Development of UHPLC

Our Performance-oriented World

Ideal Ultra High Performance Liquid Chromatograph Pursued by Everyone

The development of Hitachi's first UHPLC began in 2010. In the field of UHPLC, Hitachi High-Technologies Corporation was the last to start the development. However, we, counting in the company's history as Hitachi, Ltd., have over half a century's worth of achievements and experiences in the field of HPLC.
With the generous applications of technologies and know-hows the company can offer, Hitachi Ultra High Performance Liquid Chromatograph "ChromasterUltra Rs" was perfected and launched into the market.
ChromasterUltra Rs is filled with the wisdoms and experiences that only engineers can provide and invites you to the profound world of the UHPLC development.

Vol.2

i n t e r v i e w

Everyone Does One's Best.

Importance of Teamwork

Each member of the analytical system design department composing the UHPLC team has superior talent and is rich in originality. Ito, the supervisor of the design site, ensured to exert the best of the members" abilities for the design objectives laid out by Kawarai. Therefore, Ito quite often remained as a listener. Then, whenever the development was lead to a dead end or the required performance could not be achieved, he would come up with different questions.

"People always focuses only on the speed of UHPLC, however, I pressed that we should focus on the resolution performance. If it is possible to separate one impurity peak which has not been observed before by one analysis run, the analysis time can be shortened. I thought by pursuing the high resolution, the sensitivity and speed could be inevitably achieved," says Ito.

However, it was not an easy task. For example, the discharge pressure could be smoothly increased from 60 MPa to 80 MPa, but the pressure control became suddenly difficult once it exceeded 100 MPa. The development target of 140 MPa seemed unachievable. All team members immediately started reviewing the flow system and other part materials.

For the easier understanding, 140 MPa can be expressed as the water pressure at 14,000 meters below sea level. To achieve the highest maximum pressure which no one has experienced, the engineers in the related departments also repeated the process of trial and error. As a result, we decided to use metallic materials and review the machining accuracy. Pursuing the high resolution may seem a roundabout approach, however, by exerting the best of the team's abilities, the UHPLC equipped with ingenious functions that had not been seen in the past was developed.

Optical Instruments Engineering Department
Senior Engineer

Masahito Ito

Ito's university major was physics and he studied about elementary particles and cosmology. He was suddenly driven by his desire "to work in a biotechnology related field" and joined Hitachi, Ltd., which was famous for its world's top-class amino acid analyzers in the market share.
He still loves reading the books by Einstein.

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ChromasterUltra Rs, an ultra high performance liquid chromatograph, provides the ultimate in high performance, high resolution, and high sensitivity analysis that are becoming requirements for research and development in pharmaceutical and chemical fields.
Hitachi UHPLC supports cutting edge studies including the high resolution analysis of chemically-similar substances and impurities in synthetic compounds and the high sensitivity detection of impurities such as harmful substances that are becoming increasingly relevant in our daily lives.

Ultra High-Speed Analysis

- World's highest range of the pressure resistance, which is 140 MPa*1, not only supports high-speed analysis but also gives selectivity of mobile phase which likely causes of higher pressure. This delivers more variety of analysis.

High Resolution Analysis

- The newly developed high resolution column (LaChromUltra Ⅱ C18 (1.9 μm), 250 mm), has a high number of theoretical plates (50,000), and high pressure resistance, taking ultra high resolution analysis to the next level.
- A newly designed 6170 Binary Pump with independent variable stroke plungers ensures solvent delivery with higher mixing performance and stability as it employs the low-volume double corkscrew mixer in addition to its unique LBT*2 control.
- The standard installation of the 6430 Diode Array Detector includes a total reflection type capillary flow cell unit (optical path length: 10 mm). The excellent control of the extra-column dispersion contributes to higher resolution analysis.

High Sensitivity Analysis

- By using the high sensitivity flow cell unit for 6430 Diode Array Detector (optical path length: 65 mm) (optional), excellent sensitivity can be obtained from the 6430 Diode Array Detector.
- The 6430 Diode Array Detector equipped with a new optical system achieves low noise and low drift which are key to high sensitivity analysis.
- The 6270 Autosampler, which allows a selection of multiple washing modes, is installed with an injection port reverse washing mechanism and can provide the excellent carry-over performance.

∗1 Among models sold in Japan, surveyed by Hitachi High-Technologies as of July 2013
∗2 LBT：Liquid Beat Technology

ChromasterUltraRS

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