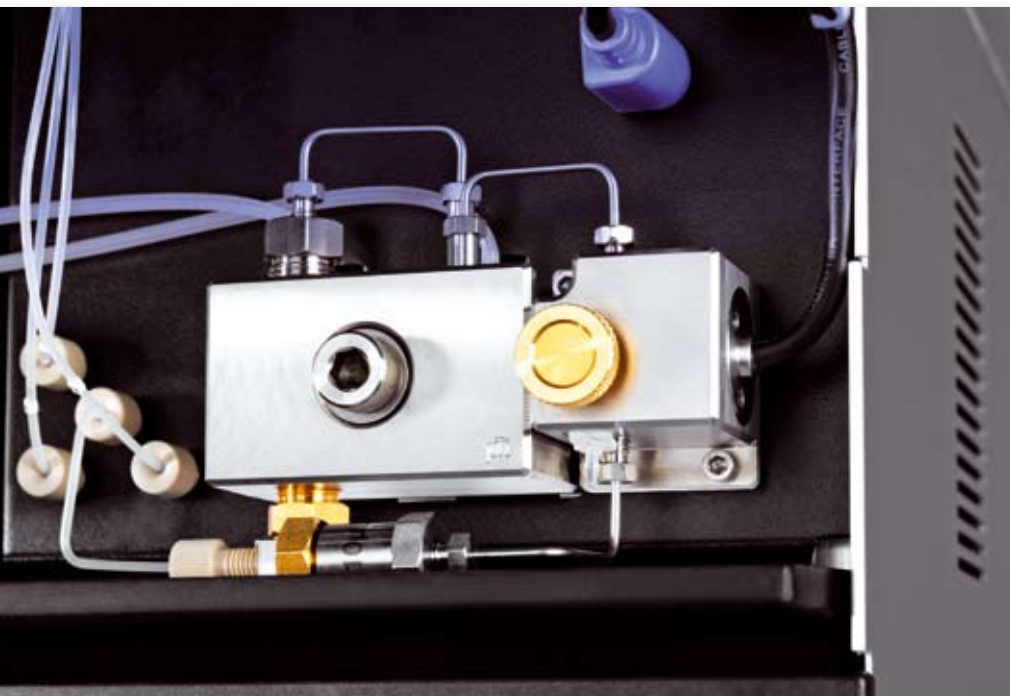


Ultra-High LC Performance for all Users

In all laboratories, and for all analytes



For decades, HPLC has been one of the most important techniques available to analytical chemists. However, despite the maturity of the technique, there continues to be a great deal of scientific research in improving selectivity and efficiency, and in providing the maximum analytical information in the shortest time possible.

Introduction

The introduction of ultrahigh performance liquid chromatography, one of the most important recent developments, is based on the theory that smaller diameters of column packing provide greater separation efficiencies. But, this improvement comes at the cost of increased back pressure that rises at the square of the decrease in particle size. Despite the increased back pressure, the benefits are clear: sub-3 micron particles allow for either shorter analysis times at constant resolution if packed in short columns, or much higher peak capacities in longer columns. Typically, those materials combine a tenfold increase in throughput with a significant reduction in solvent consumption. Until now, the tremendous backpressure due to the small particle sizes demanded expensive, specially designed LC equipment that could handle pressures higher than the conventional 400 bar limitations. This new technology was called Ultra High Performance Liquid Chromatography, or UHPLC. Despite many benefits of UHPLC, a large number of users have been unable to take advantage of this technology because of higher investment costs, ease-of-use concerns, and difficulties associated with the transfer of existing HPLC methods. Dionex recognizes these challenges and has a firm commitment to make UHPLC accessible to all users, all laboratories, and for all analytes. This accessibility is based upon powerful combinations of instru-

ment and software technology and is designed to allow everyone to take full advantage of the UHPLC revolution.

The Instruments

Well-designed instruments are the key to UHPLC because they must be able to handle the higher pressures involved, the lower extra-column volume, and faster data collection rates. At the same time, the instruments need to be able to run existing methods and be flexible enough to meet the budget and application requirements of diverse laboratories. At the HPLC 2010 conference, Dionex introduced a new range of UHPLC+ instruments that meet all these challenges. For laboratories with limited budgets, the new UltiMate 3000 Basic Automated System (BAS) includes all components necessary for fast separations on sub-3 μm particles: binary, quaternary, and dual-gradient pumps delivering flow rates up to 10 mL/min at up to 620 bar; an autosampler with an integrated column oven; and many different detector types with data rates up to 100 Hz. These options ensure full HPLC and UHPLC compatibility.

In addition, a new generation of the UltiMate 3000 standard systems that significantly expands the capabilities of the BAS was also introduced. These standard systems offer e.g. an extended column compartment temperature range from 5 to 80 °C and optional switching valves.

The flagship product is the new high-end UltiMate 3000 RSLC system providing binary, quaternary or dual-gradient pumps with flow rates from 50 $\mu\text{L}/\text{min}$ to 5 mL/min at pressures up to 1000 bar and flow rates from 5 to 8 mL/min at pressures up to 800 bar. The RSLC systems offer the largest flow/pressure footprint on the market today. There are highly flexible liquid handlers with optional integrated fraction collection and automated re-injection, column thermostats for temperatures from 5 to 110 °C, optional switching valves for even the most advanced chromatographic solutions and detection systems with data rates of up to 200 Hz to provide the maximum operational range for today's laboratories. The UltiMate 3000 RSLCnano system with its continuous, direct flow design provides flow rates from 20 nL/min to 50 $\mu\text{L}/\text{min}$ at pressures up to 800 bar, and is the market-leading system of choice for nano and cap LC.

The best separation can be spoiled by insufficient detection capabilities. Dionex offers a great variety of highly versatile, UHPLC-compatible detectors, ranging from different UV/Vis detectors, a powerful and fast fluorescence detector, the Coulochem III Electrochemical Detector and the near universal, fully gradient-compatible Corona ultra Charged Aerosol Detector. This wide portfolio of detectors delivers on Dionex' commitment to make UHPLC accessible for all applications, as it en-

sures that any analyte that is separated can be detected.

In addition, a giant leap forward in the practical use of UHPLC is the unique Viper zero-dead-volume capillary connection system. This uses a new fitting principle which works without ferrules, does not require any tools, and prevents leakages and dead volumes when used at 1000 bar. This design makes UHPLC as easy to use as HPLC, and always ensures best possible chromatographic performance.

Entire Workflows

At the end of the day, it is not only a high-performance UHPLC hardware that makes the difference. A tenfold throughput increase produces 10 times more data, all of which must be analyzed and interpreted. Here, the Chromeleon Chromatography Data System (CDS) software can be used to get the maximum advantage from UHPLC technology. Designed with Operational Simplicity, the Chromeleon software offers intuitive usability together with a long list of features ranging from details like real-time previews of chromatograms in the sequence table to instant data processing and reporting. The new Cobra peak detection algorithm reliably detects peak start and end times, and correctly assigns peak baselines without requiring a long list of detection parameters. For the challenge of unresolved peaks, the unique Smart-Peaks Integration Assistant draws the correct baselines quickly and intuitively. No training is required, so even novices can immediately integrate complex chromatograms correctly and reproducibly. The integrated spreadsheet allows calculation of the even the most complex results, as well as individually designed report layouts and data visualization.

The Chromeleon eWorkflow framework provides an easy way to automate all chromatography analyses by combining all steps from sequence set-up to the final report in one single process. Using only five mouse clicks, the user can set up a complete sequence table including all required instrument methods, data processing parameters, and reporting templates, thus ensuring the shortest possible time between receiving the sample for analysis and generating the final result.

Online Library of Ready-to-Use Applications

Finally, the last piece in the UHPLC⁺ solution is a web-based application search engine, the D-Library (<http://dlibrary.dionex.com>). The D-Library provides a large collection of ready-to-use applications including all required method parameters. This freely accessible database can be searched with any web browser, and with a few mouse clicks all electronic data for the analysis including instrument, processing, and report methods can be downloaded directly into the Chromeleon software thus making the use of

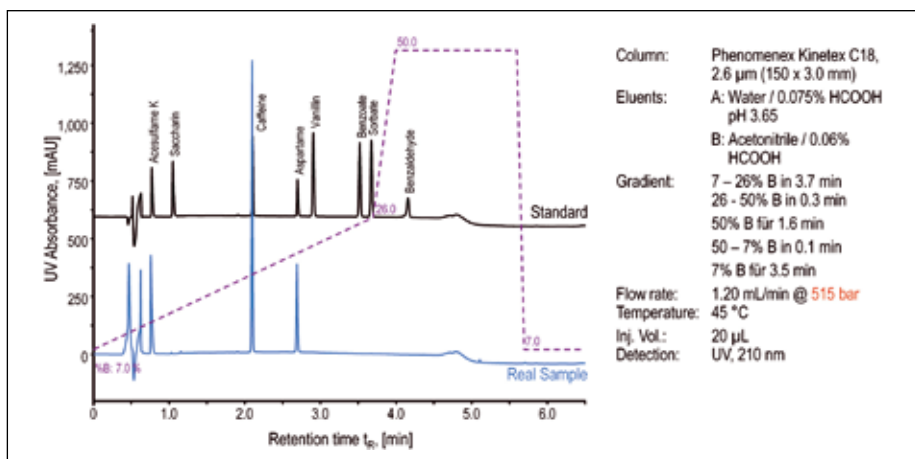


Fig. 1: Fast: Even the entry level UltiMate 3000 System enables UHPLC separations, as shown here with the analysis of soft drink additives in less than 6 min.

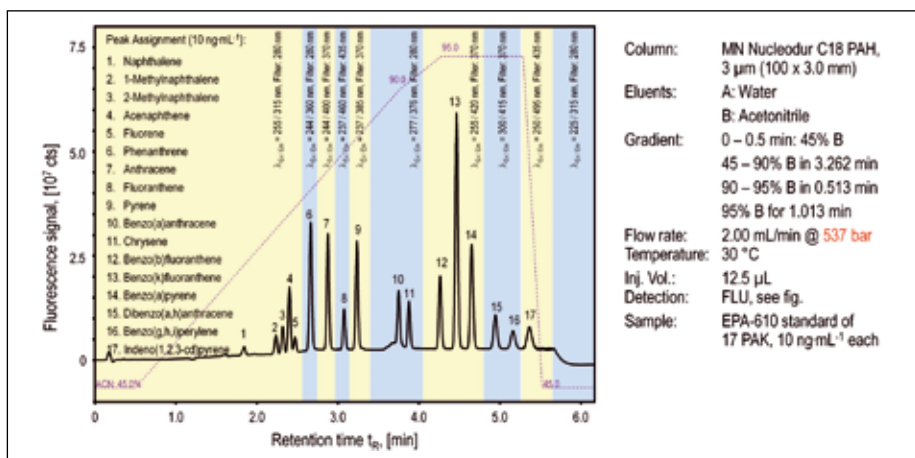


Fig. 2: Faster: Separation of 17 polyaromatic hydrocarbons (PAH) in less than 6 min with high-speed and ultra-sensitive fluorescence detection at ppb level with the new UltiMate 3000 Standard System.

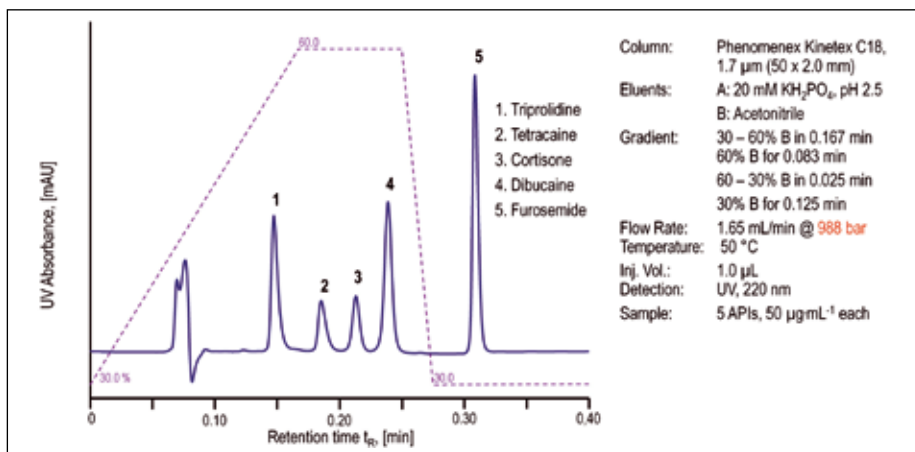


Fig. 3: Ultrafast: UHPLC of five pharmaceuticals – Routine analysis in seconds with the new UltiMate 3000 RSLC

UHPLC technology as quick and easy as a music download.

Conclusion

The UHPLC⁺ product range meets the goal of making UHPLC accessible to all users, all laboratories, and for all analytes by fusing well designed high-quality instruments with intelligent and easy-to-use software as well as innovative technologies such as the Viper zero-dead-volume capillary con-

nection. Dionex ensures that anyone can immediately take full advantage of the benefits of UHPLC.

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