AA-7090 Atomic Absorption Spectrometer

Application

AA-7090 is the fifth-generation atomic absorption spectrometer developed by It combines the quality and precision that is known for with important new features. The AA-7090 graphite furnace features a unique design with transverse heating, longitudinal Zeeman background correction and variable magnetic field intensity. The Zeeman background correction is suitable for high precision analysis of samples with complex interference matrices. Variable magnetic field intensity allows the operator to optimize field strength for each element, maximizing the Zeeman effect for accurate results every time.
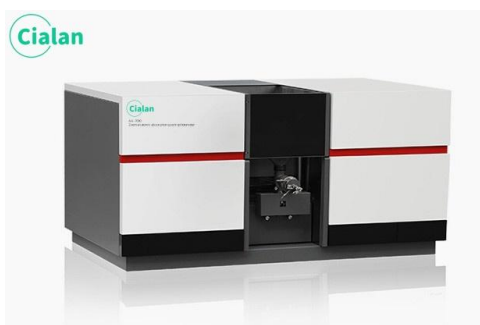
AA-7090 – The new standard for high performance Zeeman GF analysis available in a flame tandem configuration.

1 Transverse graphite furnace heating technology improves sample atomization efficiency and uniformity.

2 Two background correction methods are available: longitudinal Zeeman effect correction and deuterium lamp correction. The operator can select the most suitable mode based on the sample.

3 Unique adjustable magnetic field strength (0.6 - 1.1 Tesla, in 0.1 Tesla increments) allows for element specific optimization to achieve high sensitivity and precision.

4 8-lamp automated lamp turret with auto-alignment for quick element switching and lamp position optimization

5 Code lamp recognition technology, compatible with both hollow cathode lamps and super lamps

6 High efficiency super lamp power supply, newly designed for higher sensitivity while consuming less power and generating less heat

Unique functional design, easy to operate

Automated burner head height control

1 The burner head height can be automatically adjusted using a software-controlled motor. This feature is used to ensure that the burner head can be accurately and reproducibly positioned on the optical path to optimize the performance of the

2 The position of the burner head is stored with the analysis method parameters of

each element in a multi-element flame analysis. During a sample run, each element will be analyzed at the optimal height without operator intervention. The following figure shows the sensitivity obtained when the burner head height of each element is separately optimized (purple) compared to the sensitivity obtained when the burner head height is optimized for only a single element, copper (cyan).

Coded lamp recognition
By simply inserting the element lamp into the lamp holder, the software will automatically identify the element and position of the lamp. This feature completely eliminates the possibility of operator error when inputting lamp information into the element lamp list.

Super lamp power supply
Super lamps are specially designed ultra-high intensity hollow cathode lamp that provide more optical energy. For certain elements, such as As, Se, Cd, Ni and Pb, super lamps can significantly
improve the limit of detection, sensitivity and linearity. AA-7090 atomic absorption spectrometer can be equipped with up to four super-lamp power supplies.

Graphite Furnace Viewing System
The Graphite Furnace Viewing System uses a camera to view the flame or graphite furnace.

This feature is indispensable for the development of graphite furnace methods. The operator can observe the entire analysis process from injection to atomization in real time. Using visual information, the desolvation, drying and ashing parameters can be set correctly to produce reproducible and accurate results.

Graphite furnace gas saving mode
The intelligent control of the protection gas switch maximizes the effective use of protection gas and reduces waste when the gas is not needed, cutting down on the cost of operation.

Excellent performance, accurate results guaranteed
Cutting edge transverse heating, longitudinal Zeeman effect graphite furnace technology
1 Compared with transverse Zeeman effect graphite furnace designs, the longitudinal Zeeman effect graphite furnace has the advantage of not needing a polarizer located along the optical path. This results in a two-fold increase in the amount of energy reaching the detector, which provides higher sensitivity and better correction linearity. Transverse graphite furnace heating has the advantage of higher temperature and greater temperature distribution uniformity, which promotes atomization of the sample

with high efficiency and uniformity.

2 Efficient graphite furnace design and precise temperature control provides the user with a reliable and precisely controlled analysis environment. This allows the AA-7090 to perform automated multi-element, multi-sample analysis with excellent stability and repeatability.

Additionally, a 2500 /sec maximum heating rate guarantees optimal atomization conditions for all elements.

Unique Variable Magnetic Field Strength

A constant magnetic field strength for all elements leads to severe limitations in analytical performance for many sample types. The AA-7090 achieves optimal background correction and sensitivity by allowing optimization of the magnetic field strength for each element/matrix combination. The applied magnetic field can be varied from a low of 0.6 to a high of 1.1 Tesla in increments of 0.1 Tesla. This allows the operator to set the optimum field strength for each element, maximizing the Zeeman Effect as measured through the magnetic sensitivity ratio (MSR).

Variable background correction allows the field strength to be adjusted to maximize both precision and sensitivity. This produces accurate results every time.

Unique double gas route

The AA-7090 features a unique double gas route design, with an inner gas route and an auxiliary gas route. Auxiliary gas is controlled through software. The addition of auxiliary gas promotes sample ashing and protects the graphite tube, allowing for more firings before replacement.

Two background correction modes

The operator can select between Zeeman effect, and deuterium lamp background correction modes based on the requirements of a particular sample matrix.

Accessories

AA-7090 works with furnace autosampler AS-500, and flame/furnace autosampler AS-600.

Also it can be used with hydride generator and other accessories.

Technical Specifications of AA-7090

Optics

Wavelength Range: 190 nm ~ 900 nm

Bandwidth: 0.1, 0.2, 0.4, 1.0 and 2.0 nm, automatic switch

Czerny-Turner Grating Mono-chromator Wavelength Accuracy / Indication Error: ±0.1 nm Wavelength Repeatability: ≤ 0.05 nm

Grating: 1800 lines / mm

Blaze Wavelength: 250 nm

Baseline Stability:Static baseline stability ≤ 0.002 A / 30 min, dynamic baseline stability ≤ 0.003 A / 30 min

Resolution: Better than 0.1 nm

Graphite Furnace System

Characteristic Concentration of Cd: ≤ $0.5×10^{-12}$ g

Detection Limit: ≤ $1×10^{-12}$ g RSD ≤ 3.0%

Temperature Control: Max 20 step temperature program. 3 modes of temperature rise: step, slope and flat.

Heating Mode: power heating

Heating Rate: ≥ 2500/ s

Flame System

Characteristic Concentration of Cu: ≤ 0.02 μg / mL / 1%

Detection Limit: ≤ 0.003 μg / ml RSD ≤ 0.45%

Burner Head: Switchable 50 mm and 100 mm titanium burner head, titanium nebulizer and high performance glass nebulizer

Position Control: Optimization of height and angle, flame and hydride switch within one min

Background Correction

Background correction is available for both flame and graphite furnace methods. Deuterium lamp for flame. deuterium lamp or Zeeman for graphite furnace.

Correction Mode: Deuterium lamp, Zeeman Correction Capability:

a)Deuterium lamp: When background absorption approaches 1.0 Abs, the instrument is capable of a

background correction of 60 times or more.

b)Zeeman: When background absorption approaches 2.0 Abs, the instrument is capable of a background correction of 100 times or more.

Data Processing

Measurement Methods: Flame absorption, flame emission, graphite furnace, and hydride method.

Analysis Method: Linear fitting, nonlinear fitting, standard addition method.

Printing Output: Calibration curve, spectrum, analysis conditions, analysis parameters, and analysis results can be automatically stored and printed.

Dimensions: 1000 mm (L) x 610 mm (W) x 510 mm (H), 150 kg

Power: 220V / 50Hz 110V/60HZ,   instrument 200W, graphite furnace 4 KW