

Thermo Scientific Dionex Corona ultra RS
Charged Aerosol Detector



Universal detection see what others miss

consistent • sensitive • versatile

Thermo
SCIENTIFIC

Going beyond HPLC

The Problem—Detection

No HPLC or UHPLC detector is perfect. UV detection is the most widely used technique, but it fails to detect compounds without chromophores. Other universal detectors do not combine application versatility with reliability. This results in detection gaps.

The Solution

The Thermo Scientific™ Dionex™ Corona™ ultra RS™ Charged Aerosol Detector is the solution. Charged aerosol detection delivers performance that refractive index (RI), low-wavelength UV, and evaporative light scattering (ELS) detectors simply cannot match. It measures analytes that other technologies fail to detect. Charged aerosol detection has greater sensitivity, wider dynamic range, and more consistent response. Virtually every pharmaceutical company has adopted charged aerosol detection.

The Corona ultra RS detector goes beyond simple HPLC. It combines all the benefits of charged aerosol detection with the high speed and increased resolution of UHPLC.

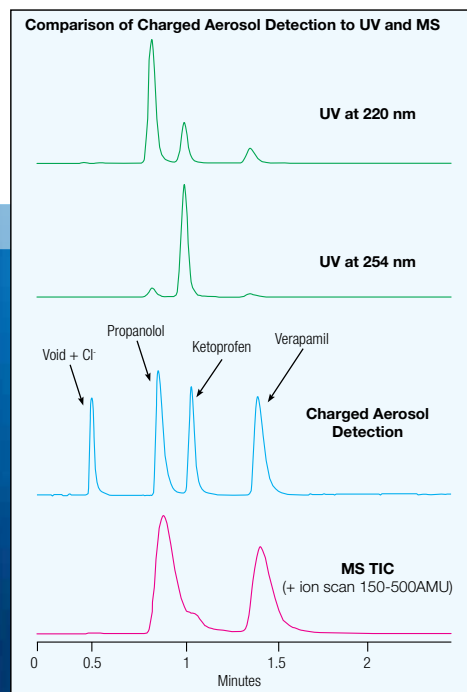
The Corona ultra RS Detector Sees the Complete Picture

The Corona ultra RS detector can be used with the most up-to-date UHPLC technology to measure analytes that cannot be seen by UV and may not be readily detected by mass spectrometry.

With the flexibility and performance for analytical R&D, and the simplicity and reproducibility needed for manufacturing QC/QA, the Corona ultra RS detector can be used for the analysis of pharmaceuticals (large and small molecule), biofuels, foods and beverages, specialty chemicals, and counterions. The detector can also be used in a range of applications from basic research to quality control.

Corona ultra RS Detector Benefits

- Consistent response independent of chemical structure
- Compatibility with UHPLC
- Simple and easy to use



Charged Aerosol Detection

What makes any detector useful is its ability to accurately measure a wide range of analytes with consistent response. However, most detectors exhibit limitations. Often, one analyte responds more strongly than another, or may not respond at all.

The Corona ultra RS detector measures charge that is imparted to analyte particles, with the charge being in direct proportion to the amount of the analyte in the sample. Measuring this charge is

accurate and consistent, regardless of the analyte. The result is that the detector can quantify any nonvolatile analyte—this includes those without chromophores or those that cannot ionize—thus providing a consistent response that is independent of chemical structure. With charged aerosol detection, you can even measure many semivolatile analytes.

Simplicity in Operation

Step One

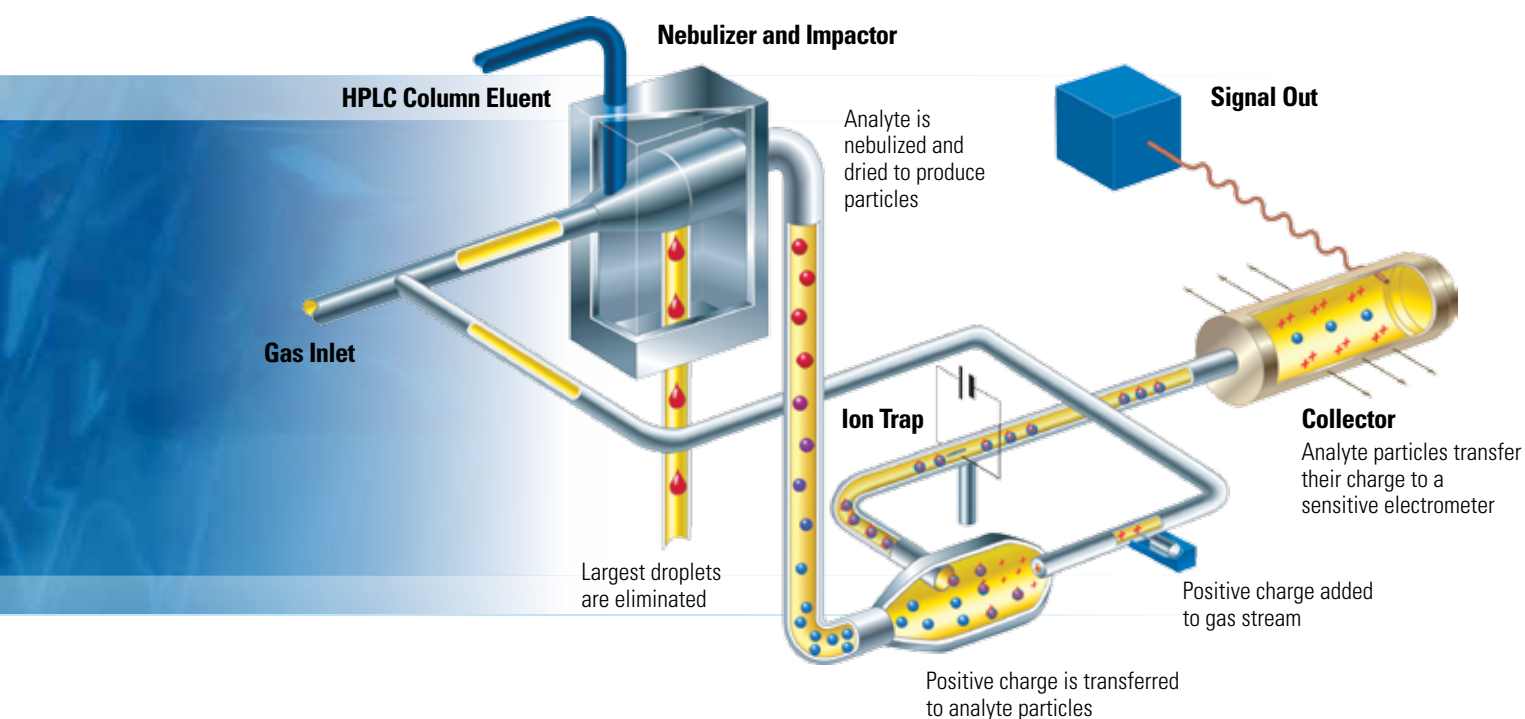
Charged aerosol detection begins by nebulizing the eluent into droplets, which are subsequently dried into particles. The particle size increases with the amount of analyte.

Step Two

A stream of positively charged gas collides with the analyte particles. The charge is then transferred to the particles—the larger the particles, the greater the charge.

Step Three

The particles are transferred to a collector where the charge is measured by a highly sensitive electrometer. This generates a signal in direct proportion to the quantity of analyte present.



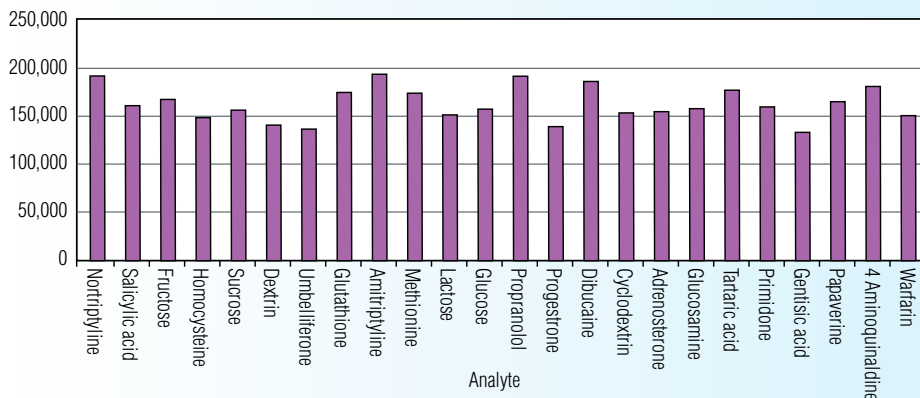
Consistent response and a wide dynamic range

Consistent Response

The magnitude of response obtained for nonvolatile analytes using charged aerosol detection is independent of chemical structure. This is demonstrated in the figure to the right, where response by flow injection analysis is very similar for equivalent amounts of a wide variety of analytes. The detector response does not depend on analyte optical properties as with ultraviolet (UV) absorbance, or the ability to ionize as with mass spectrometry (MS). This is critical for studies dependent on mass balance assessment or where UV response varies greatly. The response with charged aerosol detection is predictable.

Detector Response for Nonvolatiles

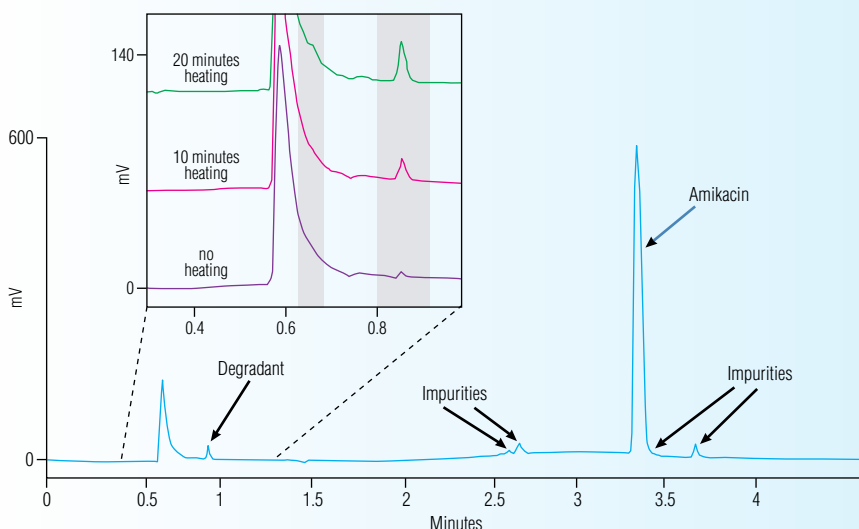
10.7% RSD variation in CAD response among 1.0 µg samples by flow injection



Wide Dynamic Range

The Corona ultra RS detector is unique among universal detectors in that it allows quantitation across a range that exceeds four orders of magnitude. This wide dynamic range provides significant advantages for the simultaneous measurement of an analyte and low-level impurities in a single run. In the forced degradation example shown below, trace levels of degradant are found at the 0.19% level—well above the limit of detection. The wide dynamic range means that the low-level impurity and the active pharmaceutical ingredient (API) can be measured in the same run. With response independent of structure, relative levels can be assessed even without knowing the identity of the peak.

Forced Degradation



Enhanced performance

Enhanced Sensitivity

The Corona ultra RS detector provides an enhancement in sensitivity when used with UHPLC. Sub-nanogram levels of detection can be readily achieved, but there is more than just greater sensitivity. More importantly, the level of sensitivity is consistent across analyte types.

Complementary to UV and MS Detection

The Corona ultra RS is an ideal primary detector. However, when combined with UV, diode array detection (DAD), or MS, it provides an orthogonal and complementary detection mechanism, allowing you to obtain additional analytical data.

Even More with UHPLC

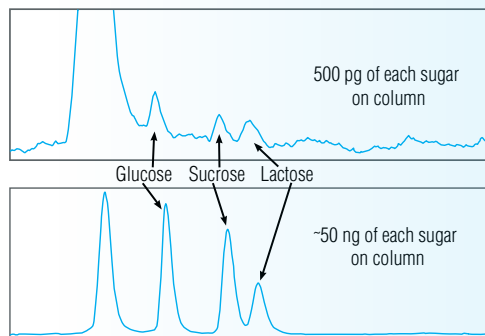
The high acquisition rate and low-peak dispersion of the Corona ultra RS detector allows you to exploit the increased separation speed and resolution of UHPLC, giving results that are 5–10 times faster than standard HPLC.

When used with the Thermo Scientific Dionex UltiMate™ 3000 RSLC x2 Dual System employing inverse gradient capability, relative peak response becomes a practical reality, providing the benefit of consistent response across the entire gradient range. Now, you can determine relative purity or level of degradation even without standards.

The Corona ultra RS detector incorporates capabilities to make applications easier, including:

- An internal valve to send unwanted analytes to waste
- An optional flow splitter for easier interfacing with MS
- A flow diversion system to eliminate waste overfilling
- A unique algorithm for data processing
- All the filter settings of the Corona CAD

Achieving New Levels of Sensitivity



For Ultimate Performance...

Combine the Corona ultra RS with the UltiMate 3000 x2 pump for cost-effective gradient compensation, providing an ideal tool for approximation of relative concentrations when standards are not available.



Intuitive, simple to operate, and easy

Ease of Use

The Corona ultra RS detector is virtually plug-and-play. It uses touchscreen technology that is easy to navigate. There are few parameters to set, and the few options are displayed on a single screen. Instrumental parameters are explained on the screen to allow easy choice of settings. This simple, intuitive operation means the detector can be quickly installed, enabling you to quickly begin generating data.

Diagnostics

A diagnostic screen provides all the information necessary to assure that the detector is working correctly. In addition, values are easy to interpret. This function provides information to help with instrument and method validation and troubleshooting. The detector even prompts you when it is time for preventive maintenance.

Solvent Compatibility and Conservation

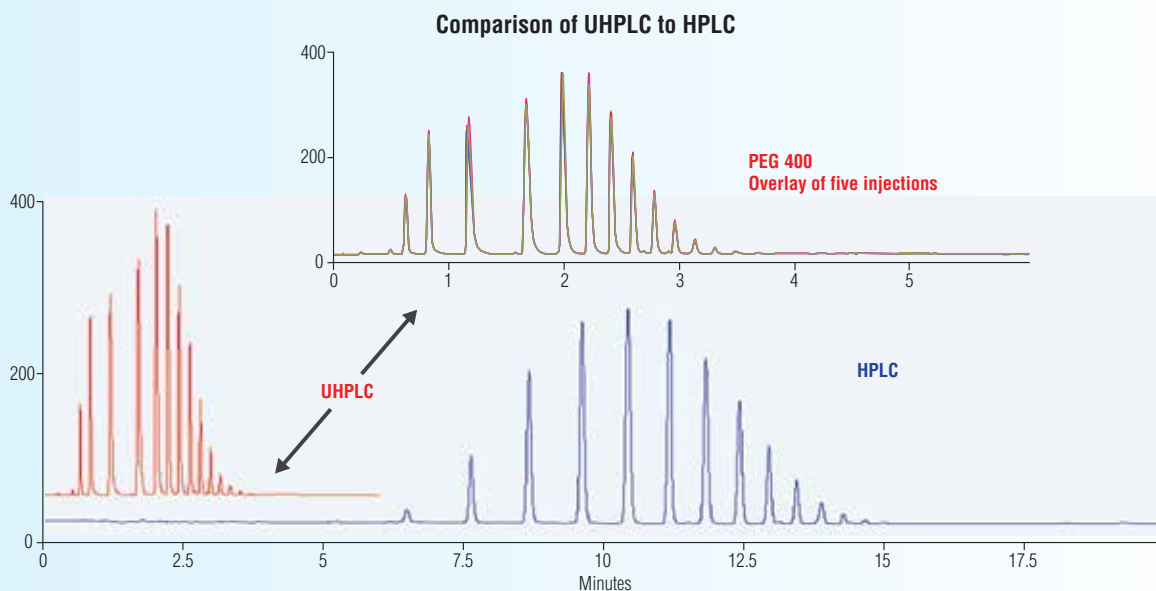
Virtually any volatile solvent can be used with the Corona ultra RS detector without concern for compatibility or UV cutoff. When used with UHPLC, run times can be reduced by a factor of 5–10 times. This saves solvent and reduces waste.



Reproducibility and Reliability

Charged aerosol detection is highly reproducible. The figure below shows the overlay of five runs. The peak shapes and responses are so reproducible that it is difficult to distinguish the individual runs. RSDs of less than 1% are typical.

Data from 150 randomly selected units over a six-month period show an inter-unit variability of approximately 2.5%. This means that you can expect the same results independent of the location of the detector.

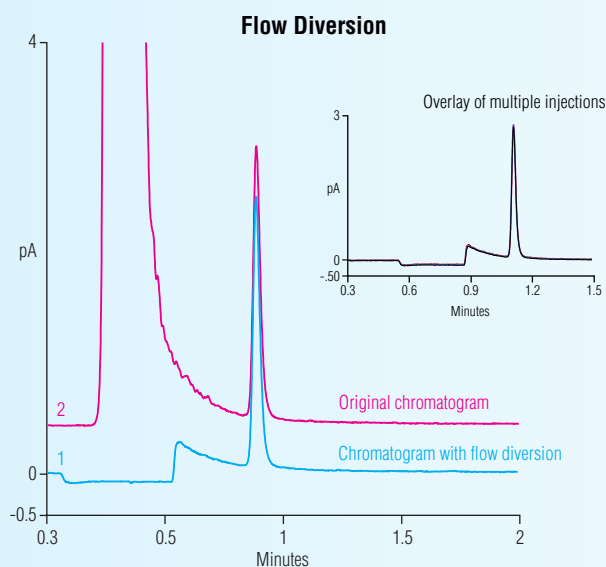


to integrate

Easily Integrates with any HPLC System

The Corona ultra RS detector can be used with any standard HPLC system, but is also ready for UHPLC without any modification.

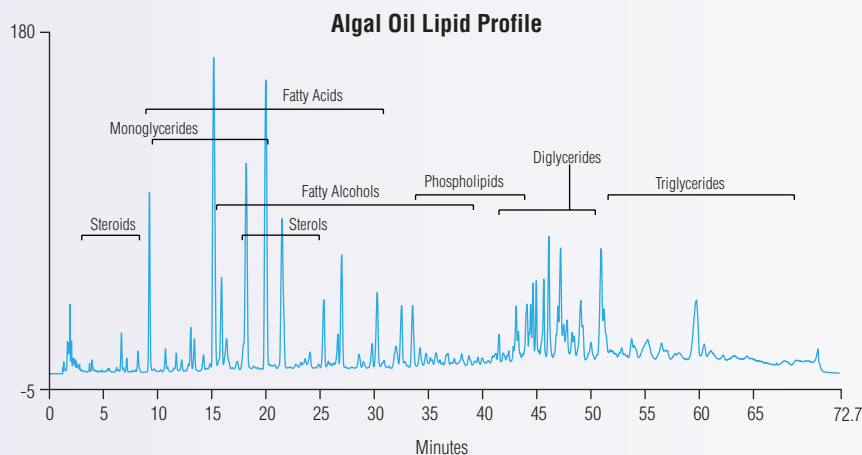
The detector is designed to integrate into any liquid chromatographic system, HPLC or UHPLC, from any manufacturer. Software drivers are available for the Thermo Scientific Dionex Chromeleon™ Chromatography Data System, as well as ChemStation®, EZChrom®, and Empower® software. The stackable design and rugged construction allow it to be placed anywhere in a system. There is no concern about moving or tipping the detector.



Makes Using the System Simple

An on-board switching valve allows flow diversion of high-salt samples during the analysis to simplify the chromatogram. The same valve can be used to divert flow to a different detector without having to disassemble the system. There is nothing to obtain separately, nothing that needs to be installed. It is all built into the detector. An optional variable-ratio flow splitter is available to integrate with MS or other parallel detectors without loss of resolution.

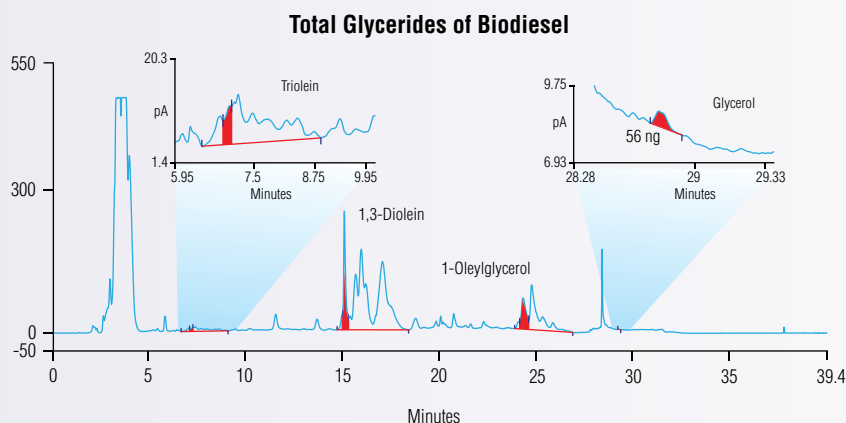
Application solutions



Lipids

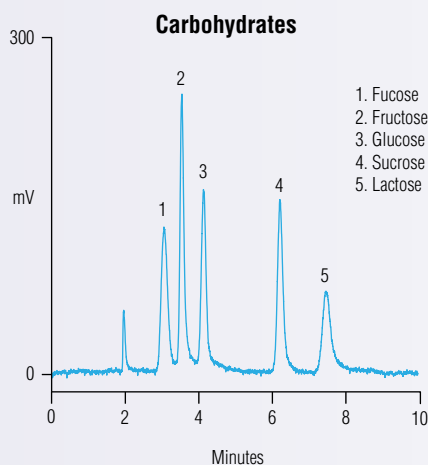
HPLC is a powerful tool for lipid analysis. With UV detection, quantitation is made difficult by differing relative response due to the wide variety of structures. Other universal detectors demonstrate a lack of response consistency making relative quantification difficult. With response independent of chemical structure, charged aerosol detection delivers consistent, predictable results with no optimization.

The same detector can be used to assess purity or to perform in-process quality control of biodiesel.



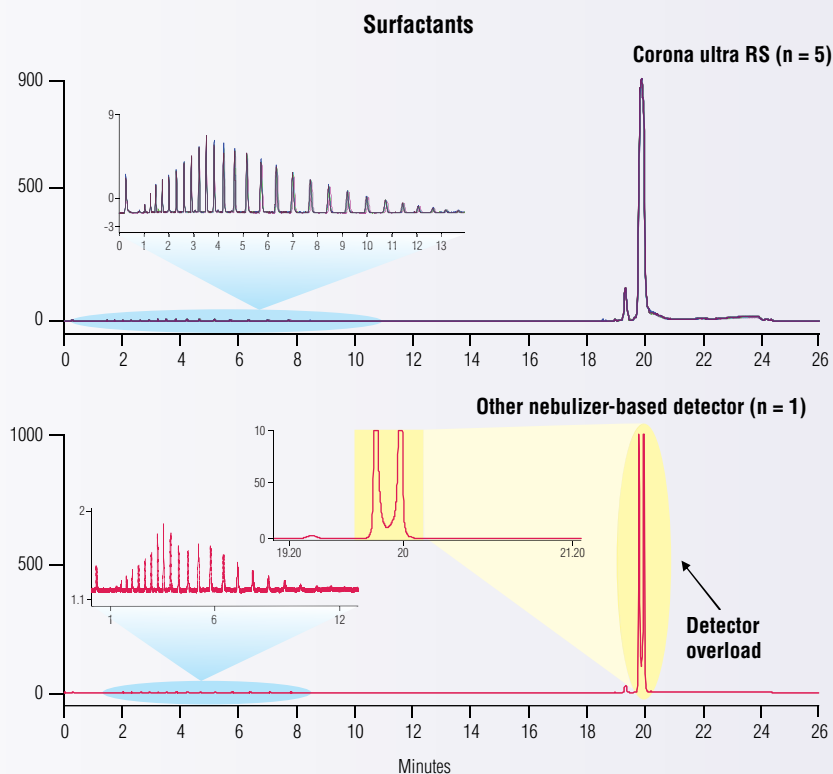
Carbohydrates

Sugar analysis using HPLC is often performed using RI detection. But RI detection is limited by poor sensitivity and the inability to use gradients. The Corona ultra RS provides gradient separations and sensitivity to low ng. It also offers the ability to use reversed-phase and HILIC modes of separation, making it an ideal complement to analysis with HPAE-PAD.



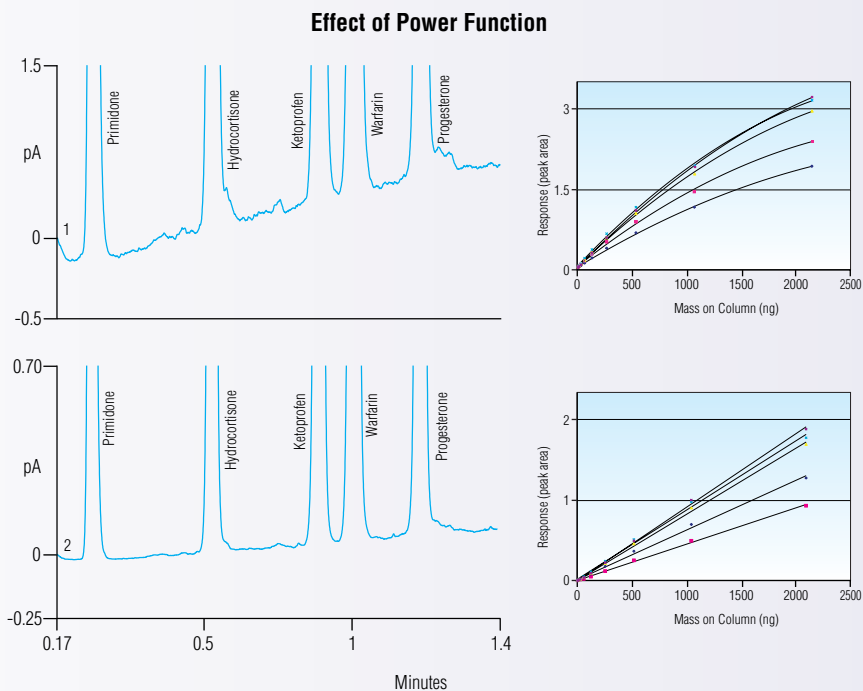
Surfactants

Surfactants such as Triton® X-100, which lacks a chromophore, can be easily measured with the Corona ultra RS detector. Unlike some other universal detectors, the wide dynamic range of charged aerosol detection technology lets you assay a full range of concentrations without overloading the detector.



Unique Data Algorithm

The Corona ultra RS includes firmware to apply a power function to the data output, often decreasing baseline noise and linearizing the data. With a few injections the ideal setting can be determined.



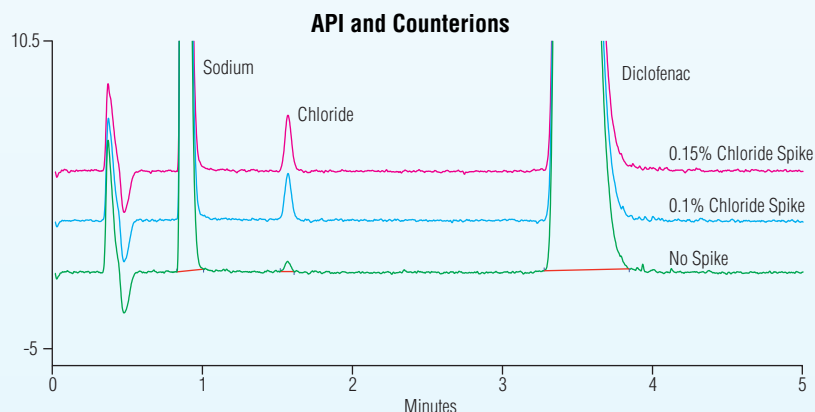
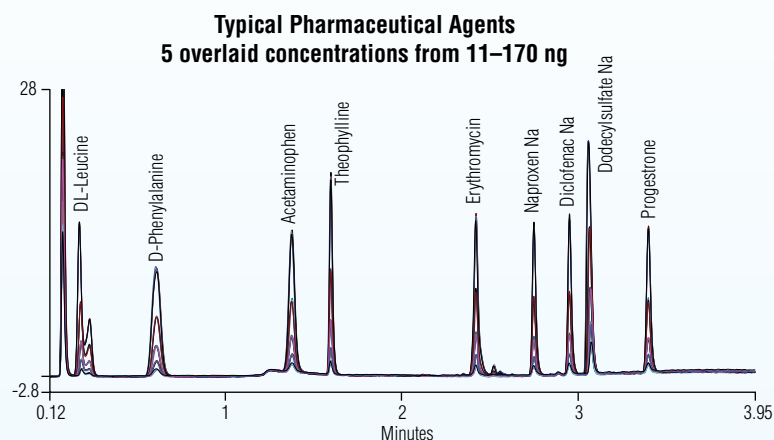
Application solutions

Pharmaceutical Analysis

Product Characterization

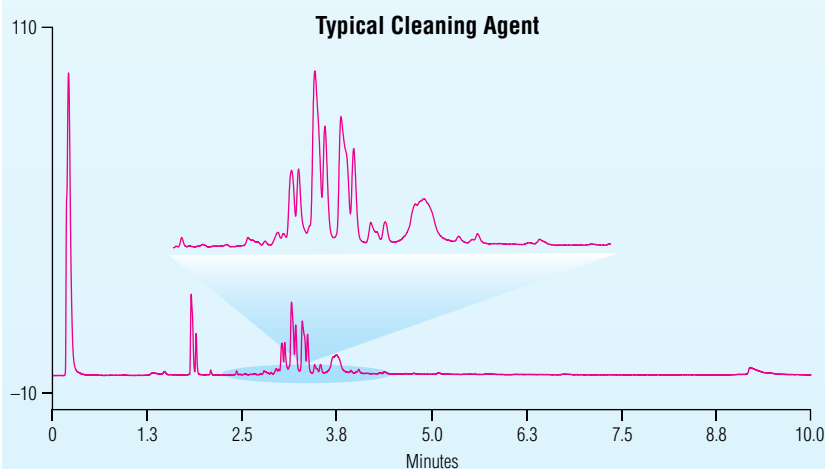
The Corona ultra RS detector makes it easy to determine the concentration and purity of any non- and many semivolatile active pharmaceutical ingredients (APIs) and excipients. With response independent of the chemical nature of the analyte, almost any API or compound used in the formulation can be measured with predictable response.

Using the unique Thermo Scientific Acclaim™ Trinity™ P1 column and the Corona ultra RS detector, the API, counterion, and impurity ions can all be quantified, simultaneously. This speeds up selection of counterions in the development process.

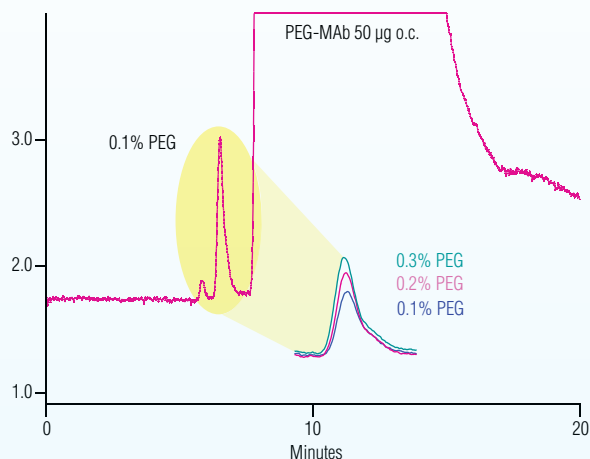


Cleaning Validation

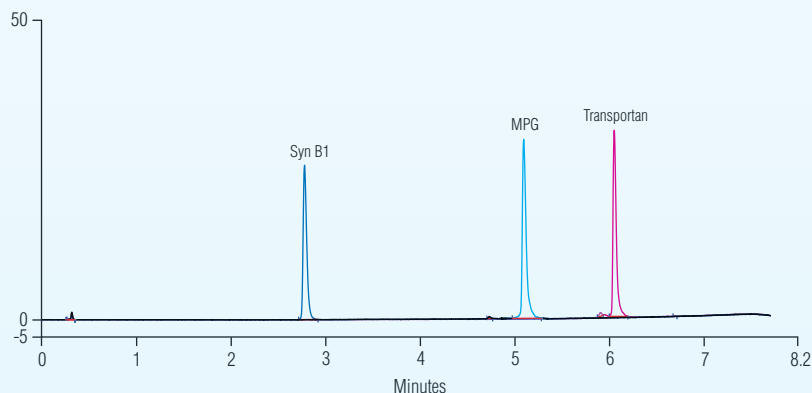
Cleaning validation can be both difficult and time consuming. Using the Corona ultra RS detector, it is possible to measure the API and cleaning agents, either separately or together, as well as estimate their relative amounts. A profile representing the relative amounts of cleaning agent can be generated even without knowing the identity of the components.



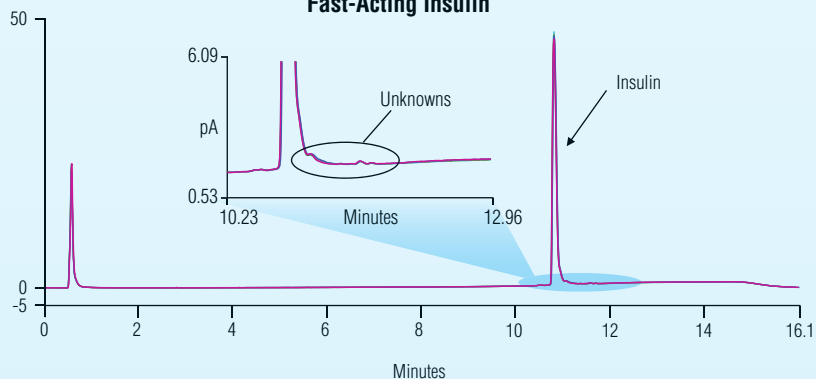
Pegylated Protein



Cationic Cell-Penetrating Peptides



Fast-Acting Insulin



Biopharmaceutical Analysis

Analysis of biopharmaceuticals present new challenges. Complex mixtures of large and small molecules, many without chromophores, can be analyzed using charged aerosol detection.

PEGylated MAb

PEGylation helps the biological stability of therapeutic monoclonal antibodies (MAbs) but measuring the residual PEG can be difficult. With predictable response irrespective of the analyte, charged aerosol detection can be used to measure residual PEG in PEGylated proteins. With its sensitivity and dynamic range, both low levels of the PEG impurity and the high levels of PEGylated protein can be measured together, without the need to reanalyze the sample.

siRNA Delivery Vehicles

The use of siRNA as a therapeutic agent requires optimized delivery vehicles. The detector lets you measure the purity and stability of both lipids and peptides used in these delivery systems.

Final Product Purity

Charged aerosol detection is ideal for peptide and protein analysis. With no restriction on solvents, as with UV, this detector gives you a greater range of selectivity. And you never need worry about acetonitrile shortages again!

From raw material qualification to final product purity of large or small molecules, the Corona ultra RS detector lets you see things as you have never seen them before.

Discover the Corona ultra RS Detector—Giving You More for HPLC and UHPLC

In the world of HPLC/UHPLC, one detection technology stands out. Charged aerosol detection has response independent of analyte structure, provides consistent responses across a range of non- and semivolatile analytes, has a wide dynamic range and broad applicability, and is as easy to use as UV.

The Corona ultra RS detector combines the benefits of charged aerosol detection with the speed and resolution of UHPLC for faster, high-resolution separations while still giving superior performance with HPLC. This detector provides the flexibility and performance for analytical R&D, and the simplicity and reproducibility needed for manufacturing QC/QA. It can be used for almost any analysis in pharmaceuticals (large and small molecule), biofuels, foods and beverages, specialty chemicals, and ions including a wide range of applications—from basic research to quality control. This makes the Corona ultra RS the detector of choice for your application.

www.thermoscientific.com/charged_aerosol

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