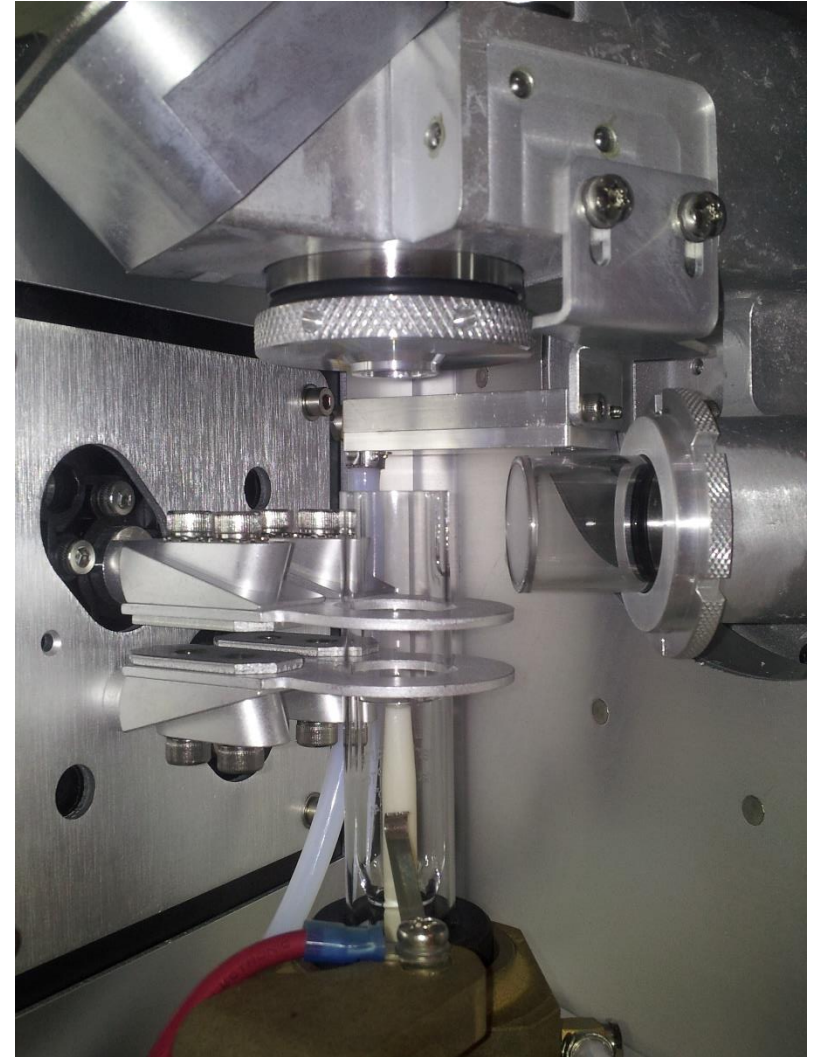
Plasma won't ignite

- Whats needed to form a plasma?
 - Argon
 - Correct flow
 - Good enough purity
 - RF field
 - Energy
 - A spark to start the reaction



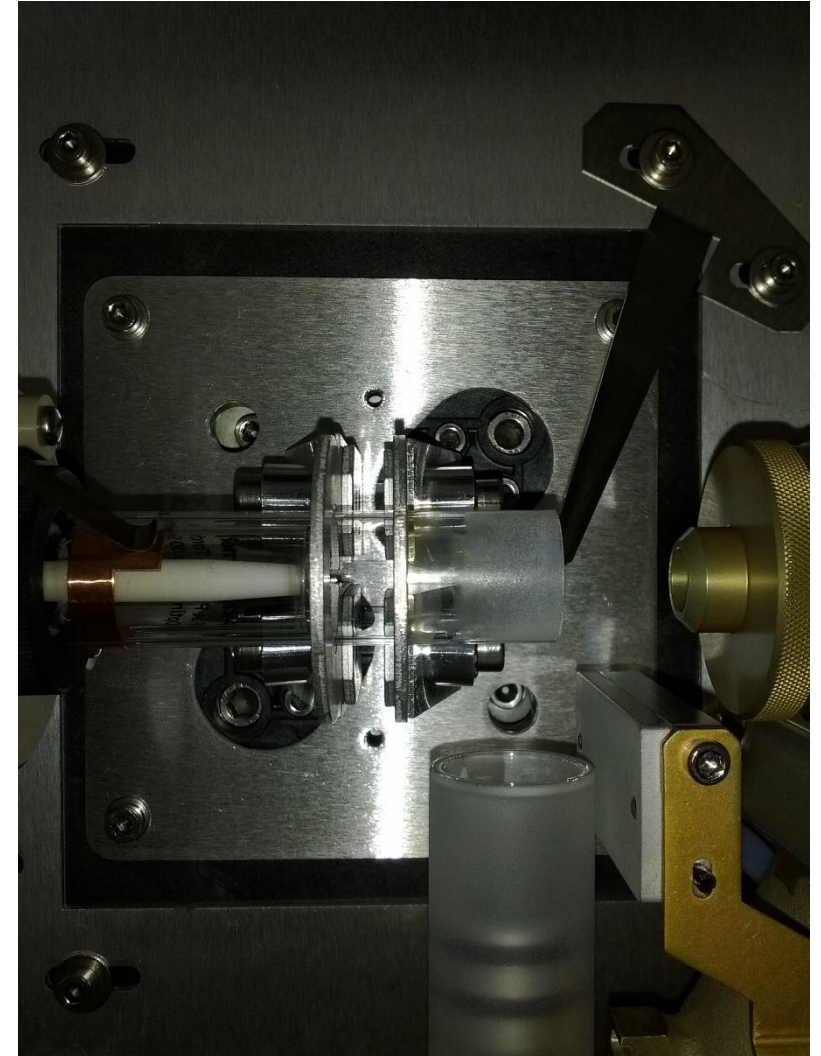
Plasma won't ignite

- Is argon coming into the torch?
 - Check incoming argon pressure
 - Check tubing for cracks/leaks
 - Check the torch and torch mount
- Is the coil clean and whole?
 - Check for build up on coil
 - Check for holes in the coil



Plasma won't ignite

- Is a spark being generated?
 - Listen for the ticking noise
 - Check the high voltage pin
 - Check grounding tab
- Interlocks
 - Safety checks
 - Will prevent operation if not met



Plasma ignites and extinguishes

- Unable to sustain plasma
 - Clogged up tubing, neb, injector
 - Overfilled spray chamber
 - Too high load, air leaks, moisture in torch
- Interlocks
 - Certain interlocks might be checked after plasma lights

Plasma extinguishes on sample

- Sample load too high
 - Tough matrix – dilute
 - Too much sample – low viscosity
- Create a more robust plasma
 - Increase plasma gas flows
 - Reduce nebulizer flow
 - Use injector with smaller bore



Signal intensity problems ICP-OES

- The intensity is too low!
 - Check sample introduction
 - Almost always the problem area
 - Blockages, worn pump tubing, kinks in capillary tubing
 - Different nebulizers/spraychambers
 - Don't stare yourself blind on signal count

Signal intensity problems ICP-OES

- Why not look at signal counts?
- BEC is a better measurement
 - Signal to background
- Example: 1000ppb Std
- 1: 100 000 cps STD. 1 000 cps Blank.
- 2: 250 000 cps STD. 5 000 cps Blank.

$$BEC = \frac{[Int\ Blank] \times [conc\ STD]}{[Int\ STD] - [Int\ Blank]}$$

$$BEC1 = \frac{[1000] \times [1000]}{[100000] - [1000]} = 10.1\text{ppb}$$

$$BEC2 = \frac{[5000] \times [1000]}{[250000] - [5000]} = 20.4\text{ppb}$$

Signal intensity problems ICP-MS

- The intensity is too low!
 - Check sample introduction
 - Blockages, worn pump tubing
 - Cones specifically
 - Different nebulizers/spraychambers
 - Optimization, flows, voltages, masscal
 - BEC not as important for ICP-MS but still useful



Signal stability problems

- Short term drift, high RSD
 - Check sample introduction especially pump tubing
 - Delay times
 - Sample volume
- Long term drift
 - Environment – temps, ventilation, contaminations



Use common sense

- When did it stop working?
 - Ex: After performing cleaning
 - Ex: Changed parts
- Whats different?
 - It worked for a month but not now!
- Is it operating within specifications?
 - Ex: Using lower quality argon



When all else fails

- Call for service
- Instrument can break down
- But often the problem lies in sample introduction
- Service Engineers: We're here to help!



Questions ?

