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Perkin Elmer 2400 Series II CHNS/O Elemental Analyzer

QUICK GLANCE

• One analyzer with three modes of operation: CHN, CHNS and Oxygen
• Advanced combustion design for handling virtually any type of sample
• Frontal Chromatography for simple, reliable and accurate measurements
• NEW EA 2400 Data Manager software for easy data handling

The PerkinElmer 2400 Series II CHNS/O Elemental Analyzer (2400 Series II) is a powerful instrument for the
rapid determination of the carbon, hydrogen, nitrogen, sulfur or oxygen content in organic and other types of materials. It has the capability of handling a wide variety of sample types in the field of pharmaceuticals, polymers, chemicals, environmental and energy, including solids, liquids, volatile and viscous samples.

Based on the classical Pregl-Dumas method, samples are combusted in a pure oxygen environment, with
the resultant combustion gases measured in an automated fashion. The design has been field-proven in
thousands of laboratories around the world. High-speed microprocessor control, solid-state components and
built-in diagnostics provide confidence in performance and reliability.

The new EA 2400 Data Manager simplifies data handling and allows convenient storage and reporting
capabilities. In addition, PerkinElmer offers the best quality reagents to provide the highest measurement
of accuracy and precision. Unlike other elemental analyzer designs, the 2400 Series II has easy access to all components for routine care and maintenance.

Multiple modes of operation
The 2400 Series II offers multiple analysis options: CHN, CHNS or Oxygen mode. As a user, you may choose
one or more options to meet your laboratories needs. Changeover to different modes of operation only requires a few simple steps. The optional Column Switching Accessory (CSA) makes switching to the Oxygen mode very convenient.

The **CHN mode** is the most widely used of the analysis modes. A range of reagents and the ability to optimize the combustion parameters offer flexibility for analyzing virtually any sample types. Interfering elements such
as halogens and sulfur are removed before detection.

The **CHNS mode** is specifically designed to simultaneously determine carbon, hydrogen, nitrogen and sulfur in organic materials.

The **Oxygen mode** is optimized for the automatic determination of oxygen in organic materials by pyrolyzing the sample.

Upgradeability
The 2400 Series II can be upgraded at any time to add additional mode capability to suit the needs of your laboratory.

Automated weight entry
Accurate weighing of samples is a prerequisite for organic elemental analysis since results are presented
on a weight percent basis.

To avoid transcription errors, the 2400 Series II provides automatic weight entry from the cost-effective PerkinElmer AD-6 Autobalance as well as other ultra microbalances. Using proven PerkinElmer balance technology, the AD-6 ultra mircobalance provides exceptional resolution and accuracy for the best results.

Special Features

Operating gases
In the CHN and CHNS modes, operating gases include oxygen, for combustion of sample materials, and a

carrier gas – either helium or argon. The use of argon as an optional carrier gas is unique to this design and
assures cost-effective use of the Elemental Analyzer in those areas of the world where helium is difficult
to obtain due to price or availability. In the Oxygen mode the operating gas is helium when using silver vials or helium/hydrogen mixture when using tin vials.

Optimized combustion flexibility for best performance
Combustion is the most critical step to the success of the measurements and ultimately affects the accuracy
and precision of the final result: the weight percent of the element or elements being measured. The 2400
Series II provides advanced combustion conditions of temperature, time and available oxygen (or pyrolysis
gas in the case of Oxygen mode). The user has the flexibility to increase the sample's combustion time
in the oxygen atmosphere as well as the amount of oxygen that is introduced allowing for complete combustion
of virtually any type of sample.

Gas control zone
The thorough mechanical homogenization of product gases under the controlled conditions of pressure,
temperature and volume are important in order to achieve the most precise results.

Frontal Chromatography for highest reliability
In the 2400 Series II, there is selective retention of the gases to produce a steady-state, stepwise signal rather
than a peak signal (see Figure 2). This technique allows for a simpler, more reliable and accurate determination
of the combustion gases than other CHNS/O systems which use a peak separation method.

Laboratory efficiency
The 2400 Series II offers fast analysis times, optimizing efficiency and precision. A typical CHN analysis is
accomplished in under six minutes, CHNS in eight minutes and oxygen in four minutes. A unique wake-up routine allows the automatic equilibration and standardization of the 2400 Series II at an operator-selected date and time. This feature allows the system to be ready when you are. A 60-position autosampler allows unattended operation night or day. The autosampler design has been tested through millions of cycles, both in accelerated quality assurance testing, and most importantly, in labs like yours throughout the world. Diagnostic routines monitor electronic and pneumatic components for proper operation and alert the operator
in the rare event that a failure is encountered. A programmable gas saver valve allows for the automatic reduction

of carrier gas flow rate when the analyzer is not in use.

Consumables
Only the best reagents, tubes and sample vials assure optimum analyzer performance. Every genuine
PerkinElmer consumable and reagent is of high quality and designed specifically for your PerkinElmer instrument. Convenient kits for 2,000, 4,000 or 10,000 experiments simplify ordering and eliminate waste.

specifications
2400 Series II CHNS/O Elemental Analyzer

Analysis mode
options:
Option 1, CHN mode The CHN mode is the most universal of the analysis modes because of the combination of the reagent design and the Optimize Combustion control parameters. Interfering elements (halogens and sulfur) are removed.

Option 2, CHNS mode
The CHNS mode is designed to handle conventional organics. This mode is specifically designed to include sulfur, which reduces universality. This includes limiting the range of sample types and sample size (1 to 2 mgs recommended). Metal cations are excluded. Special care must be used in calibration and blanks for lower levels of sulfur.

Option 3, Oxygen mode
The Oxygen mode is designed to handle conventional organics. This mode excludes compounds containing phosphorous, fluorine, silicon and metal cations. Samples containing mineral matter must be demineralized prior to analysis.

Upgradeability The user may choose any or all modes. The 2400 Series II may be freely upgraded at any
time to add additional mode capability to suit the needs of the laboratory.

Analysis times CHN: 6 min, CHNS: 8 min, Oxygen: 4 min

Sample size 0 to 500 mgs, depending on sample type. Small samples will generally be limited by
weighing errors, but may be used. Large samples are limited by the sample matrix and content (see Analytical Range).

Analytical detector range
Element Range (mgs)
C 0.001 - 3.6
S 0.001 - 2.0

H 0.001 - 1.0
O 0.001 - 2.0
N 0.001 - 6.0

Analytical performance (based upon organic standards)

Mode	**Helium Carrier Gas**	**Argon Carrier Gas**
	Accuracy[%] / Precision [%]	Accuracy[%] / Precision [%]
CHN	< 0.3 / < 0.2	< 0.4 / < 0.3
CHNS	< 0.3 / < 0.2	< 0.5 / < 0.4
Oxygen	< 0.3 / < 0.2	< 0.4 / < 0.3

0.1% = 100 ppm
Best performance requires an ultra microbalance

*with 95% confidence limits for an organic standard material weighed
with a PerkinElmer AD-6 Series ultra microbalance.

special features
2400 Series II CHNS/O Elemental Analyzer
Optimized combustion Offers advanced combustion conditions for static and dynamic step. Users optimize temperature, time and available oxygen.

Gas control zone Controls pressure, temperature and volume of the product gases.

Diagnostics Monitors electronic and pneumatic components continuously, assuring best instrument performance.

Wake-up Allows automatic instrument startup, equilibration and calibration at any operator-selected time and date.

Shutdown Allows for the automatic reduction of operating temperatures at operator-selected time and date.

Gas saver Provides automatic reduction of carrier gas flow rate with a built-in valve at an operator-selected time and date.

Run counters Aids in routine maintenance procedures and monitors reagent and expendable components.

Advanced Allows calculations on filters and for polymers, element ratios, mixtures, simplest empirical
formula, heating valve, calculates solvent of crystallization or results on dry basis.

Automatic weight transfer Eliminates transcription errors and simplifies operations through automatic weight transfer using a PerkinElmer cost-effective AD-6 ultra microbalance, Mettler UMX2
or Sartorius SE2.

Helium or argon carrier gas Accepts argon as a substitution for the system carrier gas in areas where helium
is difficult to obtain or is high in price.

Copper reagent reduction Allows for the reduction (with 5-8% H2 gas mixture) of the copper reagent for reuse at operator-selected time and date.

Column switching accessory The Column Switching Accessory (CSA) is available to conveniently switch columns from CHN or CHNS mode to the Oxygen mode.