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PERKIN-ELMER

Model 2380 Atomic Absorption Spectrophotometer

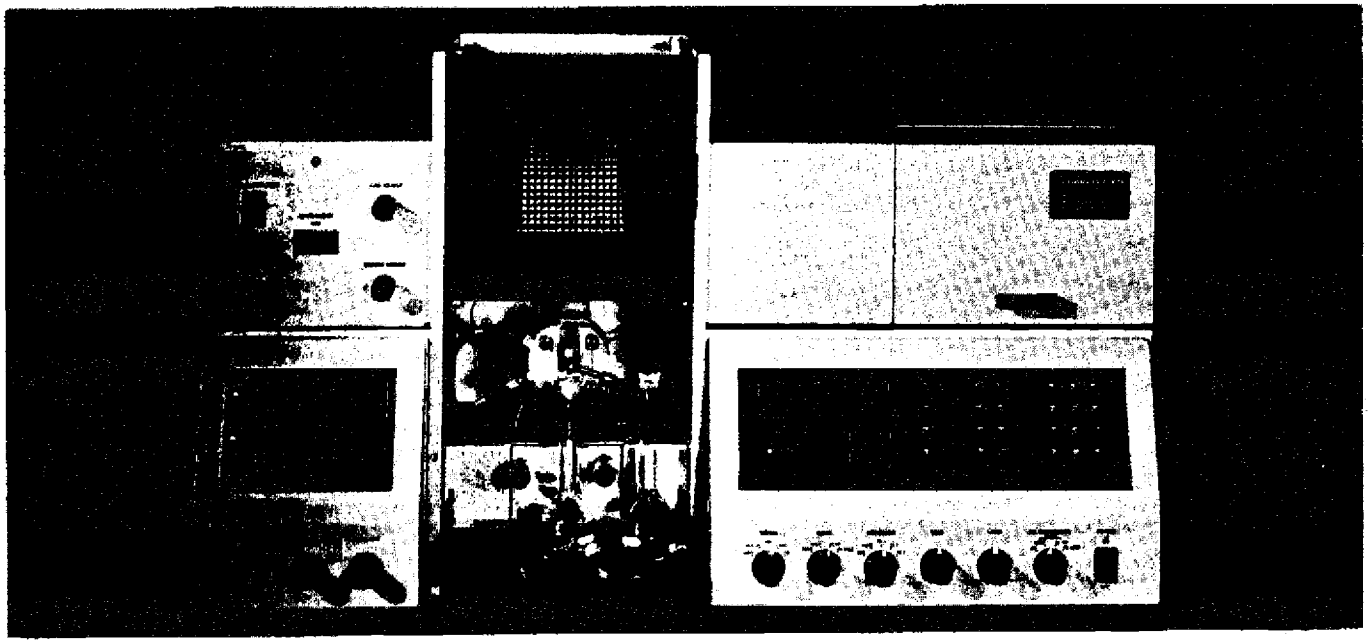


Figure 1. The Perkin-Elmer Model 2380 Atomic Absorption Spectrophotometer.

Some of the outstanding features of the Model 2380 include:

- **Double-beam optical system with high-dispersion monochromator**
- **Two sets of slits for optimal performance with flame or graphite furnace sampling**
- **Microcomputer electronics allows minimum keystroke operation**
- **Full four-digit readout**
- **Automatic Gain Control**
- **Automatic resloping at the push of one button**
- **Measurements in peak height or peak area**
- **Automatic calibration with 1, 2 or 3 standards**
- **Scale expansion continuously variable from 0.01 X to 100 X**
- **New burner chamber accommodates flow spoiler or impact bead**
- **Integration time continuously variable from 0.2 to 60 seconds in 0.1-second intervals**
- **Statistics package which includes average, standard deviation and coefficient of variation**
- **Built-in interlocked gas controls with burner head safety interlock, automatic nitrous oxide switching with acetylene boost and remote flame ignition**
- **Double-beam Deuterium Arc Background Corrector with BG ONLY mode selection**
- **Optional microprocessor-controlled burner control allows automatic ignition of air-acetylene or nitrous oxide-acetylene flames; digital flow settings, burner head and drain interlocks, flame sensor and flow-ratio monitoring are built-in**

The Model 2380 is a double-beam, microcomputer-controlled atomic absorption spectrophotometer. The 2380 uses a high-dispersion monochromator with a dual-blazed grating and high-performance photomultiplier for maximum energy throughput over the wavelength range from 190 to 870 nm. Two sets of slits (NORMAL and ALTernate) provide optimum performance with both flame and flameless techniques.

MICROCOMPUTER-CONTROLLED CONCENTRATION READOUT

The 2380 reads out directly in concentration on a built-in digital display with a range of ± 9999 counts. The built-in microcomputer permits automatic calibration on the display with one, two or three standards. To calibrate the 2380, simply enter the desired value with the numerical keyboard and push the button for the appropriate standard (S1, S2 or S3). The calibration value is automatically stored in memory. Next, aspirate each standard in sequence and press the appropriate standard button. Calibration is equally easy for atomic absorption or flame emission, flame or flameless sampling. To recalibrate in the middle of the run, analyze a single standard and press the reslope (RSLP) key.

The Model 2380 has built-in averaging to improve the accuracy of your analysis. Also available in the statistics package are standard deviation and coefficient of variation. For printed results, the Model 2380 can be connected directly to the accessory PRS-10 Printer-Sequencer or the accessory TR-2 Teletypewriter Readout. There is also an optional communications interface which provides an EIA RS-232C-type of output.

Integrated readings may be taken continuously or held on the display. Peak height and peak area measurements are also available. Integration times are continuously variable in 0.1-second intervals from 0.2 to 60 seconds. Scale expansion is continuously variable from 0.01 X to 100 X.

BURNER AND GAS CONTROLS

The burner system on the Model 2380 consists of the new Perkin-Elmer premix design burner chamber. The chamber is made of a highly resistant material, Ryton, and is internally coated with polypropylene for maximum corrosion resistance. It can accommodate a flow spoiler or an impact bead to provide improved detection limits whether using air-acetylene or nitrous oxide-acetylene flames. A 10-cm, single-slot,

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all-titanium burner head and a stainless steel adjustable nebulizer are standard equipment with the Model 2380.

Interlocked gas controls are built into the Model 2380. There are pressure regulators and flow meters for fuel and oxidant and a three-way valve to switch between air and nitrous oxide. To switch over to the nitrous oxide-acetylene flame, turn the valve to nitrous oxide, and if the nitrous oxide burner head is in place, the acetylene flow will be increased automatically and nitrous oxide will flow. If the nitrous oxide burner head is not in place, the air-acetylene flame keeps burning. Naturally, both fuel and oxidant may be shut down at the instrument.

An optional microcomputer gas control system is also available for the Model 2380. It is programmed to control ignition and shut-off of the air-acetylene and the nitrous oxide-acetylene flames in the proper sequence. It also has burner head and drain interlocks, checks if the flow ratio you have selected will allow safe operation and displays the gas flows on digital readouts. Sensors watch the flame and gas pressures and turn off the gases in proper sequence if there is a pressure drop, power failure or if the flame is extinguished.

The 2380 may be used for atomic absorption or flame emission measurements. When the instrument is used in the atomic absorption mode, the built-in Automatic Gain Control sets and maintains the proper photomultiplier gain throughout the analysis. When the optional Deuterium Arc Background Corrector is used, Automatic Intensity Control adjusts the power to the deuterium arc to maintain an optimized intensity relative to that of the primary source, whether an Intensitron* *Hollow Cathode Lamp or a Perkin-Elmer Electrodeless Discharge Lamp (U.S. Patent Number 3,873,884) is being used.

SPECIFICATIONS — MODEL 2380

Monochromator: Littrow grating system. Focal length 267 mm. Wavelength range 190-870 nm, covered by dual-blazed grating 1800 lines/mm (45,700 lines/inch). Ruled area 64 × 72 mm, blazed at 236 nm and 597 nm. Resolution settings of 0.2, 0.7 and 2 nm, switch selectable. (NORMAL slits for flame work and ALTernate slits for graphite furnace work.) Dispersion: 1.6 nm/mm (nominal). Wide-range photomultiplier detector with UV-transmitting windows. Wavelength read in nm on three-digit counter.

Photometer: Double-beam, time-shared system. "AC" system (lamp light modulated by rotating chopper while flame light is unmodulated). Minimum spectral bandwith, 0.2 nm (nominal). Source current adjustable to 40 ma. Front-surfaced reflecting optics with protective coating for improved ultraviolet reflectivity.

Readout: *Results shown on a four-digit electronic display with polarity indication and adjustable decimal.* Absorbance readings from -0.5 to 2.000 A, concentration readings to 9999 with continuously variable scale expansion of 0.01 X to 100 X. Automatic zero setting and automatic concentration calibration (with up to three standards) are push-button actuated. Integration time variable from 0.2 to 60 seconds in nominal 0.1-second intervals. Built-in ability to take a number of readings, average them and display the average, and to calculate and display the coefficient of variation and standard deviation. Reslope of the calibration with a single additional standard is built-in. Informative error messages are displayed to alert the analyst of improper instrument calibration. Peak height and integrated peak area modes are provided for use with fast peak-shaped signals. Overrange indication for expansion, calibration, absorbance and display. Function indicator and display checks in LAMP and SET UP modes. Direct connection provided for laboratory recorder with separate recorder control allowing continuous or integrated readings on recorder (per the digital display), continuous readings in absorbance or continuous readings with display calibration and three different time constants. Compatible with PRS-10 Printer-Sequencer and TR-2 Teletypewriter systems. Optional communications interface provides EIA, RS-232C-type of output.

Deuterium Background Corrector (Optional): Internally mounted unit with controls mounted in lamp compartment and easily accessible. Provides simultaneous correction for molecular absorption and light-scattering. Deuterium arc lamp used as continuum source for increased intensity and broader wavelength coverage relative to hollow cathode lamp-type continuum sources. Power switch activates Automatic Intensity Control circuitry which automatically adjusts the power to the lamp to provide the appropriate lamp intensity. Rotary switch allows selection of AA (background corrector off), AA-BG (AA simultaneously corrected for background absorption), BG (AA-BG operation but energy display shows background energy) and BG ONLY (hollow cathode lamp off) monitored on Lamp Energy display (two-digit LED display).

Sample Area: 22.5 cm wide, 21 cm deep. Open to the front through a removable flame shield with about 7% light transmission. Sample tray, 21 cm wide and 12 cm deep, adjustable to three separate heights.

Wavelength Drive: (Optional Module) 5 nm/min scan speed.

Burner: Premix design with Ryton (highly resistant material) mixing chamber internally coated with polypropylene. Accommodates plastic-coated flow spoiler or impact bead. Angled to ensure proper drainage. Auxiliary air inlet. Burner mount is adjustable in vertical, horizontal, and angular directions. Adjustable stainless steel nebulizer (corrosion-resistant nebulizers are available); 10-cm single-slot all-titanium burner supplied.

Standard Flame Gas Controls: Interlocked gas controls containing individual flow controls and meters for oxidant and fuel. T-valve to switch oxidant from air to nitrous oxide. Flame is ignited only on air-based flames with push-button actuated glow plug. Also contains burner head safety interlock system and automatic fuel change when switching to a nitrous oxide-acetylene flame.

Optional Flame Gas Controls: Includes microprocessor to measure oxidant and fuel flows, to provide automatic checking for safe flow ratio, and to sense burner head, pressure, flame and burner drain. Also includes automatic gas sequencing in addition to the features of the standard burner control.

Literature: Perkin-Elmer book "Analytical Methods for Atomic Absorption Spectrophotometry" (the *Cookbook*) and instruction manual supplied with instrument. One-year free subscription to the bimonthly journal: *Atomic Spectroscopy*.

Training Course: Training course available at various U.S., Canadian and European locations given by qualified product specialists.

Weight: 70 Kg (150 lb) net, 125 Kg (270 lb) gross.

Power Requirements: 105-125 or 200-240 volts, 50/60 Hz, 150 watts.

Dimensions: 54 cm high overall, 46 cm high without flame shield; 50 cm deep, 58 cm wide.

PERKIN-ELMER

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