

Atomic Absorption Spectrophotometer AAS - 3500 PLUS



Innovative Technologies

Our AAS is productive, reliable and user-friendly. It improved the optical precision, linear range and background correction effect effectively. AAS - 3500 plus are the external computer controlled AAS fitted with 8-lamp positions and automatic gas control.

AAS - 3500 Plus is an Atomic Absorption Spectrometer with international advance technologies for Flame & Graphite Furnace technique.

Both models have two background correction technologies in one unit.

Analytical Technologies developed PC information processing technology. Automatic measurement and straylight dynamic detected without any reference materials and any cost increment.

Original Optical Noise Reduction

Analytical Technologies develops optical noise reduction technology, which combines optical component UV enhancement technology. It improves instrument's optical performance, linear range and enhanced background correction.

Lamp control (Patent)

Analytical Technologies develops interval lamp control technology. It makes normal hollow cathode lamps self-absorption background correction possible without the influence to instrument's stability. Meanwhile, it will prolong working time of the lamp.

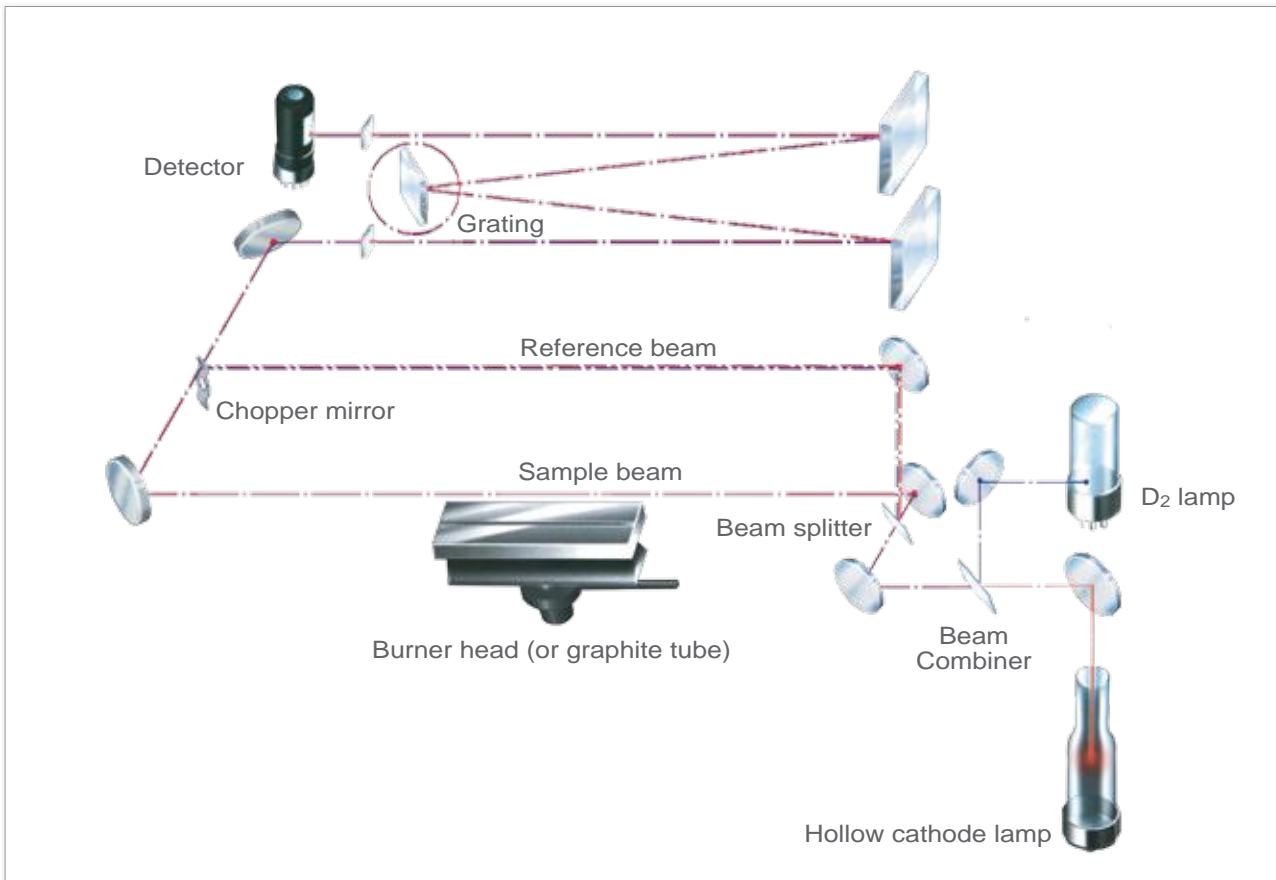
The cost of normal hollow cathode lamp is only about one-tenth of special lamp.

Original "Hg lamp-reagent" gradient measurement

Analytical Technologies develops "Hg lamp-reagent" gradient measurement technology. We establish an exact mathematical model to estimate "double beam linear and balance" specification. This technology provides a fast and economic method for instrument self testing system. It also establishes a brand new method to improve instrument's detection performance.

Numerous technological innovation and renewal such as fashion design, element lamp multi-dimensional automatic adjustment system, gas path electronics functional and modular design, No-adjustment D₂ lamp holder and so on.





Optical Diagram of AAS 3500 Plus: total reflection optical

The combined advantages of two techniques

Advantages of the Double-Beam System (AAS - 3500 plus)

- Long-term stability.
- Automatic lamp drift compensation.

Advantages of the Single-Beam System

- Highest light throughput.
- Less optics so no energy loss.
- High sensitivity.

Outstanding Flame and Graphite furnace autosampler technology

- The autosampler is easy to adjust and operate, stable running, no noise. It has a function of intelligent dilution in the system.
- One unit of autosampler can perform with flame and graphite furnace mode. The number of sample is 85 positions for flame mode and 87 positions for graphite furnace mode.

Advance Dual Atomizer System (AAS - 3500 plus)

- Combine two systems for flame and graphite furnace in one unit.

Dual-Background Correction Functions

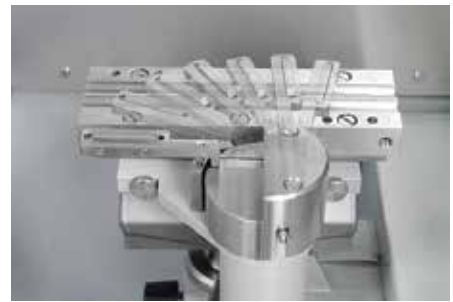
- The optimal background correction methods are installed as standard: self-absorption method (Smith-Hieftje) and deuterium lamp method (D₂ method).



▲ Graphite Furnace head



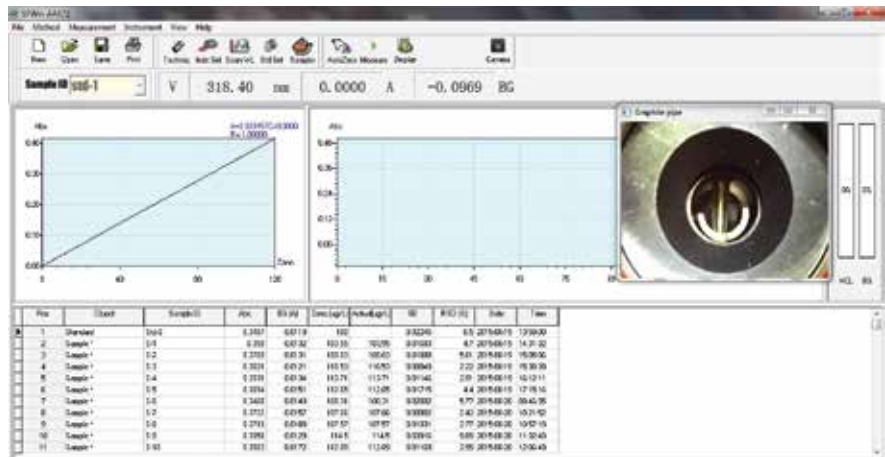
▲ Graphite tube



▲ Scraper

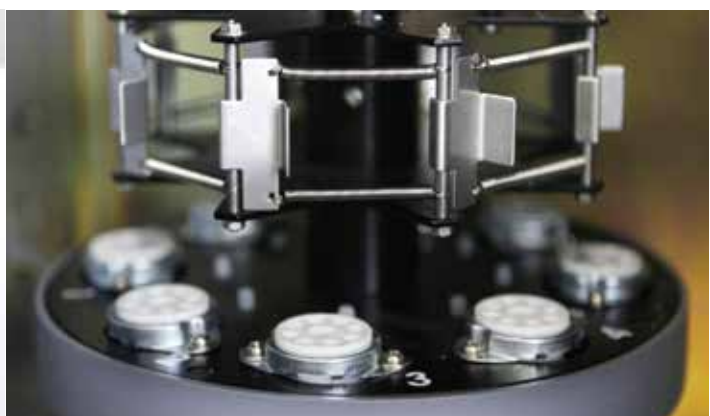


▲ Burner head



▲ Camera for Graphite tube

The Main Features



Reflection achromatic optical system :

AAS-3500 plus Atomic Absorption Spectrometer using a large aperture of 355.8 and 345.6 mm focal length monochromatic roads and 1800/mm diffraction grating monochromator, total reflection optical systems, as well as aberration aspheric mirrors, the instrument has a high luminous flux, no color, excellent optical performance without chromatic aberration. Keep the measurement is accurate and reliable. Make the analysis is effective.

Pioneering lamp turret position vertical structure :

8 lamps turret position vertical structure for maximum automatic changer.

Automatic ignition for flame mode (for AAS-3500 Plus)

The ignition of flame on the burner head is controlled from the software.

Good ability to resist atomizer optical radiation reasonable design.

Autosampler for flame and graphite furnace :

One unit of autosampler can operate with flame and graphite furnace mode. The number of sample is 85 positions for flame mode and 87 positions for graphite furnace mode.

Auto flame ignition and gas flow automatic setup (for AAS-3500 Plus)

It is important to determine the optimal gas flow rate for the flame when using an organic solvent or after changing the burner height.

Automatic burner height (for AAS-3500 Plus)

The absorption sensitivity for flame analysis depends on the atomization position at the proper burner height . Automatic burner cleaner for 50 mm. burner head (Option)

Automatic slit selection :

The system can select for four slits: 0.1, 0.2, 0.7 and 1.4 nm.

Powerful software and data process ability, humanistic operation interface and beautiful graphic output :

Fashion design, element lamp multi-dimensional automatic adjustment system, gas path, electronics functional and modular design, No-adjustment D₂ lamp holder numerous technological innovation and renewal.

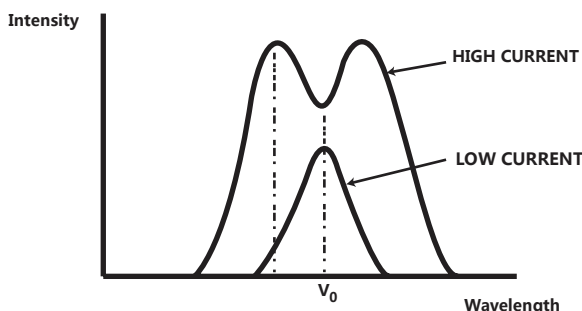
Other automatic function :

- Full wavelength scan and peak seeking.
- Negative voltage and energy balance.
- Auto optical balance in D₂ lamp balance correction.
- Lamp current setting.
- Alarm and safety protection.

Self-absorption background correction function

1.

Self-absorption background Correction (Smith-Hieftje).



2.

Comparison sheet of common background correction methods.

Compare items	D ₂ lamp	Zeeman			Self-absorption
		Constant magnetic (Horizontal)	Alternate (Horizontal)	Alternate (Vertical)	
Device	Beam consistency	Bad	Good	Good	Good
	Optics energy balance	Balance	Almost Balance	Almost Balance	Imbalance
Property	Energy calculation	Loss	Big Loss	Big Loss	No Loss
	Wavelength correction range	UV Area (traditional)	Full-Wavelength	Full-Wavelength	Full-Wavelength
	Sensitive Loss	No	Big Loss	Loss	Few
	Baseline Stability	Not so good	Good	Good	Better
	Background Correction 1A	Good	Good	Good	Good
	Background Correction 2A	Bad	Good	Good	Good
	Background Correction Structure	Not Allowed	Allowed	Allowed	Allowed
	Spectrum Overlapping interference	Not Allowed	Partially	Partially	Partially
Curve flip	No	High	High	High	Very Low

3.

Advantage of High performance self-absorption background correction.

Competing with Zeeman effect background correction, it is low cost, no loss of light due to polarizers, accurate correction for spectral interference and easy to use for various application.

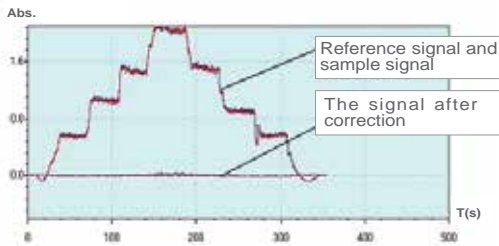
such as: Measurement of trace levels of zinc in iron solution.

Interested Element	Analytical Line (nm)	Matrix Element	Absorption Line (nm)
Al	309.28	Mg	309.30
As	193.76	Fe	193.73
Ca	422.67	Fe	422.64
Cd	228.60	Ni	228.84
Cu	324.75	Fe	324.73
Mg	285.21	Fe	285.18
Ni	232.00	Fe	232.04
Pb	217.00	Fe	216.95
Sb	217.58	Fe	217.55
Se	196.03	Fe	196.05
Si	251.61	Fe	251.69
Zn	213.856	Fe	213.8589

4.

AAS - 3500 Plus break many technologies bottleneck:

Creating "multiple linearity and balance technique" adopted hardware and software combined method. Solving many problems by using self-absorption background correction. Dual signal (sample beam wide pulse and reference beam narrow pulse). Transmission/Absorption in wide linear range and dynamic balance.



Self-absorption background correction (Cd 228.80 nm)
 Flame background correction performance at 2.0A

Self-absorption background correction is more accurate than deuterium lamp (D_2) background correction. This is ideal for the quantitation of trace elements in matrix complex solution, such as bio-samples and metals.

Self-absorption background correction over the entire wavelength range from 185 nm to 900 nm.

No polarizer is used, measurements are possible with no light loss and high S/N ratio.

Due to the excellent self-absorption and D_2 lamp background correction ability, the molecular absorption and particle scattering are corrected and produce the accurate correction for spectral interference and some spectral overlap.

These technologies are appropriate to test trace elements in food, traditional chinese medicine, seawater, blood, biologicals high-salt solution, especially in the analysis of Cd, Pb, Cu, Zn.

Excellent D_2 lamp background correction function

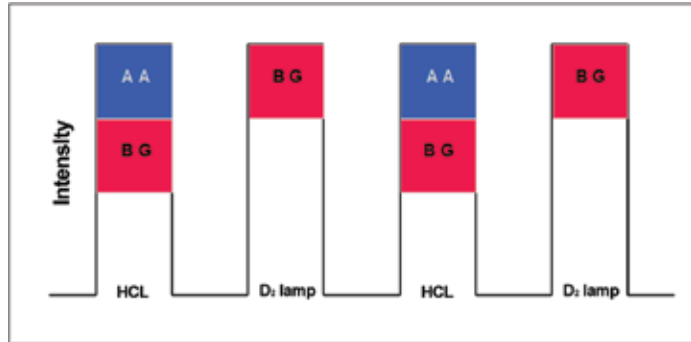
Excellent D_2 lamp Background Correction Technology. Unique reflection optical system.

Unique reflection optical system keeps the light transmission unique. It makes hollow cathode lamp beam and D_2 lamp beam through different wavelength in the best condition.

Hollow cathode lamp and D_2 lamp Beam optical balance technology extended application range of D_2 lamp background correction. It also realizes high ability of background correction.

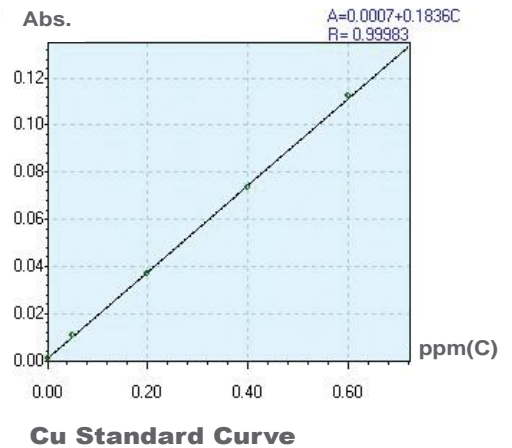
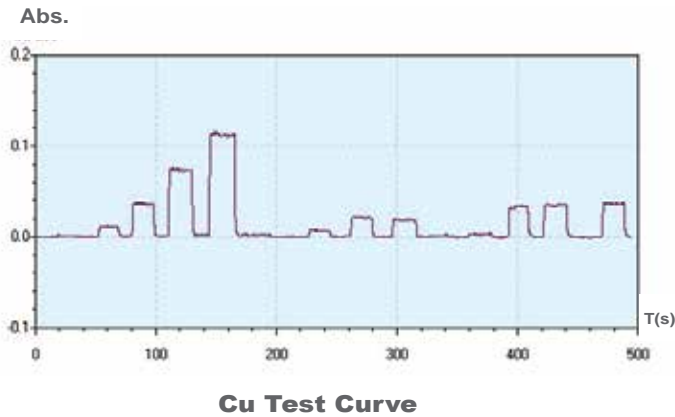
Principle

The deuterium lamp method involves lighting the hollow cathode lamp and the deuterium lamp alternately at high speed. The light from D₂ lamp almost observes to wide-bandwidth molecular absorption as background absorption. While the light from the hollow cathode lamp can absorb the same bandwidth of the atomic absorption band and molecular absorption band, the total of the atomic absorption and the background absorption can be observed. With the deuterium lamp background correction method, light from both sources passes through the burner. The difference of absorbance is determined to conduct background correction.



Advantages:

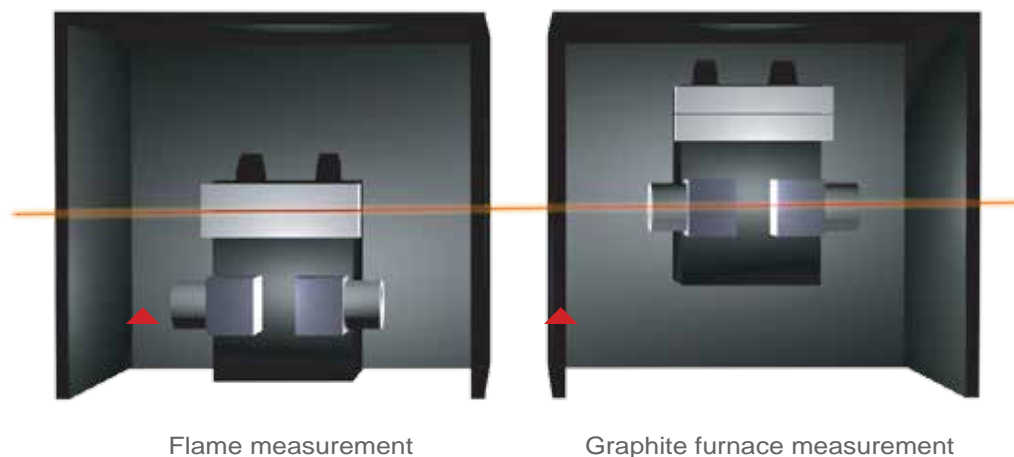
- High-sensitive detection.
- Wavelength range of background correction could be extended to 500 nm.
- Simple and inexpensive.
- No sensitivity loss.
- Does not require a special primary light source.
- Powerful enough for most and graphite furnace application.



New Atomizer Smart Design For Easy Switching Between Flame and Graphite Furnace (for AAS - 3500 Plus)

The atomizer units (burner head and graphite furnace head) can be switched both manual operation and automatically by software operation. No need to disconnect pipes or wires.

One autosampler can be used for both flame and graphite furnace measurements.



Longitudinal-heated graphite furnace :

Longitudinal-heated graphite furnace makes the improvement in accuracy. It minimizes many chemical interferences and matrix effects. It can programmable temperature up to 3000 °C and the heating is 2000 °C /s by software controlled.

Two independently controlled gas flows are used : external gas flow for protection of the graphite tube from the oxidation while heating and internal gas flow is used analytically to remove pretreatment step by-products and to control the sensitivity of an analysis. The internal gas flow can also be changed to an alternate gas, such as air or oxygen, to aid in sample decomposition.

Minimize cost per analysis :

The cost of Longitudinal-heated graphite tube is cheaper when compare with the other techniques. You can choose between two types of tubes : platform type and wall type.

STPF :

The "Stabilized Temperature Platform Furnace" (STPF) concept can reduce the spectral interferences. It improves the accuracy of the analytical data.

Hydride System :

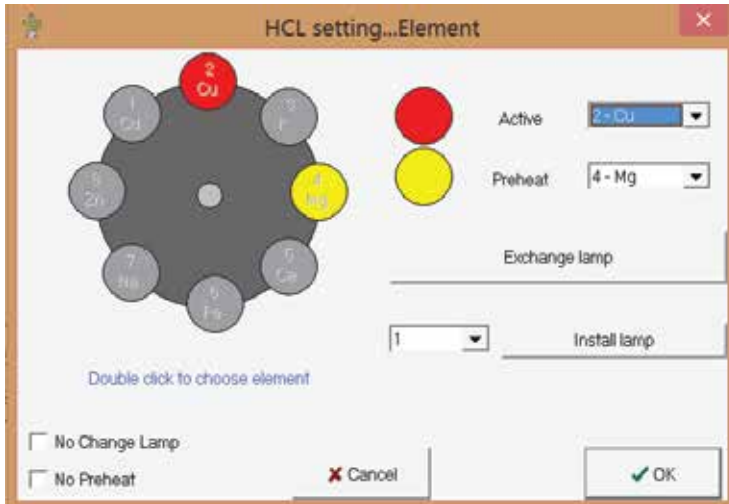
The Hydride system is a continuous flow technique for the determination of As, Se, Sb, Sn, Te, Bi and Hg at low microgram per liter (ppb) concentrations with electrothermal heating unit to heat the quartz cell. With the continuous flow mode, it guarantees convenient handling and precision as well as efficiency during the analysis of hydride-forming elements and mercury with the cold vapour technique.



Hydride System

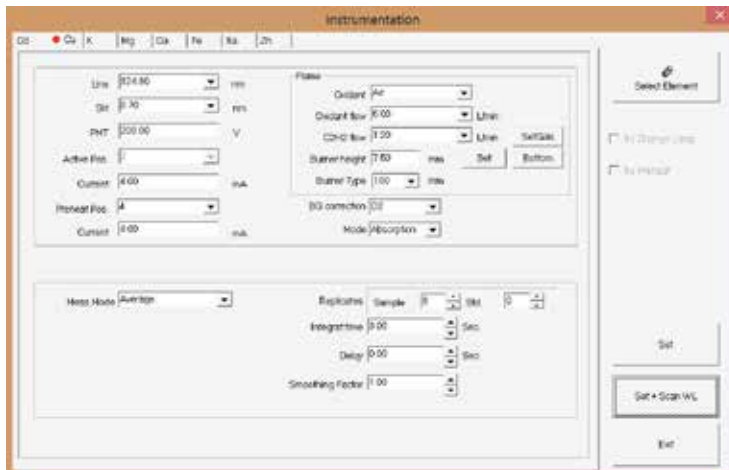
**Test condition and calculation setup,
Instrument automatically control.**

1.



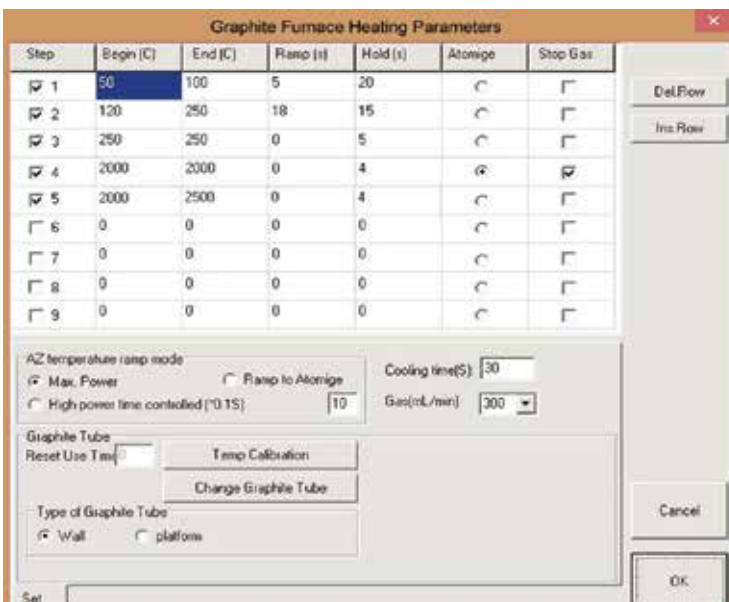
Element lamp setup
Element lamp property
Element lamp position

2.



Default value of every element
(recommended)

3.



Temperature condition setup(recommended)

Fields of Application/Industry:

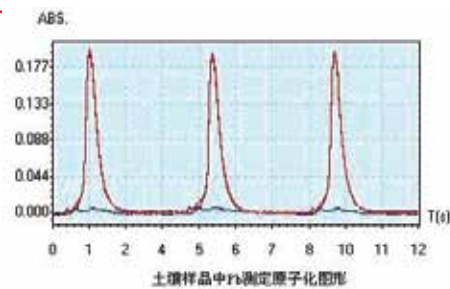
- Chemistry / Polymer Industry
- Clinical Chemistry / Medicine/
- Hygiene / Health Care
- Cosmetics
- Electronics
- Energy
- Environment / Water / Waste
- Food / Agriculture
- Geology / Mining
- Material Analysis
- Metallurgy / Galvanization
- Pharmacy
- Refineries / Petrochemistry
- Semi-Conductor Technology
- Others



Example of application case

1. Soil analysis

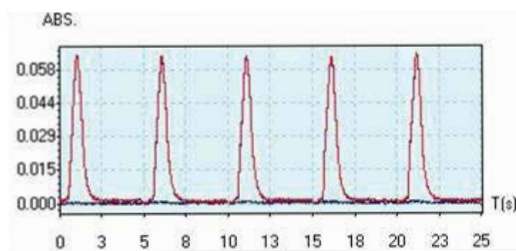
Test content of Pb in soil sample



Pb Atomization Graphic of soil sample

2. Food analysis

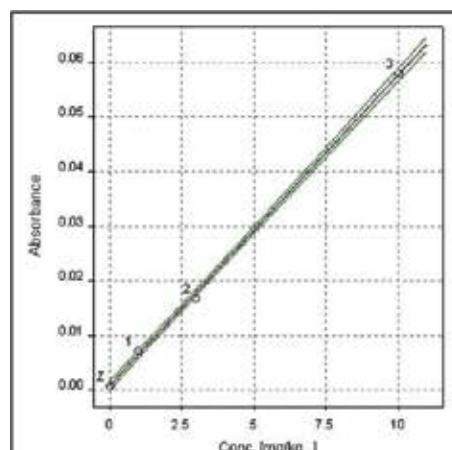
Graphite Furnace test content of Cd in tea leaf sample.

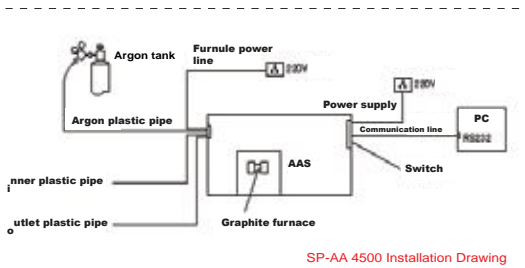
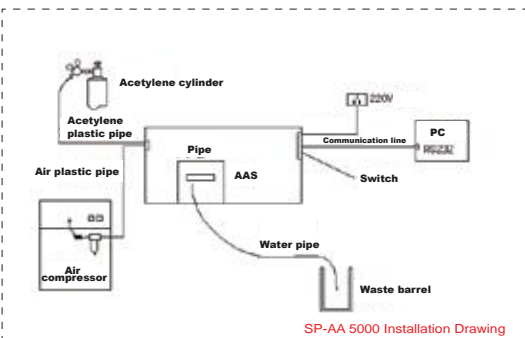
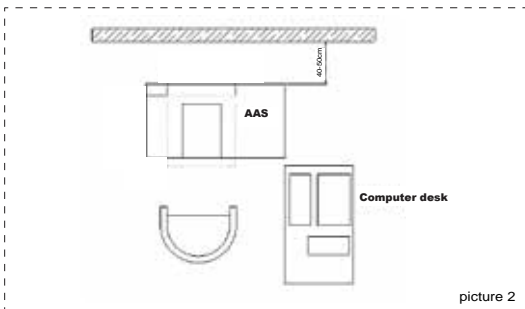
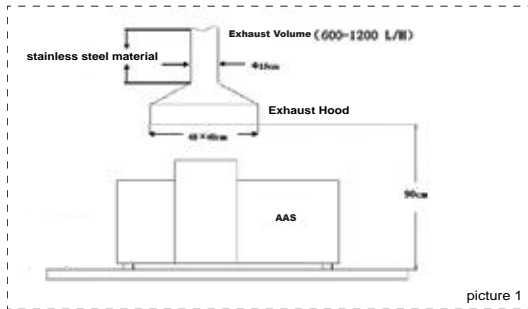
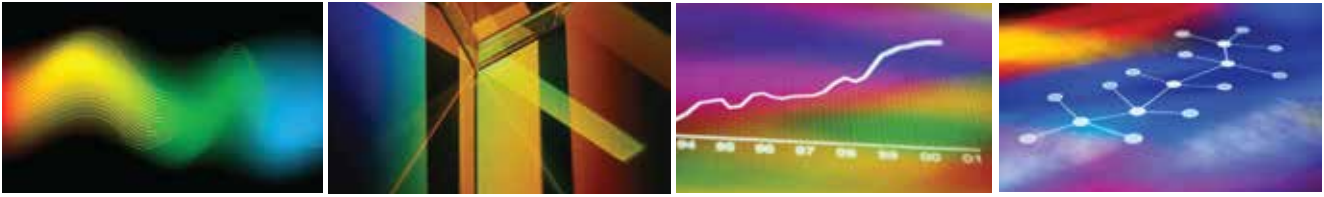


Cd Atomization Graphic of Tea leaf sample

3. Petroleum analysis

Determination of Al in motor oil by flame mode. Al calibration standards have been prepared in a solution containing 20 g oil and 35 g IMBK. The calibration standards have been prepared using fresh motor oil (clean oil).





1. Exhaust Equipment

Exhaust equipment is required in the laboratory. The exhaust air rate should adsorb the big newspaper. If the exhaust air rate is too high, it will affect the stability of the flame. On the contrary, if the exhaust air rate is too low, the harmful gas will not be exhausted.
 (Refer to picture 1)

2. Laboratory Cabinet

Laboratory cabinet is required to be consisted and stable. The table top should be smooth. The distance between the instrument and the wall is required about 40-50cm. It will be convenient for installation and maintenance.
 (Refer to picture 2)

3. Power Requirement

3.1 AAS - 3500 Plus Flame

Power requirement: 220 V (±10%), 50/60 Hz
 Power ≥ 220 V×10A, 1 KVA exchange purification of electronic power supply is required.
 A separated earthing cable if possible.

3.2 AAS - 3500 Plus Graphite Furnace:

Network power requirement: (220±22) V, rough three-core socket, Hz : (50±1) Hz. Power ≥ 220V×30A, 15 KVA exchange purification of electronic power supply is required.
 A separated earthing cable is required and earth resistance ≤ 4Ω.

4. Gas Supply Configuration

4.1 Flame:

A bottle of high purity Acetylene ≥ 99.5% (instrument grade) is required. Output pressure of Acetylene gauge: approximately 0.8-1.6 kgf/cm² (0.08-0.16 MPa or 12-22 psi). Technical grade Acetylene is not allowed.
 A bottle of high purity Nitrous Oxide ≥ 99.5% (instrument grade) if need. Output pressure of Nitrous Oxide gauge: approximately 4-6 kgf/cm² (0.4-0.6 MPa or 56-85 psi).
 Compressed air, oil free, output pressure gauge: approximately 4-6 kgf/cm² (0.4-0.6 MPa or 56-85 psi).

4.2 Graphite furnace:

A bottle of ultra high purity Argon (99.998%) or high purity Argon (99.995%) is required. Output pressure of Argon relief value: approximately 2.5 kgf/cm² (0.25 MPa or 35 psi). Cooling water is required.

4.3 Hydride:

A bottle of ultra high purity Argon (99.998%) or high purity Argon (99.995%) is required. Output pressure of Argon relief value: approximately 2.5 kgf/cm² (0.25 MPa or 35 psi).

▶▶▶ Regulatory compliances



▶▶▶ Corporate Social Responsibility

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1. Research & Innovation Scientist's awards / QC Professional Award : Quality life is possible by innovation only and the innovation is possible by research only, hence ANALYTICAL FOUNDATION is committed to identify such personalities for their contributions across various fields of Science and Technology and awarding them yearly. To participate for award, send us your details of research / testing / publication at Info@analyticalfoundation.org

2. Improving quality of life by offering YOGA Training courses, Workshops / Seminars etc.

3. ANALYTICAL FOUNDATION aims to DETOXYFY human minds, souls and body by means of yoga, Meditation, Ayurveda, Health Care, Awards, Media, Events, Comps etc.



Analytical
Foundation

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