

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, 6 th Floor, Chaloeprakiet Building, Phyathai Campus
Custodian	:	PRADUP MESAWAT

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

Description and Specification FAAS:

System Design:	<ul style="list-style-type: none">➤ Double-beam flame spectrometer and graphite furnace atomizer on a single instrument.➤ Deuterium background correction ensures maximum sensitivity.
Monochromator:	<ul style="list-style-type: none">➤ Wavelength range: 184 – 900 nm.➤ Diffraction grating: 1800 lines/mm blazed at 236 nm and 597 nm.➤ Focal length: 267 mm
Spectra Bandwidths:	<ul style="list-style-type: none">➤ Automatic slit widths of 0.2, 0.7 and 2.0 nm at their optimized slit height.
Detector:	<ul style="list-style-type: none">➤ Wide-range segmented solid-state detector, built-in low-noise CMOS charge amplifier array.
Automatic Lamp Selection:	<ul style="list-style-type: none">➤ 8-lamp mount with built-in power supplies cableless Lumina hollow cathode and patented EDLs improved sensitivity and extended lamp lifetime.
Lamps:	<ul style="list-style-type: none">➤ Lumina Hollow Cathode Lamps - Unique 2-inch cableless coded lamps automatic setup and provide long lamp lifetime.➤ EDLs designed to deliver the best linearity, sensitivity and precision.
Cutting-edge fiber:	<ul style="list-style-type: none">➤ Maximize light throughput for improved detection limits.

Description and Specification FAAS:

Nebulizers:	➤ Stainless steel or high-sensitivity, corrosion resistant options are available to suit virtually any application.
Burner Heads:	➤ A variety of solid titanium burner heads (5-cm, 10-cm as well as 3-slot) for different flame and sample types. ➤ The align burner automatically adjusts the burner head position vertically and horizontally.
Innovative new mixing chamber:	➤ Requires no gas line connections.
Flame Atomizer:	
Gas Controls:	➤ Oxidant and fuel monitoring. Keyboard-activated ignition system with air-acetylene. ➤ Acetylene flow is automatically adjusted prior to the oxidant change when switching to or from nitrous oxide-acetylene operation.
Safety Functions:	➤ 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. ➤ Interlocks also will automatically shut down burner gases if a flame is not detected.
Sample Introduction System:	➤ System consisting of the quick-change spray chamber, burner head and nebulizer units. ➤ Alignment of the flame is automatic, using a motorized burner mount for vertical and horizontal burner adjustment. ➤ The standard is all-titanium, 10 cm, single-shot burner head for air-acetylene operation.

Graphite Furnace Atomic Absorption Spectrometer (GFAAS)



Description and Specification GFAAS:

System Design:	<ul style="list-style-type: none"> ➤ Transversely Heated Graphite Atomizer (THGA)-the graphite tube is transversely heated, providing a uniform temperature profile over the entire tube.
Furnace system:	<ul style="list-style-type: none"> ➤ An internal purge gas goes through the graphite tube to remove the volatilized matrix vapors during drying and thermal pretreatment.
Common Furnace Features:	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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	<ul style="list-style-type: none"> ➤ 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 and Specification GFAAS:

Dispensable Volume:	<ul style="list-style-type: none">➤ 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:	<ul style="list-style-type: none">➤ The autosampler is powered from the spectrometer and software-controlled.
Background Correction:	<ul style="list-style-type: none">➤ Zeeman-effect Background Correction-PinAAcle 900T➤ Longitudinal AC Zeeman-effect background correction using a modulated 0.8 Tesla magnetic field.
Furnace Camera:	<ul style="list-style-type: none">➤ 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:	<ul style="list-style-type: none">➤ 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:

Flow Injection Mercury System:	<ul style="list-style-type: none">➤ FIAS-100 Flow Injection System for cold vapor mercury AA.➤ Single beam low pressure Hg lamp and solar-blind detector with maximum sensitivity at 254 nm.➤ Automatic baseline offset correction (BOC) and control electronics based on SMD (Surface Mounted Device) technology.➤ Peristaltic pump of 8 channels for tubing with 0.13 to 3.18 mm inner diameter.➤ The pump speed is selectable from 30 to 120 rpm.➤ FI switching valve with 5 ports and exchangeable sample loops (500 μL loop supplied as standard).
Quartz	<ul style="list-style-type: none">➤ The heated quartz tube atomizer for the determination of As and Se absorption wavelengths below 200 nm.➤ Hg can be easily reduced in solution to generate elemental mercury, known as cold vapor (CV).
FIAS:	<ul style="list-style-type: none">➤ Speeds up analyses requiring complex sample preparation such as Hg and hydride-forming element.➤ Regulated gas supply used for: As, Se, and Hg.➤ The quartz cell was heated to 900 $^{\circ}$C for the hydrides and 100 $^{\circ}$C for mercury vapor condensation in the cell.
Mercury/Hydride System:	<ul style="list-style-type: none">➤ Delivers improved detection limits (down to the ng range) for mercury and hydride-forming elements.
Reductant:	<ul style="list-style-type: none">➤ Sodium borohydride for hydrides or stannous chloride for mercury to produce the gaseous vapors.
The Sample Loop Size:	<ul style="list-style-type: none">➤ 500 μL for all analytes
Flow rate (mL/min):	<ul style="list-style-type: none">➤ Flow of 50, 80 and 100 mL/min were used for the arsenic, selenium and mercury determinations.
The Carrier Solution:	<ul style="list-style-type: none">➤ As and Se determination was a 10% (v/v) hydrochloric acid (HCl) solution. For As, the NaBH₄ concentration was increased to 0.5%➤ 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.➤ The selenium hydride generation reducing agent was an aqueous solution of 0.2% (w/v) NaBH₄ in a 0.05% (w/v) NaOH.

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

No.	EDL Lamp	Char. Conc. (mg/L)	Sensitivity Check Conc. (mg/L)	Sensitivity Check Abs. (mg/L)	-20%	+20%	Linear to Zero (mg/L)
1	As	0.59	25	0.186	0.149	0.224	55
2	Cd	0.01	0.5	0.220	0.176	0.264	1
3	Pb	0.18	8	0.196	0.156	0.235	10
4	Se	0.3	15	0.220	0.176	0.264	100

No.	HCL Lamp	Char. Conc. (mg/L)	Sensitivity Check Conc. (mg/L)	Sensitivity Check Abs. (mg/L)	-20%	+20%	Linear to Zero (mg/L)
1	Ag	0.02	1.1	0.242	0.194	0.290	1
2	Au*	0.18	7	0.171	0.137	0.205	50
3	B*	13	600	0.203	0.162	0.244	400
4	Ca*	0.062	3	0.213	0.170	0.255	5
5	Co	0.053	3	0.249	0.199	0.299	1
6	Cr*	0.078	4	0.226	0.181	0.271	5
7	Cu	0.025	1.3	0.229	0.183	0.275	1.6
8	Fe	0.04	2	0.220	0.176	0.264	3
9	K*	0.02	1	0.220	0.176	0.264	1
10	Mg	0.004	0.18	0.220	0.176	0.264	0.25
11	Mn	0.016	1	0.275	0.220	0.330	0.6
12	P*	290	140000	-	-	-	10000
13	Zn	0.006	0.3	0.220	0.176	0.264	0.75

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

No.	HCL Lamp	Characteristic Mass (pg/0.0044 A ⁻ s)	Sensitivity Check (μg/L for A ⁻ s)	Modifier
1	Ag	4.5 pg/0.0044 A ⁻ s	5.0 μg/L for 0.10 A ⁻ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
2	Au	18 pg/0.0044 A ⁻ s	40 μg/L for 0.20 A ⁻ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
3	B	600 pg/0.0044 A ⁻ s	2000 μg/L for 0.30 A ⁻ s	0.005 mg Ca
4	Ca	1.0 pg/0.0044 A ⁻ s	2.0 μg/L for 0.18 A ⁻ s	none
5	Co	17 pg/0.0044 A ⁻ s	20 μg/L for 0.10 A ⁻ s	0.015 mg Mg(NO ₃) ₂
6	Cr	7.0 pg/0.0044 A ⁻ s	10.0 μg/L for 0.13 A ⁻ s	0.015 mg Mg(NO ₃) ₂
7	Cu	17 pg/0.0044 A ⁻ s	25 μg/L for 0.15 A ⁻ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
8	Fe	12 pg/0.0044 A ⁻ s	20 μg/L for 0.15 A ⁻ s	0.015 mg Mg(NO ₃) ₂
9	K	2.0 pg/0.0044 A ⁻ s	5.0 μg/L for 0.22 A ⁻ s	none
10	Mg	0.4 pg/0.0044 A ⁻ s	1.0 μg/L for 0.22 A ⁻ s	none
11	Mn	6.3 pg/0.0044 A ⁻ s	10 μg/L for 0.14 A ⁻ s	0.005 mg Pd + 0.003 mg Mg(NO ₃) ₂
12	P	210000 pg/0.0044 A ⁻ s	20000 μg/L for 0.08 A ⁻ s	0.020 mg Pd + 0.005 mg Mg(NO ₃) ₂
13	Zn	1.0 pg/0.0044 A ⁻ s	2.0 μg/L for 0.18 A ⁻ s	0.005 mg Mg(NO ₃) ₂