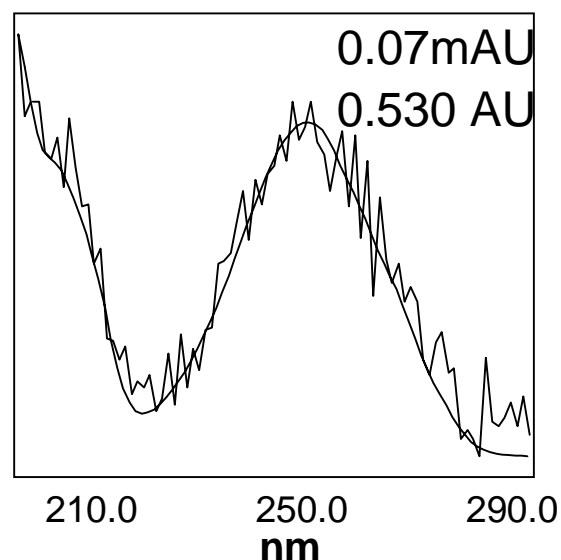
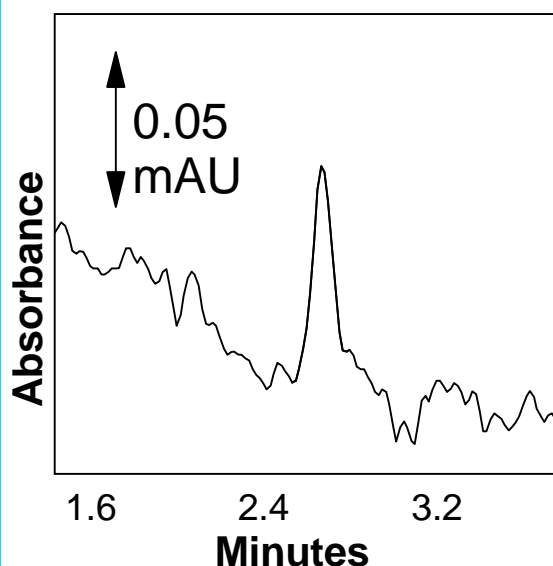


Waters 996 Photodiode Array Detector Sensitivity

A photodiode array detector that can be used for both detection and identification of compounds when high sensitivity is required.



A common perception about photodiode array detectors is that they are not as sensitive as tunable, single wavelength UV/Visible detectors because there is too much baseline noise. With a peak height of 7×10^{-5} AU, the figure on the left indicates the Waters 996 PDA Detector has the chromatographic sensitivity equivalent to single wavelength detectors. However, with a PDA the analyst also wants spectral information. PDA detectors should be able to provide this spectral information from the small, as well as the large peaks. The figure on the right shows the low level spectrum of ethylparaben at 7×10^{-5} AU (noisy trace) overlaid on a spectrum of 0.53 AU which represents a more concentrated injection.

System:	Waters 616LC Solvent Delivery
Autosampler:	Waters 717 Plus
Columns:	Waters Nova-Pak C18 3.9x75mm
Mobile Phase:	30:70 Acetonitrile:Water
Detector:	Waters 996 Photodiode Array
Wavelengths:	200-350 nm, monitored 257 nm
Resolution:	1.2 nm
Filter:	1 sec
Sample:	5 mL of 0.15 ng/mL ethylparaben

★ PDA Detector Sensitivity

Detector sensitivity determines the limits of detection and quantitation. Sensitivity can be defined as signal-to-noise (S/N) ratio, the peak height to the baseline noise. The higher the S/N ratio, the greater the sensitivity.

The S/N ratio can be increased by increasing the signal. Factors which increase the signal include:

1. Increased sample concentration
2. Increased injection volume
3. Longer flow cell path length
4. Smaller flow cell volume
5. Wavelength selection

The S/N ratio can be increased by decreasing the noise. Factors which decrease noise include:

1. Lamp optimization
2. Flow cell design
3. Transparent mobile phases
4. Detector electronics
5. Shorter flow cell path length

★ Waters 996 Photodiode Array Detector

The Waters 996 Detector provides chromatographic sensitivity equivalent to variable wavelength UV/Visible detectors while also providing exceptional spectral sensitivity. This is achieved through optics bench design and software.

The Waters 996 Detector optics bench contains a 10 mm, 8 uL Taperbeam flow cell which reduces baseline noise while maximizing the response with a long pathlength and a small cell volume. The use of elliptical mirrors increases light transmission giving noise performance of $\pm 1.5 \times 10^{-5}$ AU with a slit that is optimized for 1.2 nm optical resolution.

As a deuterium lamp ages, baseline noise increases as a result of decreased lamp energy. The Lamp Optimization software feature for the Waters 996 PDA detector adjusts the exposure time every run to compensate for any changes in lamp energy, mobile phase and the wavelength range. Thus, the signal-to-noise performance is constant for the life of the lamp.

The Waters 996 Detector is the only "No Compromise" photodiode array detector available today with excellent sensitivity, linearity, optical and chromatographic resolution.