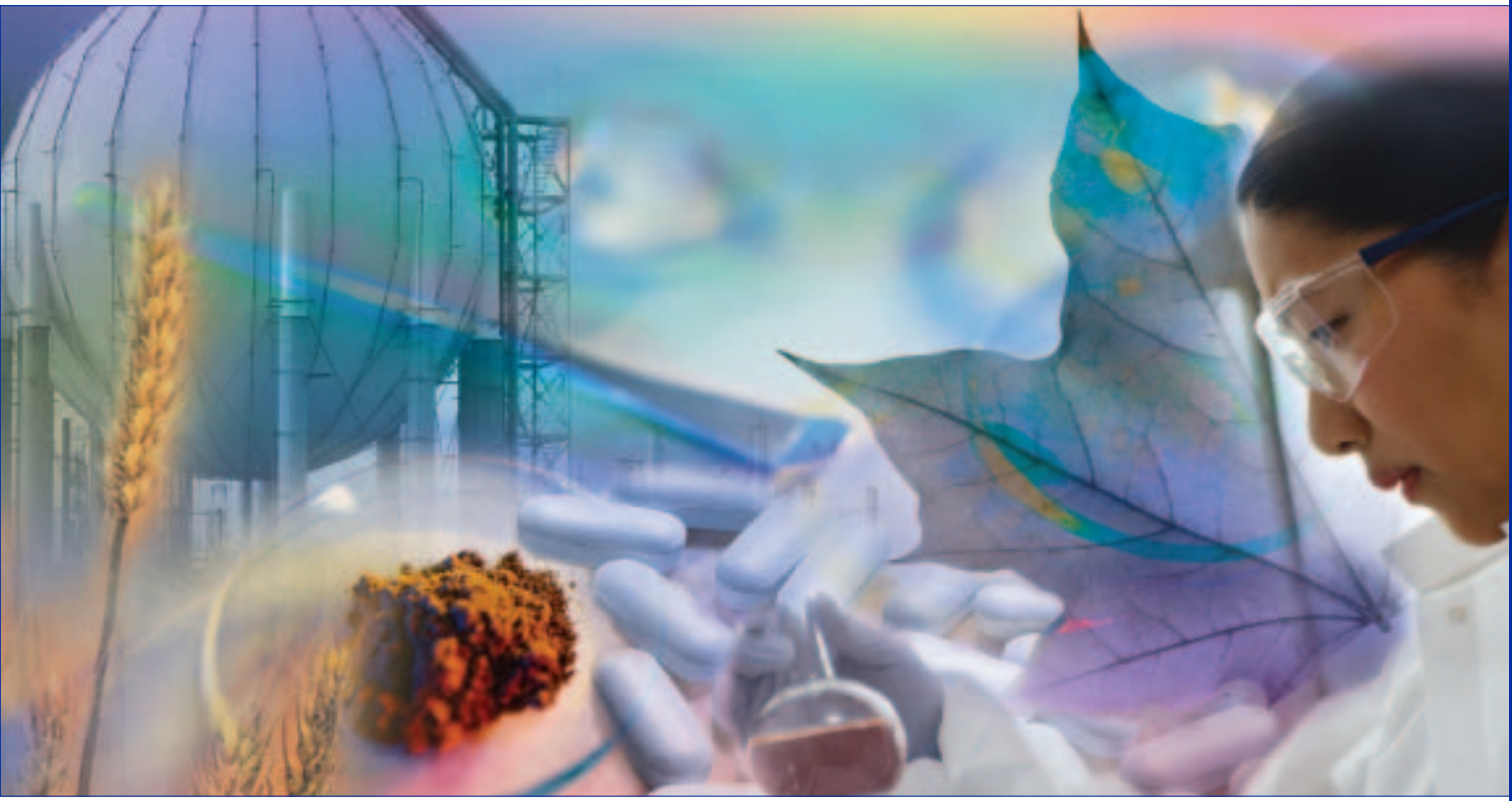
Organic Elemental Analysis

2410 Series II Nitrogen Analyzer



proven performance

reliable results

PerkinElmer®
precisely.

PerkinElmer 2410 Series II Nitrogen Analyzer

Advanced Combustion Method

QUICK GLANCE

- Advanced combustion design for handling virtually any type of sample
- Frontal Chromatography for simple, reliable and accurate measurements
- Unique, economical features such as CO_2 carrier gas, wake-up and gas saver

The PerkinElmer® 2410 Series II Nitrogen Analyzer measures nitrogen and/or protein in a wide range of materials by using an advanced combustion method. The instrument is easy-to-use with a self-contained microprocessor-controlled analyzer to deliver reliable results.

Used primarily in the food and agricultural areas, the 2410 Series II replaces the time-consuming, multi-stepped Kjeldahl method of analyzing feeds, grains, cereals, dairy products, fish, meats, fruits, nuts, fertilizers, plant material, soils and sediments.

Additional application areas are in the polymer and petroleum industries. When nitrogen is the hetero-element in a polymer blend, it is monitored for quality control purposes. In the energy area, nitrogen is monitored as a contaminant or as an indication of the amount of additive present.

For virtually any material where the measurement of nitrogen and/or protein is important, the 2410 Series II will find a place in your laboratory testing.

Standard features

Based on the classical Dumas method, the PerkinElmer 2410 Series II Nitrogen Analyzer employs the following design principals:

- **Furnace.** Operating temperatures in excess of 950 °C. Combustion of sample occurs in pure oxygen environment.
- **Isolation of Product Gases.** Reduction of NO_x to N_2. Nitrogen is separated from other combustion gases, including methane, by a gas chromatography column.
- **Detection.** Detection of nitrogen by a thermal conductivity detector (TCD). Detector response is automatically converted directly to weight percent nitrogen and/or protein.
- **Calibration.** Calibration is based on weight percent nitrogen in a single primary standard.

The design meets the method requirements for the determination of nitrogen and/or protein by combustion as described in AOAC methods 990.03, 992.15, 992.23, 993.13 and 997.09, as well as applicable AOCS, AACC and ASBC methods.

Reporting results

At the end of the analysis, the 2410 Series II automatically prints the results. Results can be directly converted from percent nitrogen to percent protein using the operator selected protein conversion factor. Different protein conversion factors can be selected for each sample. Additionally the nitrogen and/or protein results may be corrected to user-selected moisture content.

Automated sample averaging

To accommodate the analysis of heterogeneous samples, the results of up to five samplings of a material can be averaged and reported as if it were performed as a single analysis.

These features, and more are standard with the 2410 Series II.

Reliable, easy-to-use design

Principle of operation

With the PerkinElmer 2410 Series II Nitrogen Analyzer samples are combusted in a pure oxygen environment, with the resultant combustion gas measured in an automated fashion.

The 2410 Series II system is comprised of four major zones:

- Combustion Zone
- Gas Control Zone
- Separation Zone
- Detection Zone

In the Combustion Zone, samples encapsulated in tin are inserted automatically using an auto injector. In the presence of excess oxygen and combustion reagents, the samples are completely combusted. Oxides of nitrogen are reduced to elemental nitrogen, N_2. Users have the flexibility of optimizing static and dynamic combustion conditions to meet the specific sampling need of their laboratory.

The product gas then passes through a water trap into the Gas Control Zone and is captured in the mixing chamber. Here, the gas is rapidly mixed for thorough homogenization and precisely maintained at controlled conditions of pressure, temperature and volume, which leads to highly reproducible results.

After the homogenization of the product gas, the mixing chamber is depressurized through a column in the Separation Zone of the instrument. The separation approach used is a technique known as Frontal Chromatography.

As the gas elutes, it is measured by a thermal conductivity detector in the Detection Zone of the analyzer. Since the measurement in this design is made as a steady-state, stepwise change, the variations associated with the quantification of peak signals as in other analyzers are eliminated.

Automated Weighted 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 2410 Series II provides automatic weight entry from the cost-effective PerkinElmer AD-6 Autobalance as well as other balances. Using proven PerkinElmer balance technology, the AD-6 ultra mircobalance provides exceptional resolution and accuracy for the best results.

No Special Sample Preparation. Simply weigh your samples into one of the 2410 Series II sample capsules. It doesn't matter if you're analyzing solids or liquids, there are capsules to accommodate most sample types and sizes.

Straightforward Operation. Place the encapsulated sample in the system and press the start key. For multiple samples, you can use the integrated 60-position autosampler for unattended operation. The 2410 Series II features multitasking operation. For improved laboratory efficiency, new samples may be added to the run sequence while a sample is being analyzed.

Highlights

Operating gases

Unlike conventional combustion analyzers, the PerkinElmer 2410 Series II Nitrogen Analyzer uses carbon dioxide as the carrier gas in place of the more expensive helium or oxygen gas. Moreover, the use of carbon dioxide as the carrier gas eliminates the need to remove carbon dioxide from the combustion products prior to the measurement of nitrogen. Therefore there are fewer scrubber traps to maintain.

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 nitrogen. The 2410 Series II provides advanced combustion conditions of temperature, time and available oxygen. 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

A unique mixing chamber ensures a thorough mechanical homogenization of the product gas under the controlled conditions of pressure, temperature and volume.

The homogeneity is important in order to achieve the most precise results. In addition, results are independent of changes in barometric pressure because the product gas is controlled to constant conditions every run.

Frontal chromatography for the highest reliability

In the 2410 Series II, there is selective retention of the gases to produce a steady-state, stepwise signal rather than a peak signal. This technique allows for a simpler, more reliable and accurate determination of the combustion gas than other analyzers which use a peak separation method.

Laboratory efficiency

The 2410 Series II was designed with reliability and productivity in mind. The instrument is easy to maintain, convenient and offers you the peace of mind that your analyses will run smoothly.

If you need the instrument to be ready at a predetermined time, use the system's unique wake-up routine. Simply program in the date and time you want the instrument to start up, equilibrate, purge, and even run blanks and calibration standards. This feature allows the system to be ready when you are.

There is the complementary shutdown feature as well as a programmable gas saver which allows for the automatic reduction of the carrier gas flow rate when the analyzer is not in use.

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 continuously monitor electronic and pneumatic components for proper operation and alert the operator in the rare event that a failure is encountered.

The 2410 Series II design incorporates a minimum number of valves for a significant reduction in maintenance time and a patented manifold for increased reliability.

Water must be removed from the combustion gases prior to the detection of nitrogen. To accomplish this, a unique material, Aquasorb, is used. It efficiently removes water, is noncaking, and can be regenerated. It produces consistent, reliable operation and further savings on reagents.

Reusable stainless steel reaction tubes provide cost-savings for your lab.

All of these features,
and more are standard
with the PerkinElmer 2410 Series II.

2410 Series II Nitrogen Analyzer

Special features

Optimized combustion	Offers advanced combustion conditions for static and dynamic steps. 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.	
Autosampler	Pneumatic, gravity feed autoinjector with 60-position autosampler carousel. Additional samples may be added during automatic sequencing.	
Multiple sample mode	Up to five samples may be run; the signals of each run are used to calculate the result which is reported as a single result. In this mode, larger sample sizes may be accommodated.	
Advanced calculations	Selectable protein determination, calculates results on dry basis, mixtures	
Automatic weight transfer	Eliminates transcription errors and simplifies operations through automatic transfer weight transfer using a PerkinElmer AD-6 ultra microbalance or TLB 60.	
CO_2 carrier gas	Cost effective, pre-heated carbon dioxide (99.995% pure)	
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.	
Physical details	**Power requirements** 100 VAC ±10% 120 VAC ±10% 230 VAC ±10% Weight ±45 kg (100 lbs)	**Bench space** Width 61 cm (24 in) Depth 55 cm (22 in) Height 55 cm (22 in)

Specifications

Analysis time	4 minutes
Sample size	up to 500 mgs, depending on sample type and matrix. Large samples are limited by the sample matrix and content (see Analytical Range).
Resolution	1 µg (10 ppm)
Analytical detector range	0.001-40.0 mgs total nitrogen content
Measuring range	0.01%-100%
Accuracy*	Within ±0.15% of respective theoretical values
Precision*	Within a standard deviation of $\leq$ 0.15%

*Based on primary standards including EDTA, nicotinic acid, tryptophan, and lysine*HCl.

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