Performance PerSPECtives

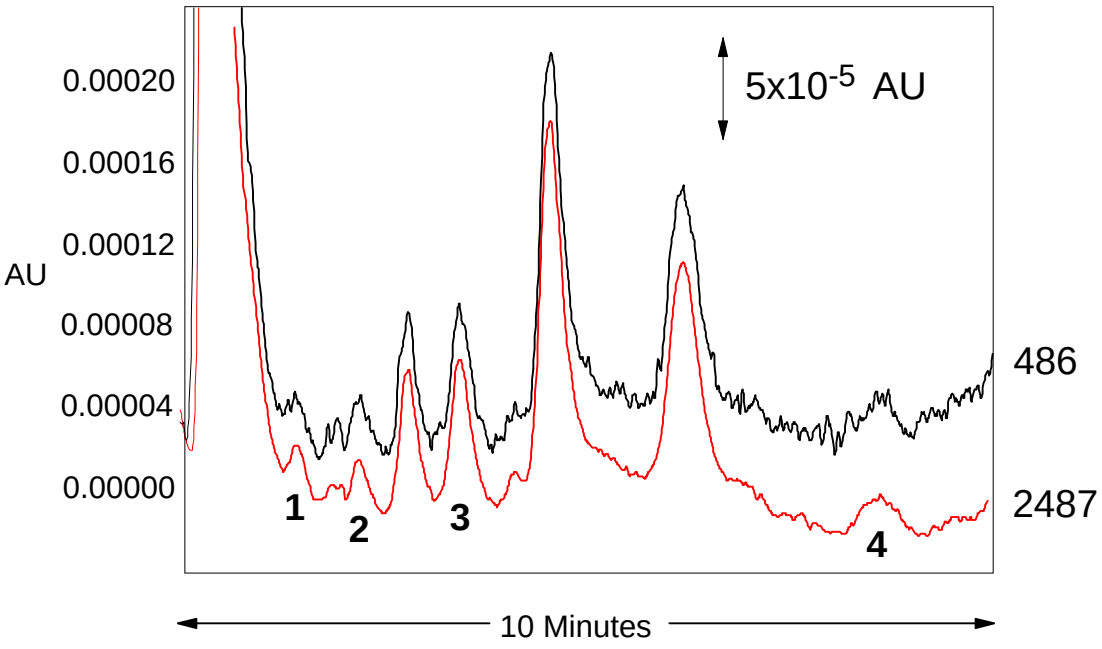
Waters® 2487 Dual λ Absorbance Detector

TaperSlit™ Flow Cell Advantages - 2

Improved Sensitivity through Baseline Noise Reduction

The Waters 2487 Dual λ Absorbance Detector contains the unique TaperSlit™ flow cell (patent applied for). The flow cell was designed to improve sensitivity by reduction of baseline noise while providing good linearity (WPP28). Figure 1 is an overlay of a portion of a chromatographic separation detected on the Waters 486 Tunable UV/Vis detector (upper) and the new Waters 2487 detector (lower). Details of the chromatographic conditions for this customer sample can not be disclosed. It was a reverse phase separation monitored at 245 nm.

Figure 1



Sensitivity is defined as signal (peak height) to baseline noise ratio. A more complete definition of sensitivity can be found in Performance Perspective WPP01. The Waters 2487 detector has a significant increase in sensitivity because of the reduction in baseline noise. As can be seen in Figure 1, the baseline noise during actual chromatographic conditions is very similar to the noise specification (±0.75 x 10^{-5} AU at 254 nm). This lowers the limit of detection (LOD) so that peaks 1, 2. and 4 can be distinguished from the baseline noise. Peak 3 (about 6 x 10^{-5} AU high) can more easily be quantitated.

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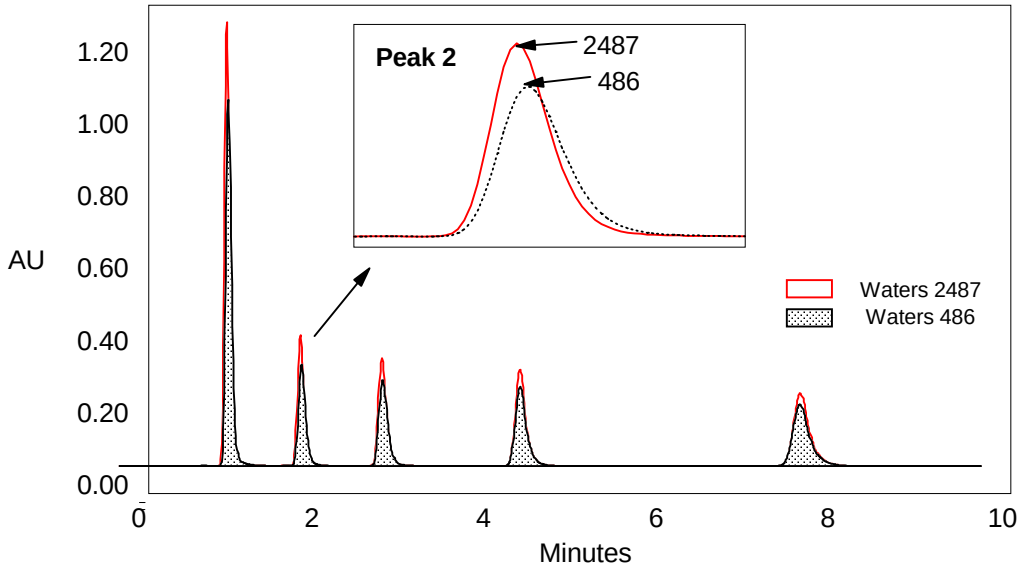
The Waters 2487 detector also has **Lamp Optimization software** which monitors the deuterium lamp energy on power-up and then optimizes the detector lamp to minimize baseline noise. This function assures consistent baseline noise performance for the life of the lamp.

Improved Sensitivity - Better Peak Shape

The detector flow cell geometry, the cell volume and the tubing connections, all contribute to the peak shape. The TaperSlit™ flow cell was designed to minimize peak bandspreading. Evidence of this can be seen in Figure 2*. This is an isocratic separation of acetone, aceto-, propio- and butyrophenone on a Symmetry® C_{18}, 3.9x150mm column. The mobile phase was 60:40 methanol:water at 1 mL/min. An Alliance™ system was used with either the 486 or the new 2487 UV/vis detector. The same injection volume of the same sample mixture was analyzed.

Figure 2



The shaded chromatogram was monitored on the Waters 486 detector. The second chromatogram with the higher peaks were monitored on the Waters 2487 detector. The insert figure is an enlargement of the peak #2 to show both the relative peak heights and shapes.

The Waters 2487 detector produced greater peak heights, narrower peaks, and less peak tailing. Each of these improvements may seem small. However, when considered collectively, they contribute to greater sensitivity by increasing peak height (signal).

Both increased peak height and decreased baseline noise achieve very high sensitivity without sacrificing linear dynamic range of 2.5 AU. The 2487 provides the capabilities of monitoring a high concentration of analyte and low level impurities in a single chromatographic run without compromising linearity or sensitivity.

*Data for Figure 2 supplied by D. Trinite, Waters

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