Quant NQAD

Features

- Easy-view, touch-panel, digital display with soft key operation
- Intuitive design allows for easy set-up and operation
- Compatibility with any HPLC system
- Low-vacuum nebulizer minimizes mobile phase outgassing
- Response unaffected by mobile phase pH
- Small footprint, quiet operation

Specifications - Model NQAD

Inlet mobile phase flow rate:	0.1 to 1.2 mL/min
Inlet connection:	Standard 10-32 receptacle
Evaporator temperature:	35 to 100°C or off, programmable
Wetted materials:	PTFE, PFA, 316 SS, PEEK, Ruby, Kalrez®
Gas requirements:	Clean, dry air or nitrogen, <10 SCFH (4.7 L/min) at 40 PSI regulated (276 kPa)
Condensing liquid:	Water
User interface:	5", color, touch-panel display Soft-key menuing Real-time chromatograph Status and setup displays
Back panel:	Water inlet (500-ml bottle) Gas inlet, 1/4" Swagelok Gas effluent outlet, 3/8" Swagelok® Liquid effluent outlet, 1/4-20 receptacle Analog/digital interface terminal connectors Power connector USB/Serial connectors
Power requirements:	150 Watts, 100 to 240 VAC, 50 to 60 Hz
Operating temperature:	15 to 35ºC
Size (WDH):	6" × 17" × 12.5" (15.5 cm × 43 cm × 32 cm)
Weight:	20 lbs (9.1 kg)
Analog output:	0 to 1.00 V selectable gains ×1 to ×500
Product safety/compliance:	CE Certification based on 89/336/EEC, 72/23/EEC, EN55011, EN61326-1, EN61010-1

Specifications are subject to change without notice.
Kalrez® is a registered trademark of DuPont Performance Elastomers.
Swagelok® is a registered trademark of Swagelok Company.

Applications

NQAD is useful for pharmaceutical and other industries for the analysis of nonvolatile and semivolatile chemicals including:

- Carbohydrates
- Cations and Anions
- Steroids
- Lipids and phospholipids
- Polymers
- Small molecules
- Peptides and Proteins

Chemists can use NQAD in a variety of fields, including:

- Pharmaceutical
- Industrial products
- Energy/petroleum
- Environmental
- Life sciences
- Forensics/narcotics
- Agricultural/food/beverage

To Order

NQAD	Nano Quantity Analyte Detector
Options	
QT-5001	IQ/OQ/PQ Documentation

Acknowledgement

The NQAD development was funded, in part, with a SBIR grant from the National Institutes of Health awarded to Fluid Measurement Technologies, Inc and Southern Illinois University, Carbondale (SIUC). Quant Technologies wishes to acknowledge the pioneering research work of Professor John Koropchak and his colleagues at SIUC.

Like Nothing Else!

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QUANT™ TECHNOLOGIES

Quant™ Technologies

NQAD

Nano Quantity Analyte Detector (NQAD)

A New Aerosol-based HPLC Detector

- **Ultrasensitive to Low Nanogram Levels**
- **Broad Range of Analytes**
- **Linear Response**
- **Wide Dynamic Range**
- **Reproducible Results**
- **Small, Robust, Reliable**
- **Easy Set-up and Operation**

Like Nothing Else!

The Quant Nano Quantity Analyte Detector (NQAD) is a new and completely different kind of aerosol-based detector for high performance liquid chromatography (HPLC). The NQAD's high sensitivity helps analytical chemists accurately identify and measure extremely low concentrations of compounds in low nanogram ranges.

The NQAD also offers a wide dynamic range with superior linearity when compared to other aerosol-based detectors. Universal detection of a broad range of semivolatile and nonvolatile compounds provides accurate concentration analysis of the drug components. This superior performance will aid pharmaceutical development where impurities or drug degradation can be detected with minimal sample preparation.

How NQAD Works

Traditionally, HPLC systems have used a UV absorbance technique to detect chemical compounds. But UV detectors are limited to analytes that contain a chromophore. Aerosol-based HPLC detectors offer an advantage because they can be used with any analyte that is less volatile than the mobile phase, with or without a chromophore.

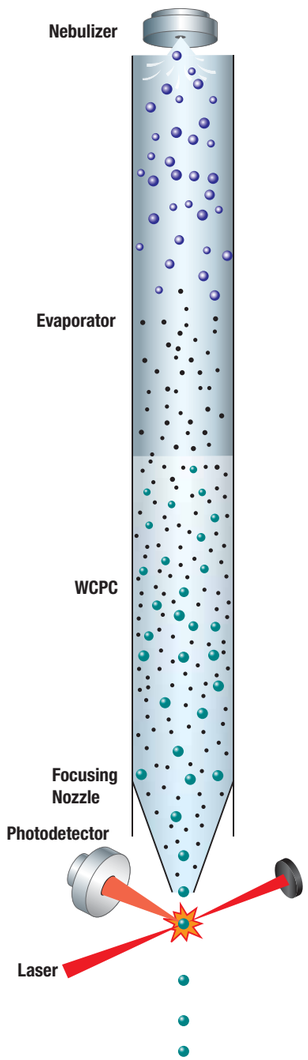
Aerosol-based detectors nebulize the effluent continuously. The mobile phase is evaporated from the droplets, leaving residue particles suspended in air. When a nonvolatile analyte elutes the HPLC column, the particles left after evaporation will increase in size. The detector measures the increase in particle size and converts it to an analog or digital output.

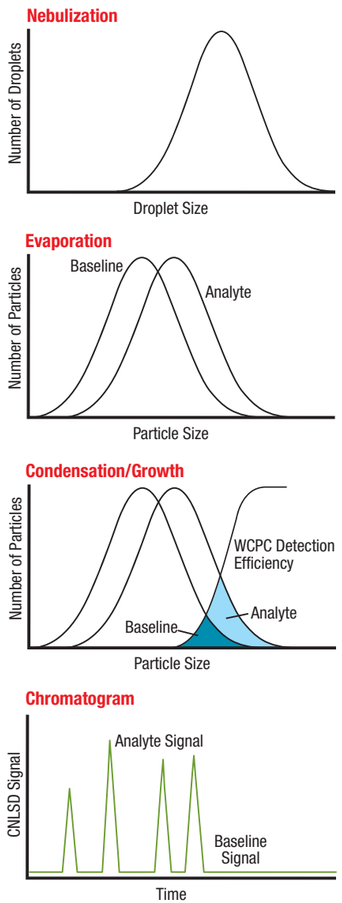
Earlier aerosol-based detectors, such as evaporative light scattering, have low sensitivity due to the low light scattering levels of small particles and photodetector drift. Detectors based on the measurement of charged aerosol are limited by inefficient charging of small particles and electrometer noise. The NQAD offers better sensitivity because it increases the number of particles detected by using a water condensation particle counter (WCPC).* The WCPC condenses water vapor onto the particles, literally growing them to a size where individual particles can be detected easily using an optical detector.

Compared to other aerosol-based detectors, the NQAD is more sensitive to changes in the size shift of the aerosol distribution. Its dynamic range spans from less than 1 ng to over 10 µg on column. Also, it offers linear response over several orders of magnitude for most analytes.

The NQAD detects a broader range of analytes than UV detectors and offers better sensitivity than other aerosol-based detectors. Its small size, inherent simplicity, and stability make it an ideal addition to the analytical chemist's toolbox.

*U.S. Patent Number 6,712,881. Other patents pending.





Nebulization
Effluent from the HPLC system is nebulized into a mist of ultrafine droplets.

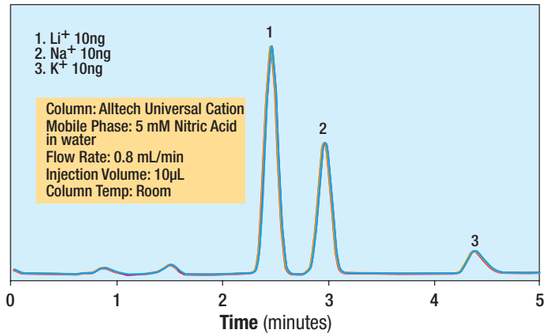
Evaporation
The mobile phase and additives evaporate, leaving behind small particles of semivolatile or nonvolatile materials. A choice of evaporator temperatures ensures mobile phase evaporation while minimizing evaporation of the analyte. The baseline curve represents the particle residue after evaporation of the pure mobile phase and its additives. The curve shifts to a larger size when analyte is present. The magnitude of this shift correlates to the concentration of analyte.

Condensational Growth
Supersaturated water vapor condenses on the particles to form large droplets. Only particles above a critical size can act as condensation nucleation sites, shown here as the WCPC Detection Efficiency curve. When using a mobile phase with very low impurities, the baseline signal is small compared to the analyte signal. Analyte detection down to 1 ng and below is possible.

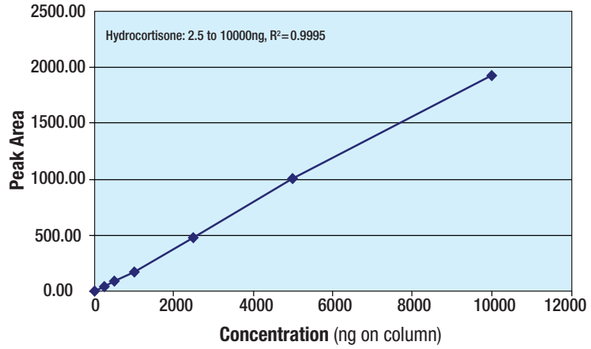
Optical Detection
The droplets are detected in discrete form as they pass through the laser beam of an optical detector. Individual light pulses measured by the photodetector have a high signal-to-noise ratio, making it insensitive to photodetector background noise or laser drift. The dynamic range of the ultrasensitive detector is over four orders of magnitude.

The NQAD signal is the number concentration of particles detected as a function of time. The peak area under the curve represents analyte concentration level.

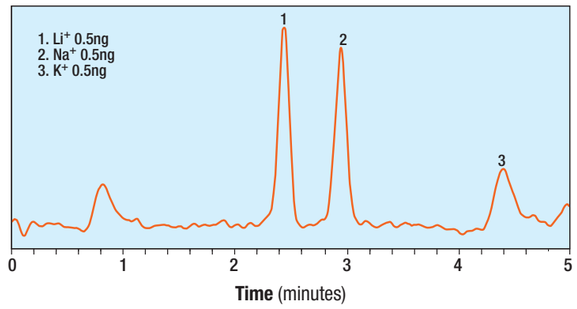
Reproducible Results
Detector response is stable, precise and reproducible for reliable results. To demonstrate this, six chromatograms of a solution containing Li^+, Na^+, and K^+ were obtained on different days and compared. The figure demonstrates the closeness of the detector responses on different days; they are identical.



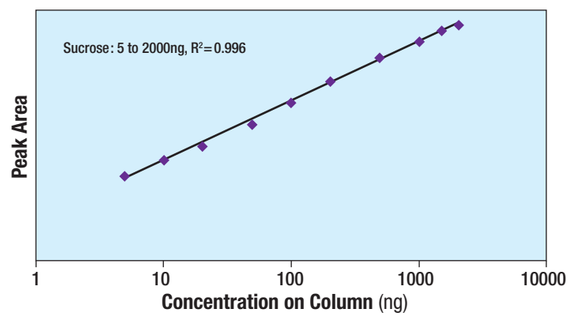
Wide Dynamic Range
The wide dynamic range shows a linear response covering over four orders of magnitude. With this wide range less sample preparation time is required and more information is obtained from a single sample solution injection.



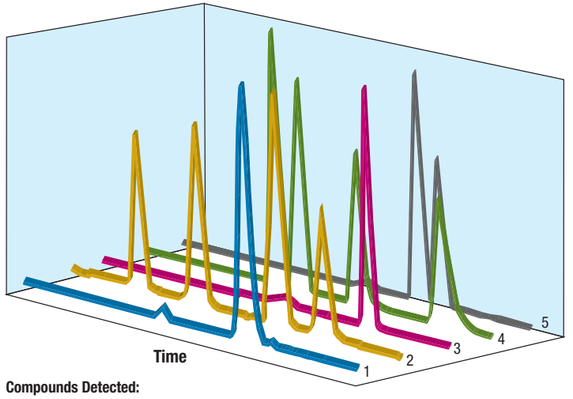
Ultrasensitive
With the ability to detect sub-nanogram levels, the NQAD's ultra-high sensitivity can be used when only trace amount of analytes are available. The NQAD is ideal for searching for drug impurities, degradation products, excipients and when industrial hygiene is a concern. Both previously easy and hard-to-measure compounds can be quantified accurately with minimal sample preparation. Shown here are 0.5 ng cation concentrations with peaks that have signal-to-noise ratios higher than 10:1.



Linear Response
The NQAD shows superior linearity compared to other aerosol-based detectors, covering several orders of magnitude for most analytes. When you combine its sensitivity and linear responsiveness, multiple sample preparation is often not necessary; only one sample preparation may be used for the main drug compound, impurities and/or degradation products analysis. Only one method validation for both the main drug compound and other compounds present in trace amountsis required. This figure shows a portion of Sucrose linearity range.



Broad Range of Analytes
The detection of NQAD is near universal for compounds that are less volatile than the mobile phase. Chromophores and fluorophores are not needed for detection, thereby eliminating or decreasing the need for compound derivertization. This figure shows five different groups of compounds detected by NQAD. Run time for the analyses ranged from 5 to 15 minutes. The detector's fast response time produces narrow peaks for more accurate quantification and enhanced resolution.



Compounds Detected:
1. Steroids: Dexamethasone
2. Carbohydrates: In elution order - Fructose, Glucose, Lactose, and Sucrose
3. Lipids: Cholesterol
4. Cations: In elution order - Li^+, Na^+, K^+, and Cs^+
5. Amino Acids: In elution order - DL Alanine and DL-Valine