Shimadzu
Atomic Absorption Spectrophotometer

AA-6200

1. LAB Bench
Place the gas cylinders in an environment that meets required safety regulations for the facility. Use metal tubing.

1. Do not allow acetylene to flow through pipes, and do not use equipment made from copper, silver, mercury, or their alloys.
2. Do not use Oxygen.

3. Gas Connection
WARNING:
Prepare an exhaust duct above combustion chamber. Very high temperatures will be generated when using the flame; use appropriate materials for the duct.

2. Ventilation-DO NOT INSTALL the AA-6200 WITHOUT PROPER EXHAUST
Easy-to-use, compact, double-beam AAS at an affordable price.

AA-6200
Shimadzu has designed and manufactured Atomic Absorption spectrophotometers since 1968. This long experience, and in combination with close customer relationships all over the world, has led to an exceptional solution. The AA-6200: Easy-to-use, compact, double-beam AAS at an affordable price.

<table>
<thead>
<tr>
<th><strong>Easy Operation</strong></th>
<th><strong>Double Beam</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Windows OS provides easy operation for system control and data processing. The Wizard function guides the user through the entire analytical procedure. Worksheets permit the experienced user direct access to all of the parameter settings.</td>
<td>It is not just another double-beam Atomic Absorption Spectrophotometer. The double-beam system provides the superior baseline stability expected from high-performance optical systems. Additionally, the signal-to-noise ratio has been greatly enhanced by using a Chopper Mirror instead of the conventional Beam Splitters/Combiner.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Compactness</strong></th>
<th><strong>Affordable</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shimadzu's AA-6200 uses the least linear bench space of any Atomic Absorption Spectrophotometers in the world. At only 690 mm (27 inches) wide, valuable laboratory space is saved. In spite of its compactness, the performance has not been compromised. In fact, the AA-6200 outperforms other atomic absorption instruments many times its physical size.</td>
<td>This affordable double-beam AA-6200 is designed and manufactured to meet your laboratory needs. The instrument not only offers an affordable solution to your analytical needs and requirements, but it also provides features usually available only on high-end instruments.</td>
</tr>
</tbody>
</table>

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- P 04 - Workstation Operation
- P 08 - Spectrometer Hardware
- P 11 - Specifications
- P 06 - Data Handling
- P 10 - Options
Easy Operation by Windows

Simple Operation

The Wizard function guides the user through instrumentation and parameter setup. Simply follow the instruction on each screen and press the [Next>] key. From turning on the instrument to actual analysis via the parameter setting Wizard, clicking on the [Next>] button leads you to...

...the Optical parameter setup. Selection of the element will automatically set the analytical wavelength and the lamp current for maximum sensitivity. Pushing the [Line Search] button verifies these conditions. Next, begin the lamp warm-up by selecting the [Warmup Lamp…] button. Clicking on the [Next>] button of the function Wizard guides you to...

...the Adjustment of the Lamp position window. Maximum energy of the specific hollow cathode lamp is achieved by optimization of the lamp position. Clicking on the [Next>] button of the function Wizard guides you to...
Workstation Operation

Easy Operation by Windows

The Wizard function guides the user through instrumentation and parameter setup. Simply follow the instruction on each screen and press the [Next>] key. From turning on the instrument to actual analysis via the parameter setting Wizard, clicking on the [Next>] button leads you to...

...the Optical parameter setup. Selection of the element will automatically set the analytical wavelength and the lamp current for maximum sensitivity. Pushing the [Line Search] button verifies these conditions. Next, begin the lamp warm-up by selecting the [Warmup Lamp...] button.

Clicking on the [Next>] button of the function Wizard guides you to...

...the Adjustment of the Lamp position window.

Maximum energy of the specific hollow cathode lamp is achieved by optimization of the lamp position. Clicking on the [Next>] button of the function Wizard guides you to...

...the Quantitation screen where the calibration method is selected for up to 10 standards. For accurate results, three different orders of the calibration curve are available. The standard concentration, units, and autosampler position are defined in this screen. Click the [Next>] button to open...

...the Measurement Screen to provide the measurement sequence with periodic blank and sensitivity correction. Selecting the [Repeat Conditions...] button defines the number of measurement repetitions for blanks, standards, and samples. A final click on the [Next>] button leads you to...

...the sample sequence table where sample identifications are entered or imported from an ASCII file. Finally, click on the [Finish] button to exit the Wizard.
Digital and analog measuring of real-time signals.

Users have a choice of calibration curves for real-time monitoring of the standards. Double clicking on the calibration curve (below) will display the screen to the right, which will allow for printing the calibration curve, equation, and curve fit.

The last five measurements are displayed for quick comparison of measured data. Overlay of signals is possible.

Selecting the [Start] button begins the analytical sequence, including automatic saving of all results.

Each element’s MRT (Measured Results Table) worksheet contains information on sample type and identification, absorbance, background, concentration for the calibration curve, final concentration of original samples based on weight and dilution factors.

Clicking on the “Summary” tab (above) reveals a sophisticated Summary Report (right). The report summarizes sample identification versus all elements analyzed.
The Help function displays detailed explanations of parameter settings and operational procedures. The search and call functions are provided for easy access to the electronic instruction manual, eliminating the need to search volumes of manuals located elsewhere.

\[
\text{average: } \mu = \frac{\sum(X_i)}{n}
\]

\[
\text{standard deviation: } \sigma = \sqrt{\frac{\sum(X_i^2) - [\sum(X_i)]^2}{n(n-1)}}
\]

\[
\text{CV value: } CV = \frac{\sigma}{\mu} \times 100(\%)
\]
Spectrometer Hardware

Double Beam - High Performance

Excellent Baseline Stability
The double-beam optical system of the AA-6200 measures the sample and reference signals alternately; any fluctuation in the light output is automatically compensated by taking the ratio of the two. This results in improved reproducibility.

Sealed Optical Compartment
The sealed optical compartment protects the optics from laboratory environments. This ensures high sensitivity and reproducibility over the lifetime of the instrument.

Improved Signal-to-Noise
Shimadzu utilizes a rotating chopper mirror to improve sensitivity. The signal-to-noise ratio is doubled compared to a conventional beam splitter/combiner. Also, the brushless type chopper motor significantly increases the operating lifetime.

Deuterium Background Correction
The BGC-D2 (Deuterium Background Correction) provides the highest sensitivity compared to any background correction technique available. This method for background compensation of interference is a standard feature on the Shimadzu AA-6200.
Optical System

**DATA SHEET**

The Calibration Curve for Cu.

Real signals of three times measurement of a 2ppm Cu standard solution.

The result of 100 minutes of continuous measurement of a Cr standard solution. One plot shows the average absorbance value of 10 times measurement of a Cr standard solution. (The average R.S.D < 0.5%).
Optional Accessory Specifications

**AutoSampler**

ASC-6100F

(Cat. No.206-60100-30: AC100V ~ 120V)

The interchangeable carousel accommodates 60 samples for automatic measurements. The ASC-6100F ensures exceptionally high productivity in routine analysis.

**Hydride Vapor Generator**

HVG-1

(Cat. No.206-17143-XX)

The nascent hydrogen released by the decomposition of sodium borohydride reduces the elements in the sample to a vapor. The vapor is then heated and atomized in an absorption cell to allow high-sensitivity measurement.

- As, Se, Hg, Sn, Sb, Te, Bi, etc. may be determined.
- The unique flush function eliminates carryover from high-concentration samples.

Note: Automated analysis is made possible by using the ASC-6100F and Nozzle Assy (Cat. No.206-67563).

**Mercury Vaporizer Unit**

MVU-1A

(Cat. No.204-21932-XX)

This mercury vaporizer unit reduces and vaporizes elemental mercury in accordance with official methods. Water analysis is highly sensitive, yet easy to perform.

**Specifications**

Vaporization method
- Reduction and vaporization using reduction agent

Measurement method: Circulation method

Air flow rate: 6 L/min

Flow cell: Optical path length up to 100 mm

Sample volume: Up to 250mL

Exhaust contamination prevention
- Adsorption collection using mercury collection vial

Size: 200W x 288D x 287H mm

Weight: Approx. 10 kg

Note: The following items must be ordered separately:
- Gas flow cell (Cat. No. 201-98687)
- Gas flow cell holder (Cat. No. 202-35867)
- Hg hollow cathode lamp (Cat. No. 200-38422-28)

**Other Options**

High-temperature Burner Head
Cat. No. 206-50300-91

Hollow cathode lamps
Cat. No. 200-38422-xx

DS-02 Drain Separator
Cat. No. 200-64020

YR-71 Compressed Gas Regulator for C2H2*
Cat. No. 040-72020-01

MAF85S Compressed Gas Regulator for N2O*
Cat. No. 040-72019-11

*Not available in U.S.A. and Canada.
### Specifications

**Atomic Absorption Spectrophotometer AA-6200 (Cat. No. 206-50000-36)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Optics</strong></td>
<td>Double Beam (chopper mirror)</td>
</tr>
<tr>
<td><strong>Monochromator</strong></td>
<td>Aberration corrected Czerny-Turner monochromator</td>
</tr>
<tr>
<td></td>
<td>Holographic grating (1,600 lines/mm)</td>
</tr>
<tr>
<td><strong>Wavelength range</strong></td>
<td>190-900nm</td>
</tr>
<tr>
<td><strong>Slit</strong></td>
<td>0.2nm, 0.7nm Manual setting</td>
</tr>
<tr>
<td><strong>Background Correction</strong></td>
<td>D2-Lamp method</td>
</tr>
<tr>
<td><strong>Lamp Turret</strong></td>
<td>2-lamps simultaneously lit (manual turret)</td>
</tr>
<tr>
<td><strong>Lamp Mode</strong></td>
<td>Emission, Non-BGC, BGC-D2</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>100HZ</td>
</tr>
<tr>
<td><strong>Nebulizer</strong></td>
<td>Nebulizer integrated impact bead and jacket tip</td>
</tr>
<tr>
<td></td>
<td>Pt/Ir capillary</td>
</tr>
<tr>
<td><strong>Chamber</strong></td>
<td>Polypropylene</td>
</tr>
<tr>
<td><strong>Burner</strong></td>
<td>Fixed back/forward position and burner height</td>
</tr>
<tr>
<td></td>
<td>(Simple switching of Air/C₂H₂ and N₂O/C₂H₂ burner)</td>
</tr>
<tr>
<td></td>
<td>Titanium 10cm slot burner (Optional high-temperature burner)</td>
</tr>
<tr>
<td><strong>Gas Control</strong></td>
<td>Manual setting of flow rate</td>
</tr>
<tr>
<td></td>
<td>Automatic Air/N₂O switching system</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Gas pressure monitoring to prevent flashback</td>
</tr>
<tr>
<td></td>
<td>Automatic flame monitoring</td>
</tr>
<tr>
<td></td>
<td>Safety interlock for misuse of burner</td>
</tr>
<tr>
<td></td>
<td>Automatic flame extinguish when power failure</td>
</tr>
<tr>
<td><strong>Ignition</strong></td>
<td>Push ignite button</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td>Software based on MS Windows® 2000/XP</td>
</tr>
<tr>
<td><strong>Dimension and weight</strong></td>
<td>W690 x D425 x H370mm, 38kg</td>
</tr>
<tr>
<td><strong>Power requirements</strong></td>
<td>AC220V, 230V, 50/60Hz, 300VA</td>
</tr>
<tr>
<td></td>
<td>(Requires transformer for AC115V)</td>
</tr>
<tr>
<td></td>
<td>(Certification of CE marking)</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>Temperature : 10-35°C</td>
</tr>
<tr>
<td><strong>Humidity range</strong></td>
<td>Humidity : 45-80% (less than 70% when temperature is greater than 30°C)</td>
</tr>
<tr>
<td><strong>Standard accessories</strong></td>
<td>Burner Head of 10cm slot. Nebulizer assembly. Deuterium lamp. Drain tube.</td>
</tr>
<tr>
<td></td>
<td>Teflon tube for sample suction. Hose assembly for Air. Hose assembly for C₂H₂</td>
</tr>
<tr>
<td></td>
<td>RS-232C connection cable (9P-9P). AC cable for 220, 230V.</td>
</tr>
</tbody>
</table>

### Personal Computer requirements

- **Operating environment**: MS Windows® 2000 / XP
- **CPU**: Pentium II : 200MHz or better
- **RAM**: More than 128MB
- **Display**: SVGA(800 x 600) or better
- **Hard disk**: More than 20MB required to install the AA software
- **3.5" Floppy disk drive**: One or more units

*Personal computer, display, software for operating system, and printer are not included in the standard setup.*
Installation Site Preparation

1. LAB Bench
The bench must be at least 120cm long and 60cm deep, and must be sturdy enough to support 80kg.
Leave 15cm to 20cm space to the left and back of the instrument.

2. Ventilation-DO NOT INSTALL the AA-6200 WITHOUT PROPER EXHAUST
Prepare an exhaust duct above combustion chamber. Very high temperatures will be generated when using the flame; use appropriate materials for the duct.

Example of ventilation setup

Example of Tubing to the AA Spectrophotometer

3. Gas Connection
Place the gas cylinders in an environment that meets required safety regulations for the facility. Use metal tubing.

WARNING:
1. Do not allow acetylene to flow through pipes, and do not use equipment made from copper, silver, mercury, or their alloys.
2. Do not use Oxygen.