

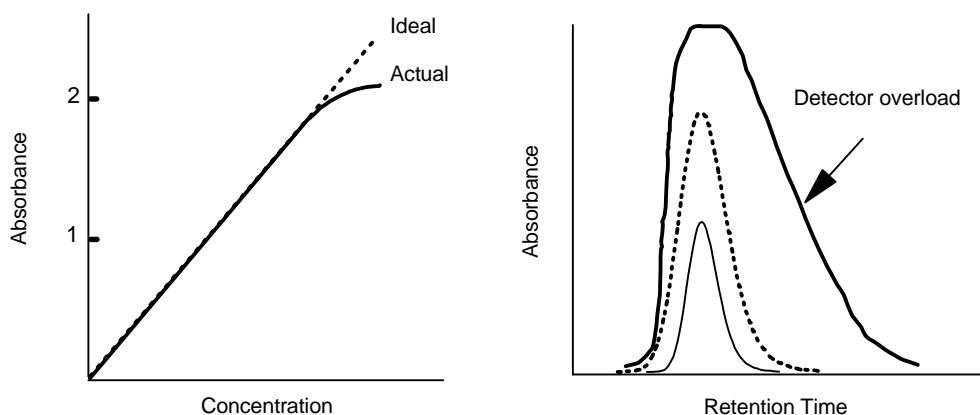
Waters 996 PDA Variable Pathlength Flow Cell: Preparative HPLC

What does a variable pathlength flow cell mean to PDA detection?

Photodiode array detectors (PDA) are UV/visible detectors. According to Beer's Law the absorbance is proportional to the concentration of the sample and the pathlength of the flow cell.

$$A = \epsilon C L$$

where A = absorbance, ϵ = molar absorptivity coefficient, C = concentration, L = pathlength

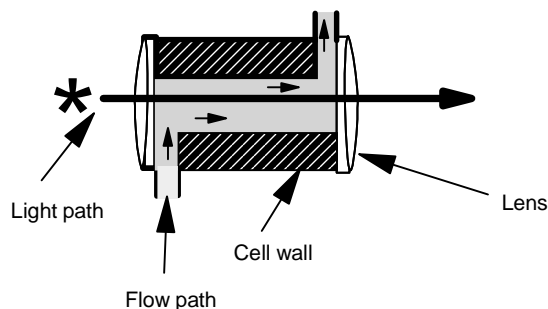


At very high concentrations of analyte, the linear range of the detector will be exceeded so that there is little or no increase in absorbance with increase in concentration. This typically happens between 1.5 and 2 AU with HPLC UV/Vis detectors. The left panel shows the ideal and actual performance of a detector. In preparative chromatography high absorbances are frequently encountered because large sample loads are typically used. The three peaks in the diagram in the right panel illustrate two peaks within the detector linear range and one which overloaded the detector. Peaks from an overloaded detector appear skewed as seen here.

One way to overcome this detector overload in preparative chromatography is to reduce the detector response by decreasing the length of the flow cell. The standard Waters 996 flow cell is the Taper Beam™ cell with a 10 mm pathlength for maximum detector sensitivity. A 3 mm prep cell is available which extends the range by 3.3X. In some cases, even a greater working range is desired. The 996 PDA Variable Pathlength Flow Cell is designed to meet that need.

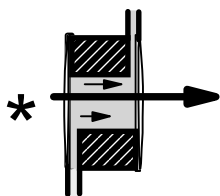
Waters 996 PDA Flow Cells - 10 mm, 3 mm and Variable Pathlength Flow Cell

TaperBeam™
10 mm Flow Cell



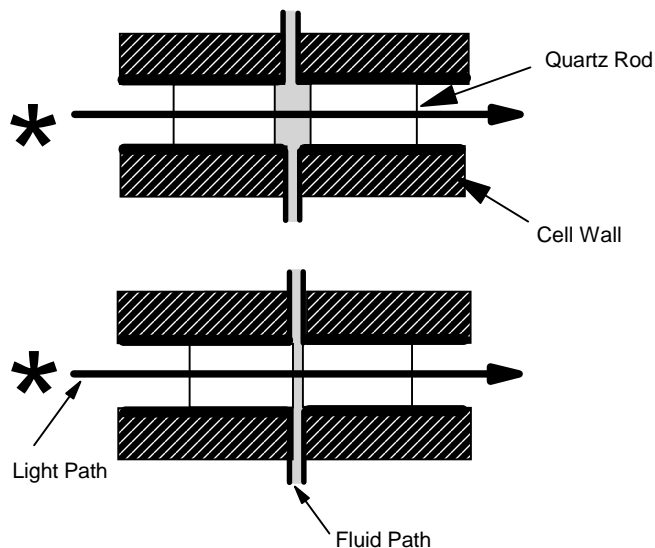
Waters TaperBeam Flow Cell is the standard flow cell for the 996 PDA. It was designed for maximum sensitivity with focusing lenses and a 10 mm pathlength.

996 Prep Cell, 3 mm



Waters Prep Cell has a 3 mm pathlength. The provides 3.3X greater linear range over the standard 10 mm cell.

Variable Pathlength
Flow Cell, 0.15 to 3 mm



The Waters 996 PDA Variable Pathlength flow cell provides flexibility in the detection range. With 0.15 mm pathlength, the Waters 996 PDA detector has a range 66X greater than with the 10 mm standard cell.

The pathlength is changed by moving the quartz rods which are the windows of the flow cell. The rods are mounted on a screw mechanism where a 360 degrees turn equals 0.5 mm change in pathlength. The flow cell is rated to 1000 psi backpressure, allowing flow rates of hundreds of mL per minute.

This flow cell provides spectral analyses and quantitation in preparative chromatography. (See Performance PerSPECTives WPP21)