

Flame Atomic Absorption Spectrometer (FAAS)



With no gas lines to connect, PinAAcle's burner assembly can be easily removed without tools for simple cleaning and easy switching between analytical techniques.

Brand : PERKINALMER
Model : PinAAcle 900T
Location : K640 Room, 6th Floor, Chaloeprakiet Building, Phyathai Campus
Custodian : PRADUP MESAWAT

Applications: FAAS (mg/L), GFAAS ($\mu\text{g/L}$), Hydride Generation

Description and Specification FAAS:

Description	Specification
System Design:	Double-beam flame spectrometer and graphite furnace atomizer on a single instrument. Deuterium background correction ensures maximum sensitivity.
Monochromator:	Wavelength range: 184 – 900 nm. Diffraction grating: 1800 lines/mm blazed at 236 nm and 597 nm. Focal length: 267 mm
Spectra Bandwidths:	Automatic slit widths of 0.2, 0.7 and 2.0 nm at their optimized slit height.
Detector:	Wide-range segmented solid-state detector, built-in low-noise CMOS charge amplifier array.
Automatic Lamp Selection:	8-lamp mount with built-in power supplies cableless Lumina hollow cathode and patented EDLs improved sensitivity and extended lamp lifetime.

Description	Specification
Lamps:	<p>Lumina Hollow Cathode Lamps (HCL) - Unique 2-inch cableless coded lamps automatic setup and provide long lamp lifetime.</p> <p>EDLs designed to deliver the best linearity, sensitivity and precision.</p>
Cutting-edge fiber:	<p>Maximize light throughput for improved detection limits.</p>
Nebulizers:	<p>Stainless steel or high-sensitivity, corrosion resistant options are available to suit virtually any application.</p>
Burner Heads:	<p>A variety of solid titanium burner heads (5-cm, 10-cm as well as 3-slot) for different flame and sample types.</p> <p>The align burner automatically adjusts the burner head position vertically and horizontally.</p>
Innovative new mixing chamber:	<p>Requires no gas line connections.</p>
Flame Atomizer: Gas Controls:	<p>Oxidant and fuel monitoring. Keyboard-activated ignition system with air-acetylene.</p> <p>Acetylene flow is automatically adjusted prior to the oxidant change when switching to or from nitrous oxide-acetylene operation.</p>
Safety Functions:	<p>Interlocks ignition if the burner head, the nebulizer/end cap, or the burner drain system is not correctly installed; the liquid level in the drain vessel is incorrect; or gas pressures are too low.</p> <p>Interlocks also will automatically shut down burner gases if a flame is not detected.</p>
Sample Introduction System:	<p>System consisting of the quick-change spray chamber, burner head and nebulizer units.</p> <p>Alignment of the flame is automatic, using a motorized burner mount for vertical and horizontal burner adjustment.</p> <p>The standard is all-titanium, 10 cm, single-shot burner head for air-acetylene operation.</p>

Graphite Furnace Atomic Absorption Spectrometer (GFAAS)



Description and Specification GFAAS:

Description	Specification
System Design:	Transversely Heated Graphite Atomizer (THGA)-the graphite tube is transversely heated, providing a uniform temperature profile over the entire tube.
Furnace system:	An internal purge gas goes through the graphite tube to remove the volatilized matrix vapors during drying and thermal pretreatment.
Common Furnace Features:	Analytical programs with up to 12 steps can be set up. Each step can be programmed with the following parameters.
Temperature:	Ambient up to 2600 °C in steps of 10 °C
Ramp Time:	0 to 99 sec in steps of 1 sec
Hold Time:	0 to 99 sec in steps of 1 sec
Internal Gas Flow:	0 mL/min (gas stop), 50 mL/min (min-flow), 250 mL/min (full flow)
Furnace Opening:	Pneumatically-operated by software command.
Required Inert Gas:	Argon-inlet pressure 300 kPa (3 bar) minimum. Maximum gas consumption is 700 mL/min.
Furnace Autosampler	Sample tray with 88 and 148 sampling positions for sample and reference solutions and 1 overflow container for pipette washing. Minimum sample requirement: Ca. 0.1 mL
Graphite Tubes	Baseline offset correction, Background correction Using THGA or HGA tubes, both feature integrated platforms for exceptional and are pyrocoated for longer lifetime. Transversely Heated Graphite Atomizer (THGA) and longitudinal Zeeman background correction.

Description	Specification
Dispensable Volume:	Sample and Reagent: 1-99 μL , selectable in increment of 1 μL . Max. dispensable volume is 99 μL (Sample volume + reagent volume). Flushing volume is fixed at 1.3 mL
Electronics	The autosampler is powered from the spectrometer and software-controlled.
Background Correction	Zeeman-effect Background Correction-PinAAcle 900T Longitudinal AC Zeeman-effect background correction using a modulated 0.8 Tesla magnetic field.
Furnace Camera	View inside the tube for easy autosampler tip alignment and sample dispensing. Monitor drying during analysis for simpler method. Used to monitor drying and pyrolysis during analysis for simpler method development.
Data Handling	Readings linear in absorbance (-0.500 A to +2.000A), concentration or emission intensity variable scale from 0.01 to 100 times. Integration times operator-selectable from 0.1 to 120 sec in increments of 0.1 sec.
Stabilized Temperature Platform Furnace (STPF):	Integrated platform Matrix modifiers Maximum power heating No internal gas flow during atomization

Hydride Generator

Model : FIAS100

Description and Specification of Hydride Generator:



Description	Specification
Flow Injection Mercury System	<p>FIAS-100 Flow Injection System for cold vapor mercury AA.</p> <p>Single beam low pressure Hg lamp and solar-blind detector with maximum sensitivity at 254 nm.</p> <p>Automatic baseline offset correction (BOC) and control electronics based on SMD (Surface Mounted Device) technology.</p> <p>Peristaltic pump of 8 channels for tubing with 0.13 to 3.18 mm inner diameter.</p> <p>The pump speed is selectable from 30 to 120 rpm.</p> <p>FI switching valve with 5 ports and exchangeable sample loops (500 μL loop supplied as standard).</p>
Quartz	<p>The heated quartz tube atomizer for the determination of As and Se absorption wavelengths below 200 nm.</p> <p>Hg can be easily reduced in solution to generate elemental mercury, known as cold vapor (CV).</p>
FIAS	<p>Speeds up analyses requiring complex sample preparation such as Hg and hydride-forming element.</p> <p>Regulated gas supply used for: As, Se, and Hg.</p> <p>The quartz cell was heated to 900 $^{\circ}$C for the hydrides and 100 $^{\circ}$C for mercury vapor condensation in the cell.</p>
Mercury/Hydride System	<p>Delivers improved detection limits (down to the ng range) for mercury and hydride-forming elements.</p>
Reductant	<p>Sodium borohydride for hydrides or stannous chloride for mercury to produce the gaseous vapors.</p>
The Sample Loop Size	<p>500 μL for all analytes</p>

Description	Specification
Flow rate (mL/min)	Flow of 50, 80 and 100 mL/min were used for the arsenic, selenium and mercury determinations.
The Carrier Solution	<p>As and Se determination was a 10% (v/v) hydrochloric acid (HCl) solution.</p> <p>For As, the NaBH₄ concentration was increased to 0.5%</p> <p>Mercury was 3% (v/v) HCl. Hg using SnCl₂ as the reducing agent, the reducing solution consisted of 1.1% (w/v) SnCl₂ (from SnCl₂·2H₂O) in 3.0% (v/v) hydrochloric acid.</p> <p>The selenium hydride generation reducing agent was an aqueous solution of 0.2% (w/v) NaBH₄ in a 0.05% (w/v) NaOH.</p>

Lamp and working standard for Flame Atomic Absorption Spectrometry (FAAS)

No.	EDL Lamp	Characteristic Conc. (mg/L)	Linear to Zero (mg/L)	Sensitivity Check Conc. (mg/L)	Sensitivity Check Abs.	-20% Abs.	+20% Abs.
1	As	0.59	55	25	0.186	0.149	0.224
2	Cd	0.01	1	0.5	0.220	0.176	0.264
3	Pb	0.18	10	8	0.196	0.156	0.235
4	Se	0.3	100	15	0.220	0.176	0.264
No.	HCL Lamp	Characteristic Conc. (mg/L)	Linear to Zero (mg/L)	Sensitivity Check Conc. (mg/L)	Sensitivity Check Abs.	-20%	+20%
1	Ag	0.02	1	1.1	0.242	0.194	0.290
2	Au*	0.18	50	7	0.171	0.137	0.205
3	B*	13	400	600	0.203	0.162	0.244
4	Ca*	0.062	5	3	0.213	0.170	0.255
5	Co	0.053	1	3	0.249	0.199	0.299
6	Cr*	0.078	5	4	0.226	0.181	0.271
7	Cu	0.025	1.6	1.3	0.229	0.183	0.275
8	Fe	0.04	3	2	0.220	0.176	0.264
9	K*	0.02	1	1	0.220	0.176	0.264
10	Mg	0.004	0.25	0.18	0.220	0.176	0.264
11	Mn	0.016	0.6	1	0.275	0.220	0.330
12	Zn	0.006	0.75	0.3	0.220	0.176	0.264

*A spacer is required for this element. For analysis of complex samples, the addition of a spacer may be desirable to reduce chemical interferences.

Lamp and working standard for Graphite Furnace Atomic Absorption Spectrometry (GFAAS)

No.	EDL Lamp	Characteristic Mass (pg/0.0044 A ⁻¹ s)	Sensitivity Check (μg/L for A ⁻¹ s)	Modifier
1	As	40 pg /0.0044 A ⁻¹ s	50 μg/L for 0.11 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
2	Cd	1.3 pg /0.0044 A ⁻¹ s	2.0 μg/L for 0.13 A ⁻¹ s	0.05 mg NH ₄ H ₂ PO ₄ + 0.003 mg Mg(NO ₃) ₂
3	Hg	220 pg /0.0044 A ⁻¹ s	400 μg/L for 0.16 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
4	Pb	30 pg /0.0044 A ⁻¹ s	50 μg/L for 0.15 A ⁻¹ s	0.05 mg NH ₄ H ₂ PO ₄ + 0.003 mg Mg(NO ₃) ₂
5	Se	45 pg /0.0044 A ⁻¹ s	100 μg/L for 0.20 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂

No.	HCL Lamp	Characteristic Mass (pg/0.0044 A ⁻¹ s)	Sensitivity Check (μg/L for A ⁻¹ s)	Modifier
1	Ag	4.5 pg/0.0044 A ⁻¹ s	5.0 μg/L for 0.10 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
2	Au	18 pg/0.0044 A ⁻¹ s	40 μg/L for 0.20 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
3	B	600 pg/0.0044 A ⁻¹ s	2000 μg/L for 0.30 A ⁻¹ s	0.005 mg Ca
4	Ca	1.0 pg/0.0044 A ⁻¹ s	2.0 μg/L for 0.18 A ⁻¹ s	none
5	Co	17 pg/0.0044 A ⁻¹ s	20 μg/L for 0.10 A ⁻¹ s	0.015 mg Mg(NO ₃) ₂
6	Cr	7.0 pg/0.0044 A ⁻¹ s	10.0 μg/L for 0.13 A ⁻¹ s	0.015 mg Mg(NO ₃) ₂
7	Cu	17 pg/0.0044 A ⁻¹ s	25 μg/L for 0.15 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
8	Fe	12 pg/0.0044 A ⁻¹ s	20 μg/L for 0.15 A ⁻¹ s	0.015 mg Mg(NO ₃) ₂
9	K	2.0 pg/0.0044 A ⁻¹ s	5.0 μg/L for 0.22 A ⁻¹ s	none
10	Mg	0.4 pg/0.0044 A ⁻¹ s	1.0 μg/L for 0.22 A ⁻¹ s	none
11	Mn	6.3 pg/0.0044 A ⁻¹ s	10 μg/L for 0.14 A ⁻¹ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
12	Zn	1.0 pg/0.0044 A ⁻¹ s	2.0 μg/L for 0.18 A ⁻¹ s	0.005 mg Mg(NO ₃) ₂