

SNS COLLEGE OF PHARMACY AND HEALTH SCIENCES

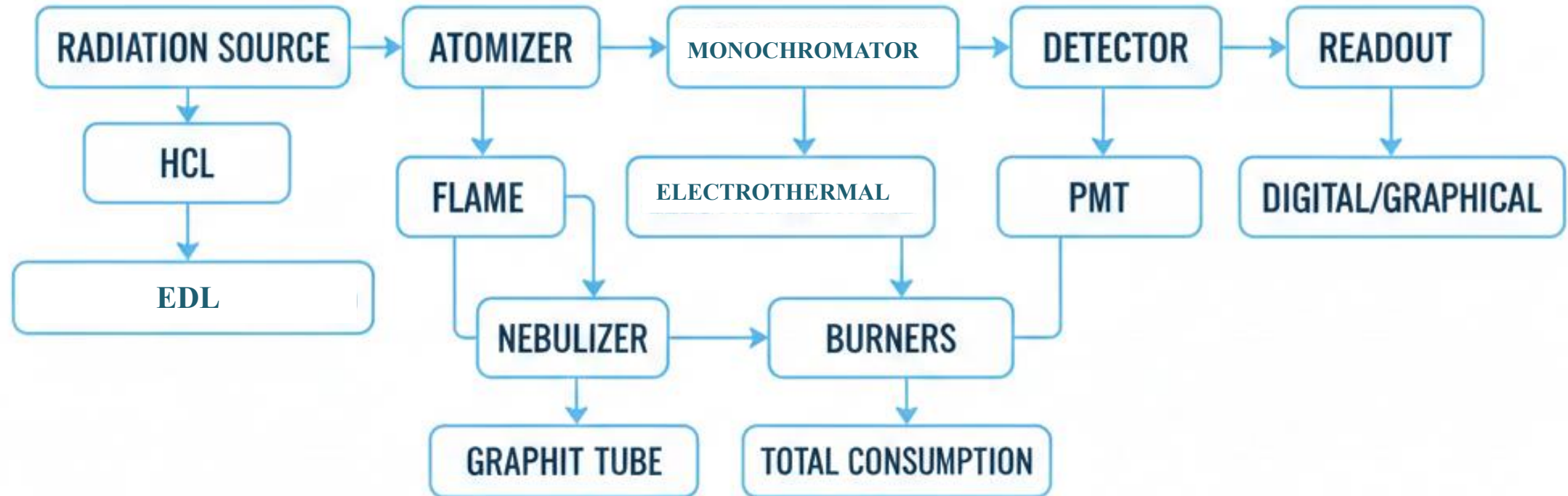
Affiliated To The Tamil Nadu Dr. MGR Medical University, Chennai
Approved by Pharmacy Council of India, New Delhi.
Coimbatore -641035

COURSE NAME: INSTRUMENTAL METHODS OF ANALYSIS (BP 701 T)

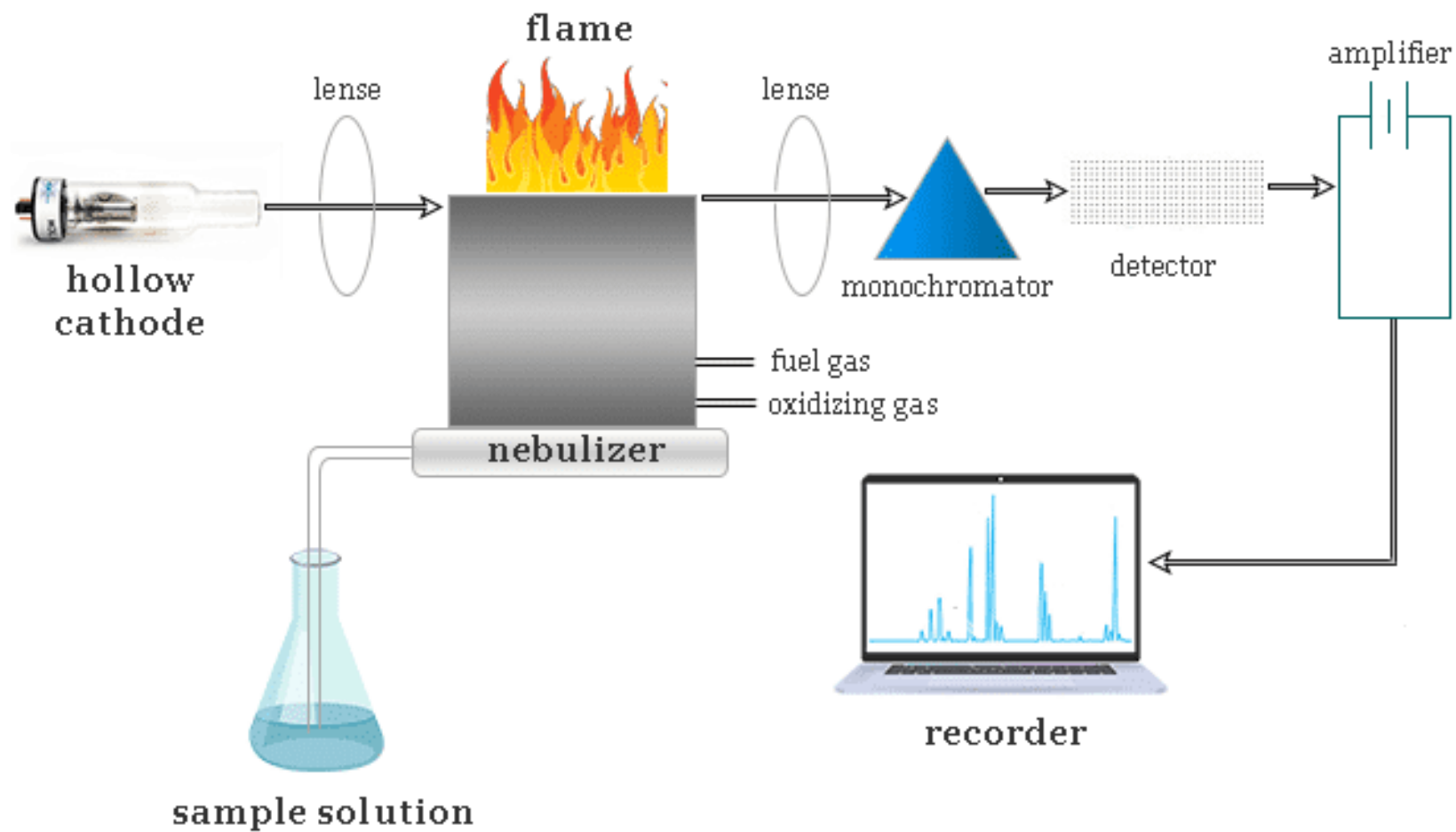
VII SEM/ IV YEAR

TOPIC 18: INSTRUMENTATION OF AAS

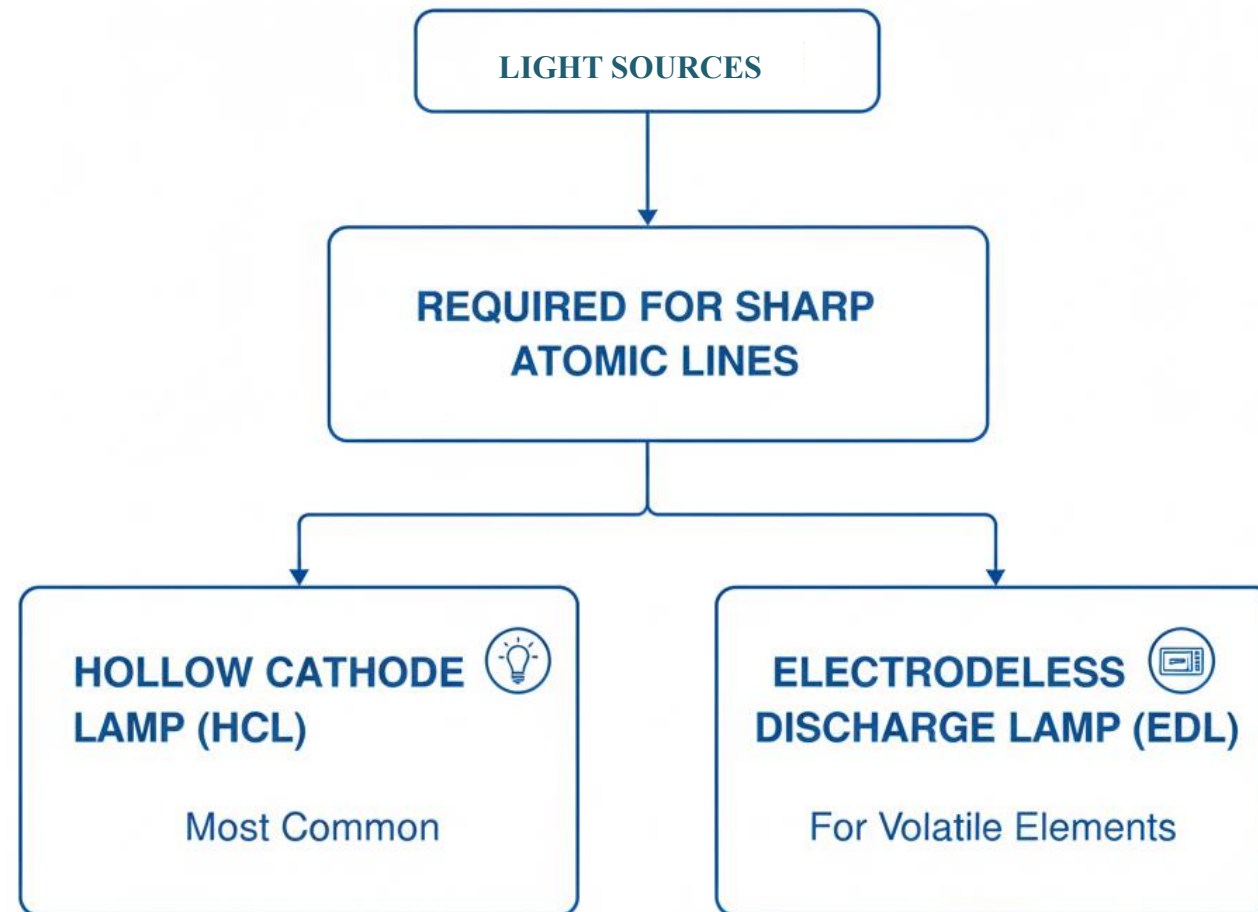
MINDMAP:



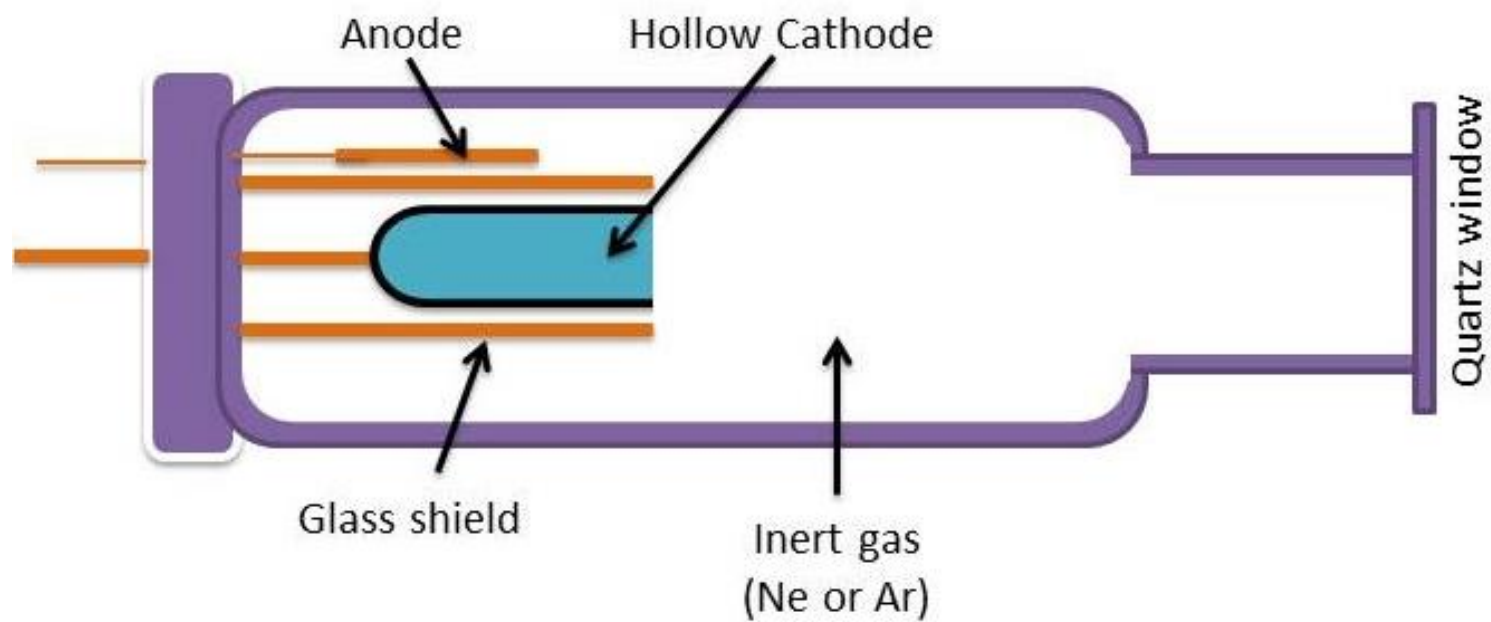
Schematic representation of AAS



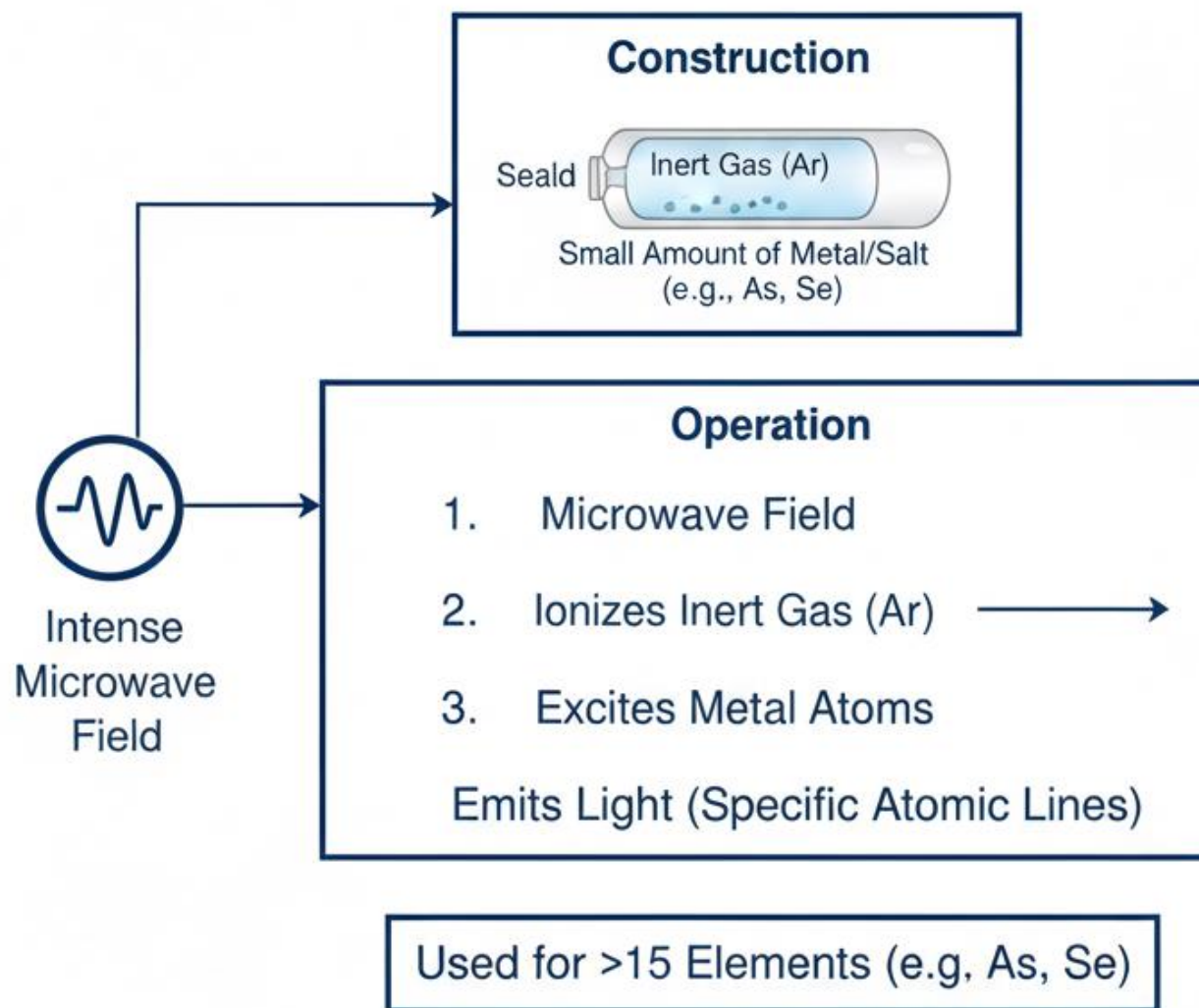
Radiation Sources



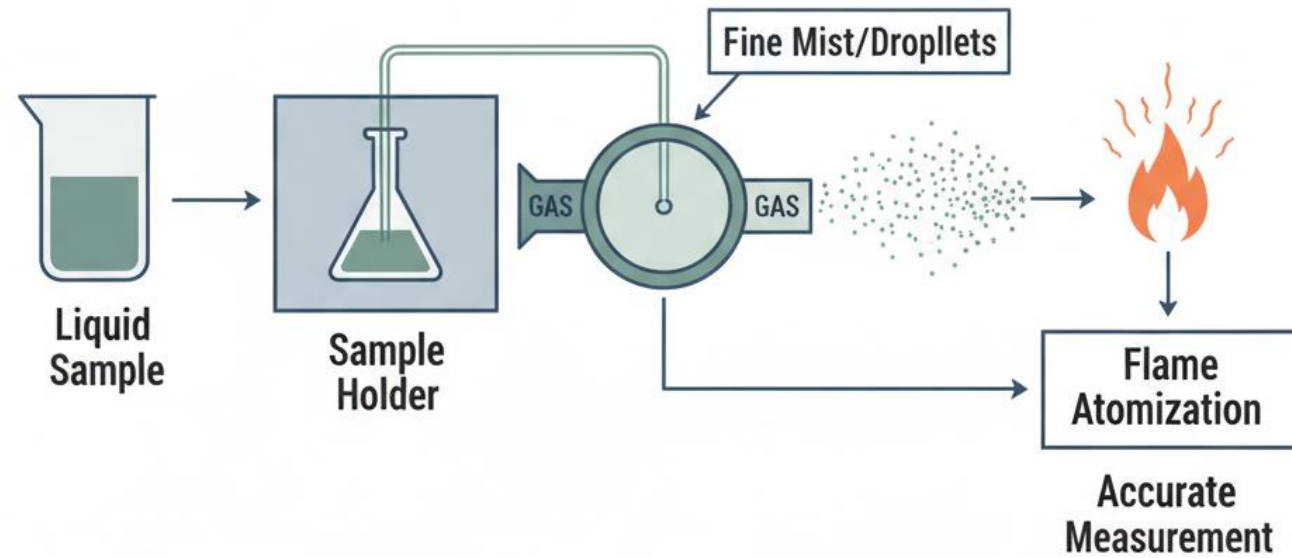
Hollow Cathode Lamp (HCL)



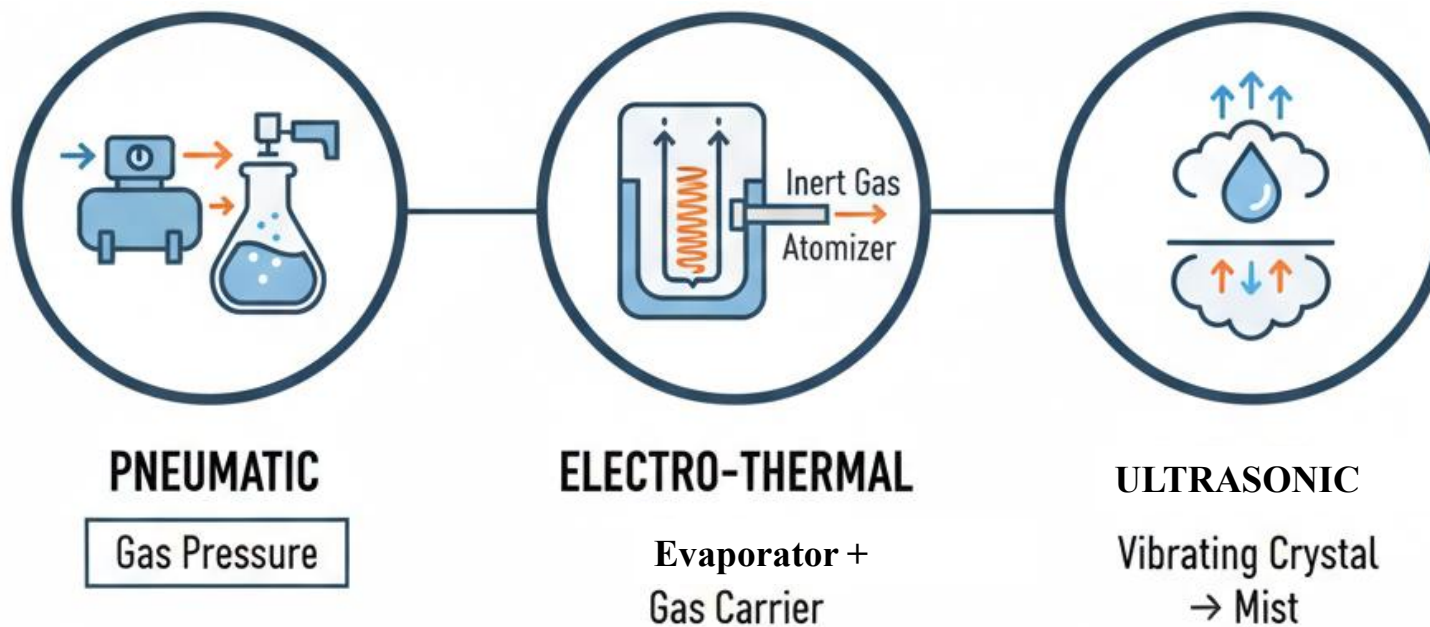
Electrodeless Discharge Lamp (EDL)



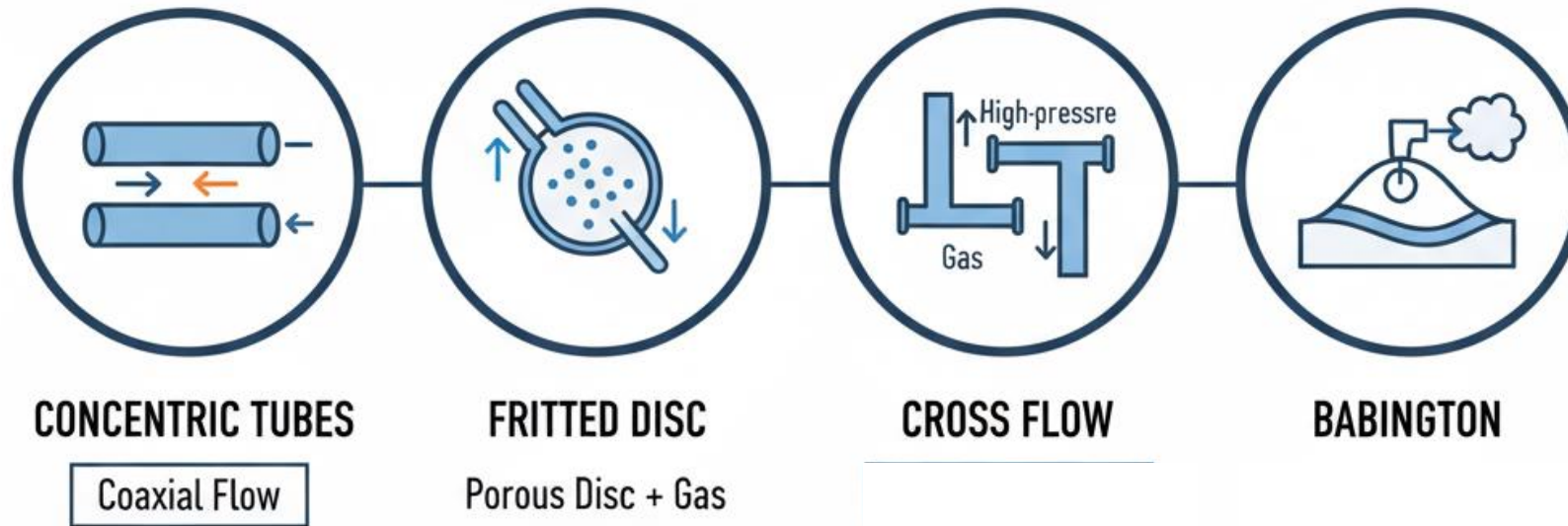
Sample Delivery System



Types of Nebulizers

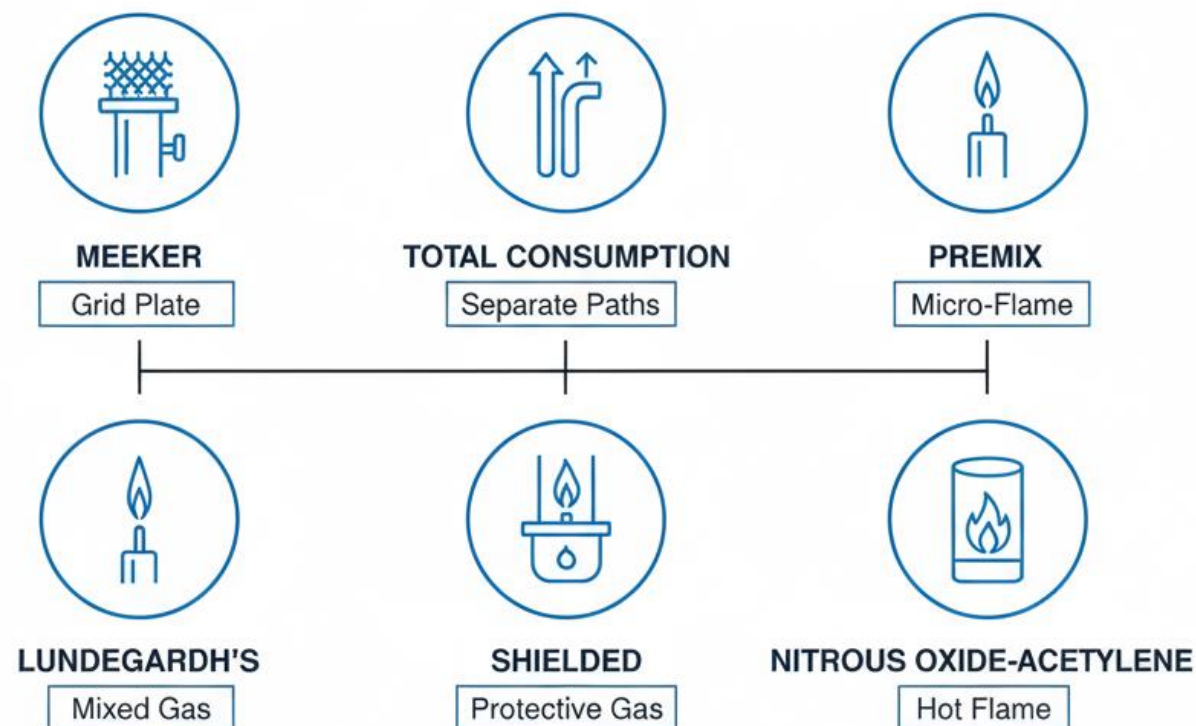


Pneumatic Nebulizers



Burners and Flames

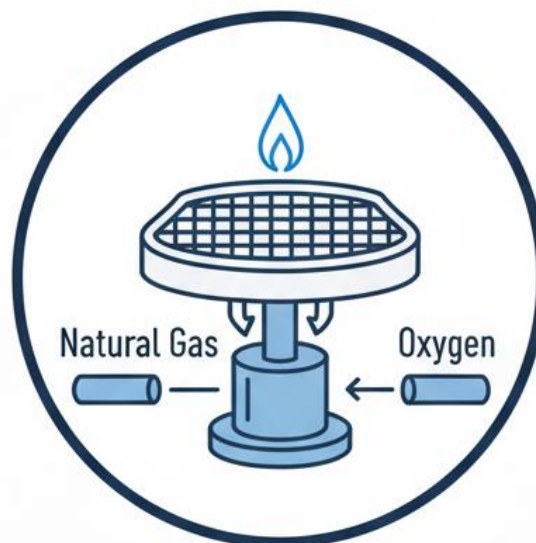
FUNCTION: Atomization + Excitation  



 **FLAMES: Provide Energy**
Affects: Temperature, Stability, Interefeence

Meeker burner

FUNCTION: Low Excitation Energy  



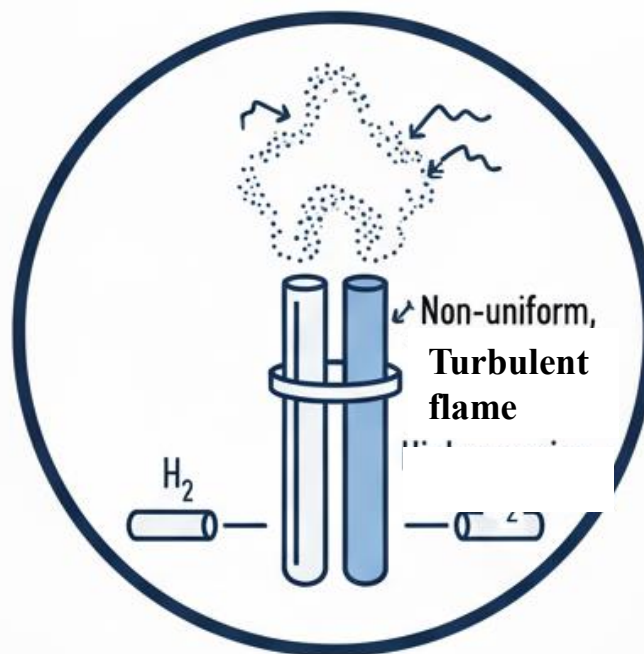
MEEKER

Natural Gas + Oxygen

Low Temperature + Not Widely Used

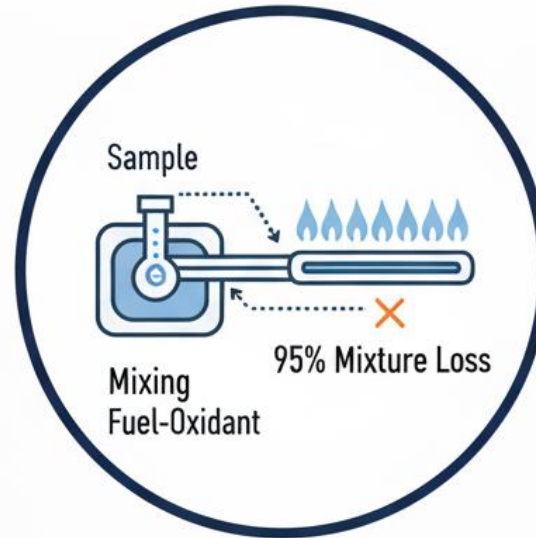
Total Consumption

FUNCTION: Entire Sample Consumed  



Premix

FUNCTION: Uniform Flame & Mixture Loss



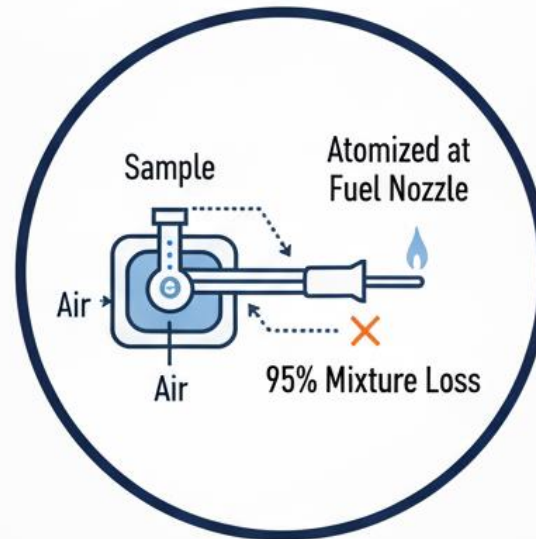
PREMIX

Sample + Fuel-Oxidant Mixed

Uniform Flame + 95% Mixture Loss

Lundegardh's

FUNCTION: Atomized at Nozzle & 95% Mixture Loss



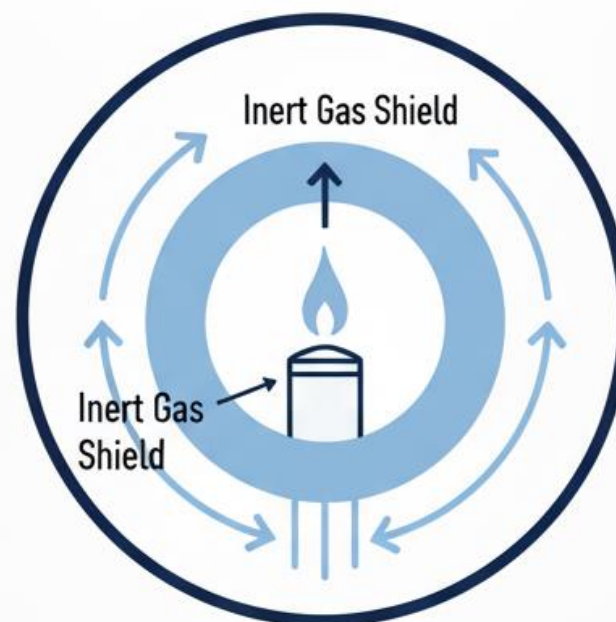
LUNDEGARDH'S

Sample + Air Mixed →

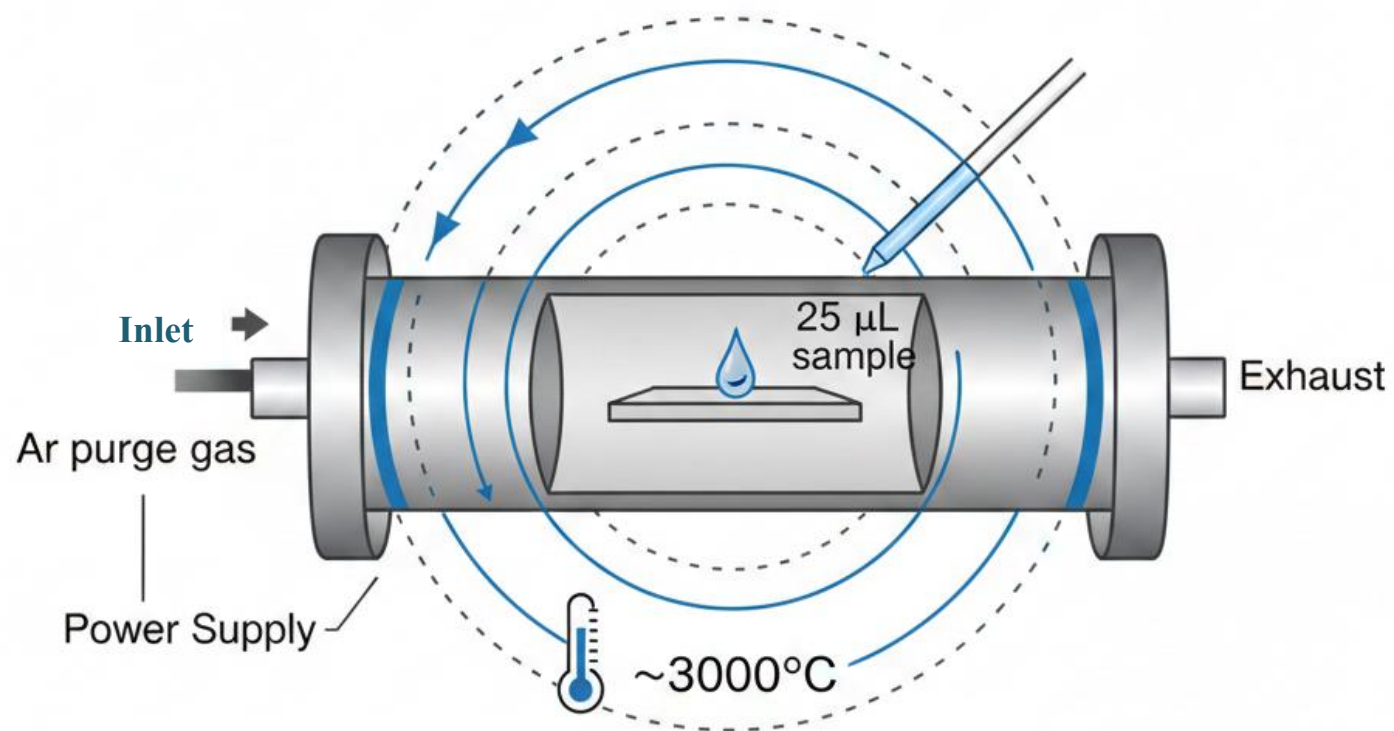
Uniform Flame + 95% Mixture Loss

Shielded

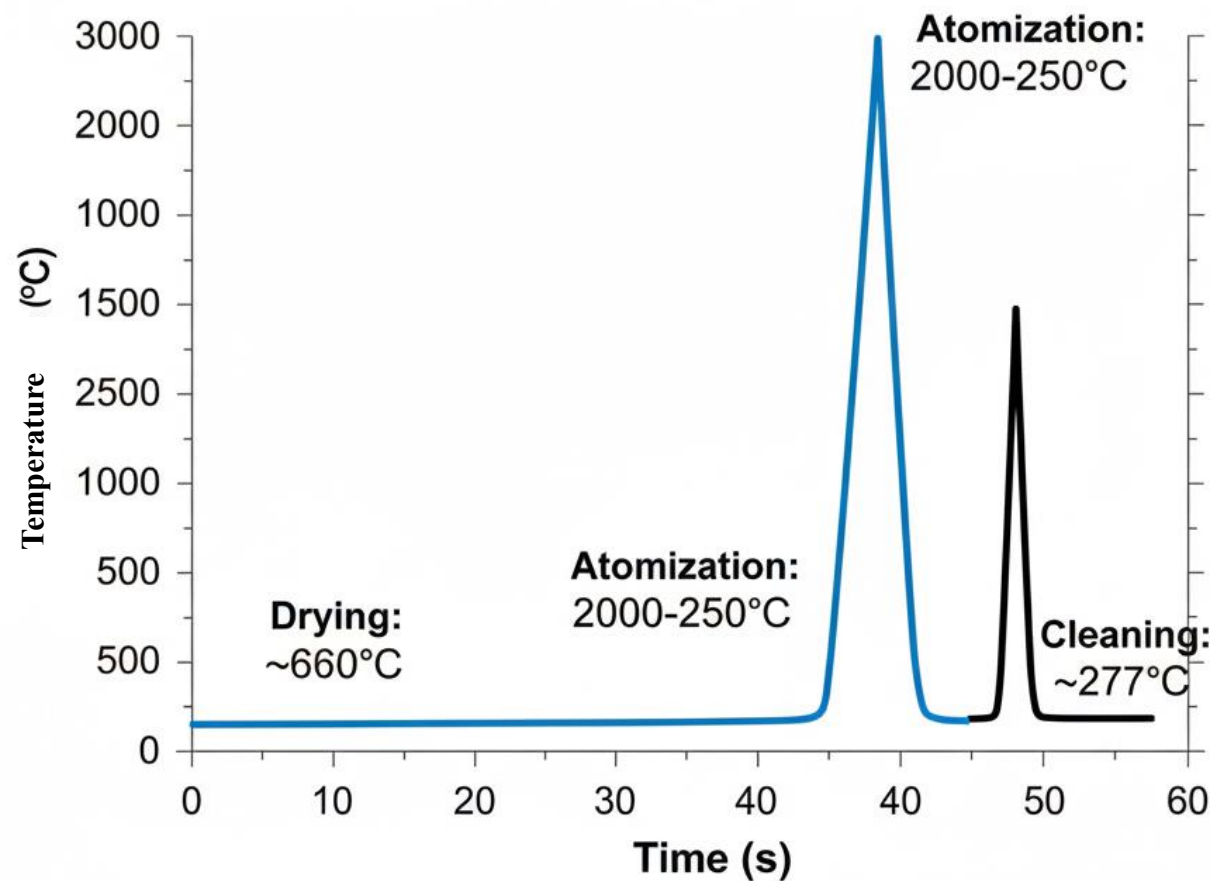
FUNCTION: Improves Analytical Sensitivity & Shield



Electrothermal Atomization (Graphite Furnace)

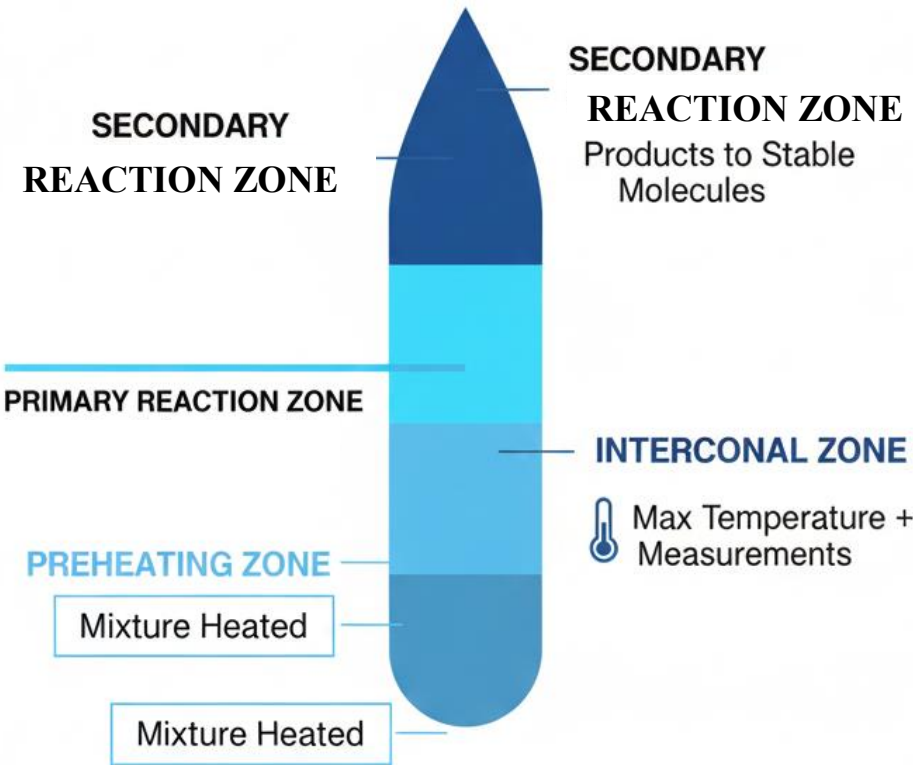


Heating Cycle in Graphite Furnace

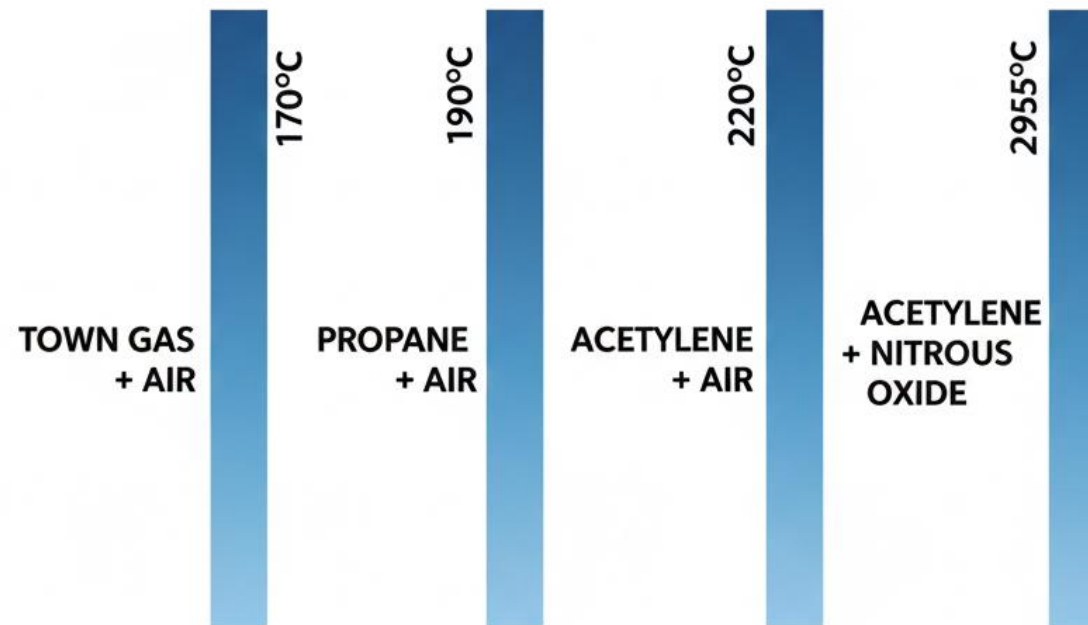


Flame Zones

FUNCTION: Energy & Chemical Reactions  



Fuel-Oxidant Mixtures



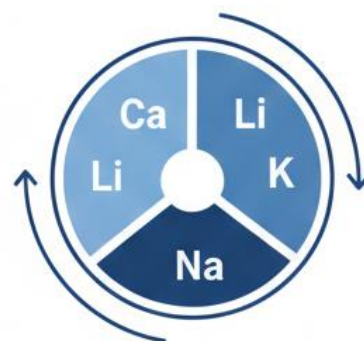
FUEL-OXIDANT MIXTURES: Determine Flame Temperature & Efficiency

Filters and Monochromators

FUNCTION: Isolate Wavelength & Intensity



FILTERS



Filter Wheel
Specific Wavelengths

MONOCHROMATORS



Prism

Quartz / Transparent

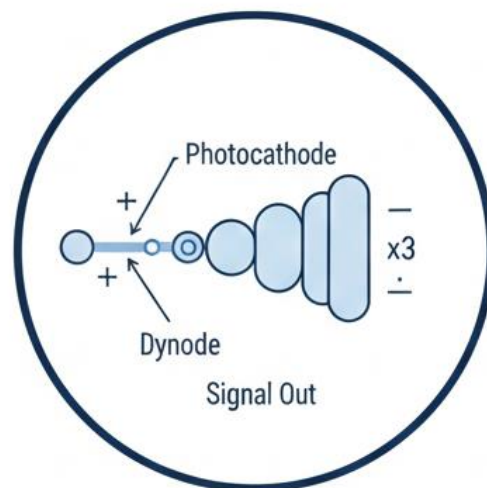
Grating

Parallel Lines

Convert polychromatic to monochromatic light

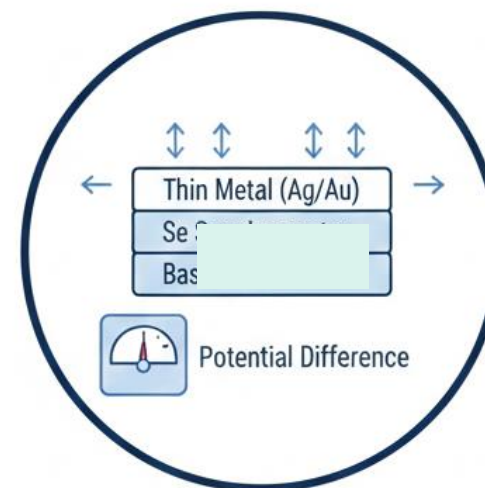
Detectors

FUNCTION: Convert Light to Electrical Signal



PHOTOMULTIPLIER TUBE (PMT)

Most Sensitive + Multiplies Signal



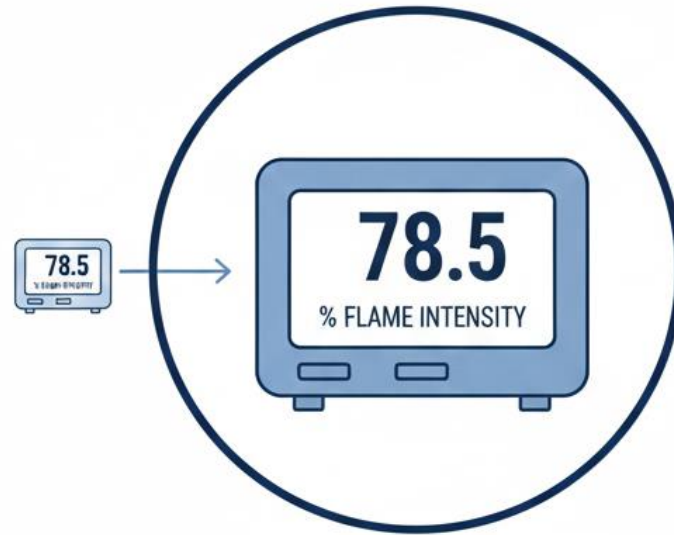
PHOTOVOLTATIC CELL



No Amplification



Readout Device



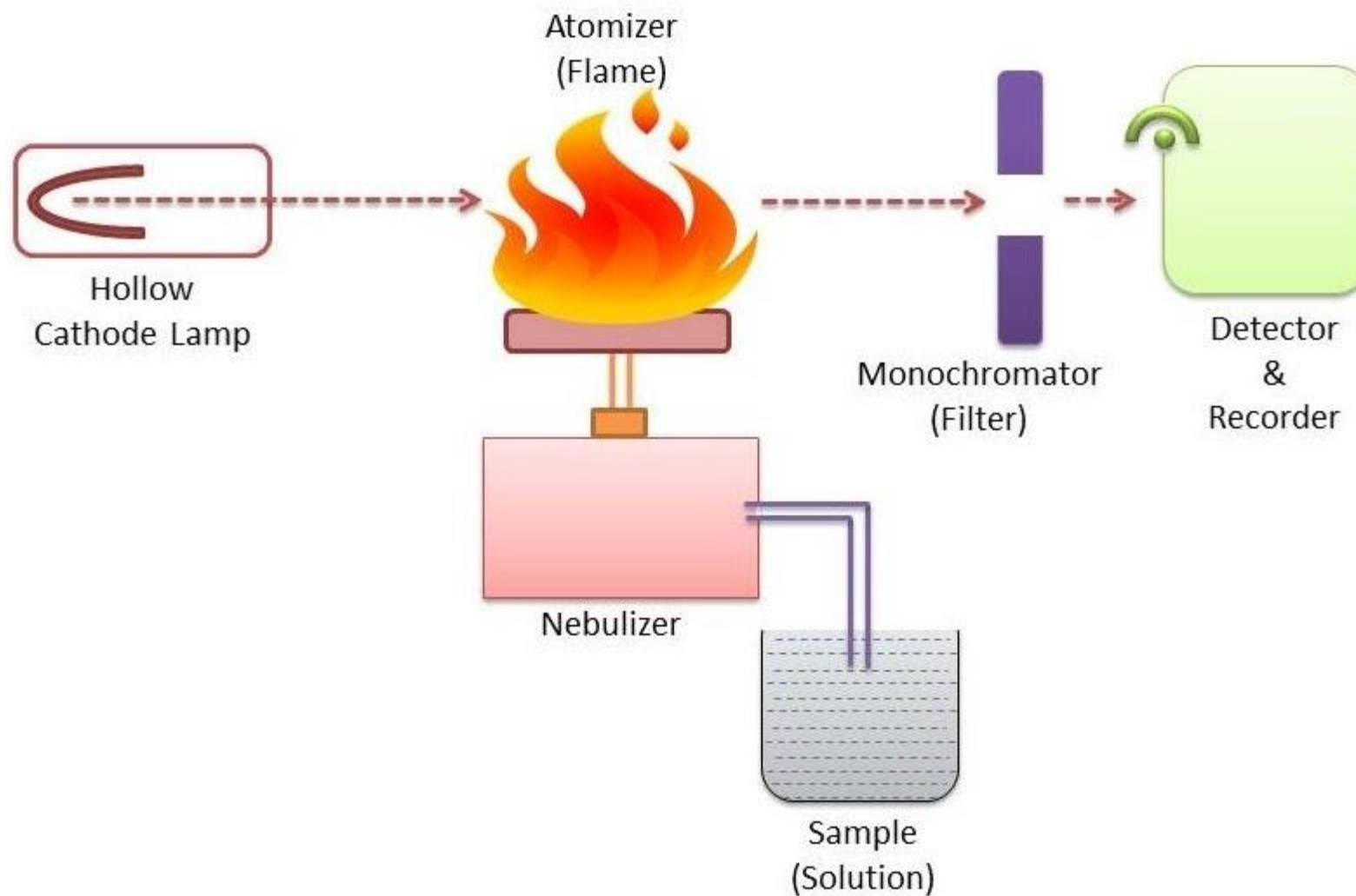
READOUT DEVICE

- Displays Detector Signal on Digital Scale
- Arbitrary Units / Proportional to Emitted Radiation

READOUT DEVICE: Converts Electrical Signal to Displayed Measurement



Summary



Assessment

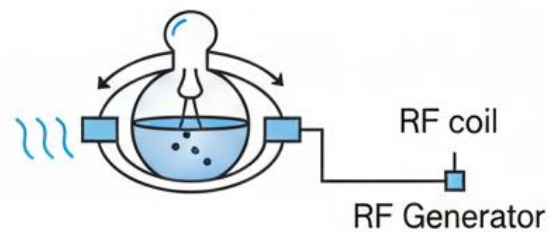
1. Which is the most commonly used radiation source in atomic absorption spectroscopy?



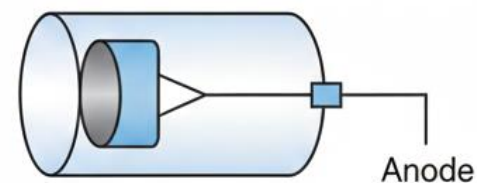
Assessment

1. Which is the most commonly used radiation source in atomic absorption spectroscopy?

a) Electrodeless Discharge Lamp (EDL)



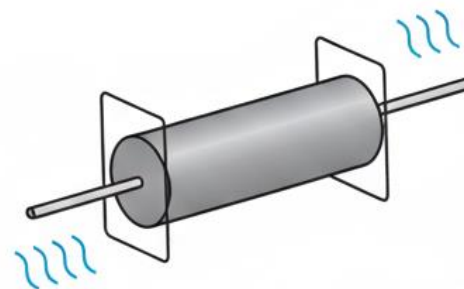
b) Hollow Cathode Lamp (HCL)



c) Incandescent Lamp



d) Globar Source



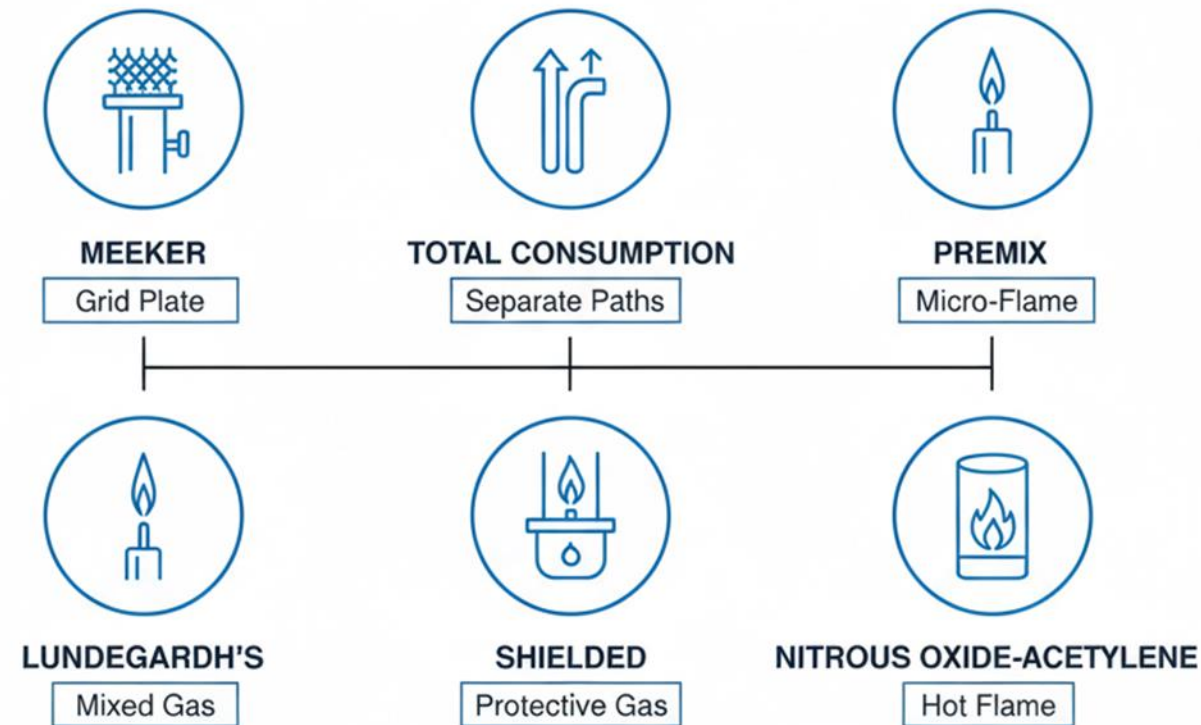
Assessment

2. In which burner is the entire sample consumed during the process?



Assessment

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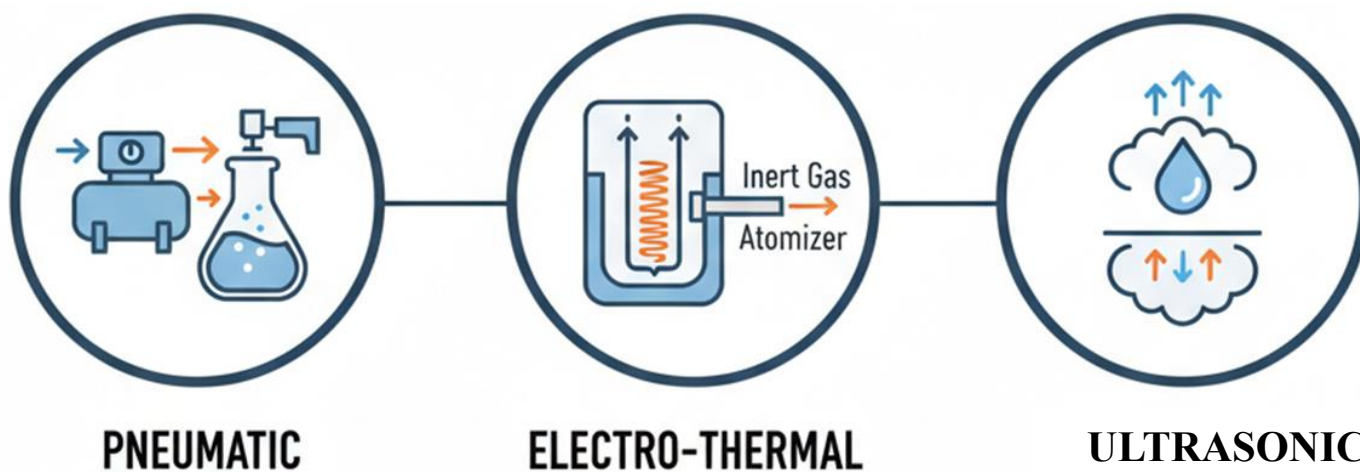
Assessment

3. Which type of nebulizer uses a vibrating piezoelectric crystal to produce a mist?



Assessment

3. Which type of nebulizer uses a vibrating piezoelectric crystal to produce a mist?



References

1. Skoog DA, Holler FJ, Crouch SR. Principles of instrumental analysis. 7th ed. Boston: Cengage Learning; 2018.
2. Beckett AH, Stenlake JB. Practical pharmaceutical chemistry. 4th ed. London: Athlone Press; 1988.
3. Willard HH, Merritt LL, Dean JA, Settle FA. Instrumental methods of analysis. 7th ed. New Delhi: CBS Publishers & Distributors; 1986.
4. Sharma BK. Instrumental methods of chemical analysis. 28th ed. Meerut: Goel Publishing House; 2019.
5. Chatwal GR, Anand SK. Instrumental methods of chemical analysis. 5th ed. Mumbai: Himalaya Publishing House; 2018.

Thank
you!