Performance PerSPECtives

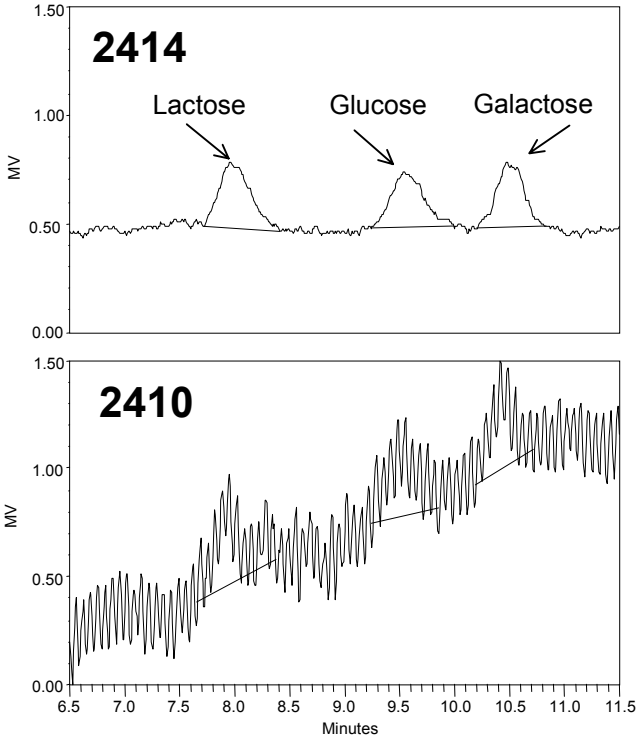
# Waters® 2414 Differential Refractive Index Detector: **Enhanced Sensitivity and Stability by Design**

The new Waters 2414 Differential Refractive Index Detector offers the superior sensitivity and stability required for optimal RI detection.

**Increased Detector Sensitivity:** In RI detectors, sensitivity is often described by referring to the noise specification of the detector. Because detector noise is influenced by many factors (mobile phase and sample composition, smoothness of eluent flow, stability of eluent temperature, etc.) evaluation of chromatographic sensitivity by comparing the signal to noise ratio (S/N) of the resolved peaks provides a better representation of detector, and total system performance.

Figure 1 and Table 1 compares results obtained from the analysis of very low concentrations of three carbohydrates (10 ng on column of Lactose, Glucose, and Galactose) on the Waters 2414 vs. Waters 2410 RI detector. The superior performance of Waters 2414, due primarily to reduced detector noise, is attributed to the advanced technology contained in this next generation product. This allows for lower limits of detection and quantitation on methods developed with Waters 2414 RI detector. In addition, the ability of a chromatography data system to reliably detect and integrate the HPLC separated peaks is improved with lower noise. This yields reproducible results and a higher level of confidence in the reported chromatographic data.

Figure 1: HPLC of carbohydrates using Waters 2414 vs. 2410 RI detector




| | |
|---|---|
| System | Alliance® 2695 |
| Detector | 2414 or 2410 |
| Sensitivity | 128 |
| Det. Temp. | 50°C |
| Coulmn | Sugar-Pak™ I (p/n WAT085188) |
| Col. Temp. | 90°C |
| Mobil Phase | Water + 50 ppm Ca-EDTA |
| Flow Rate | 0.50 mL/minute |
| Inj. Vol | 10 µL |
| Sample | 1 ng/µL each Lactose, Glucose, and Galatose in water |

**Table 1 – Calculated S/N Ratios**

| | 2414 | 2410 |
|---|---|---|
| 10 ng Lactose | 6.9 | 1.8 |
| 10 ng Glucose | 6.2 | 1.5 |
| 10 ng Galactose | 7.3 | 1.4 |

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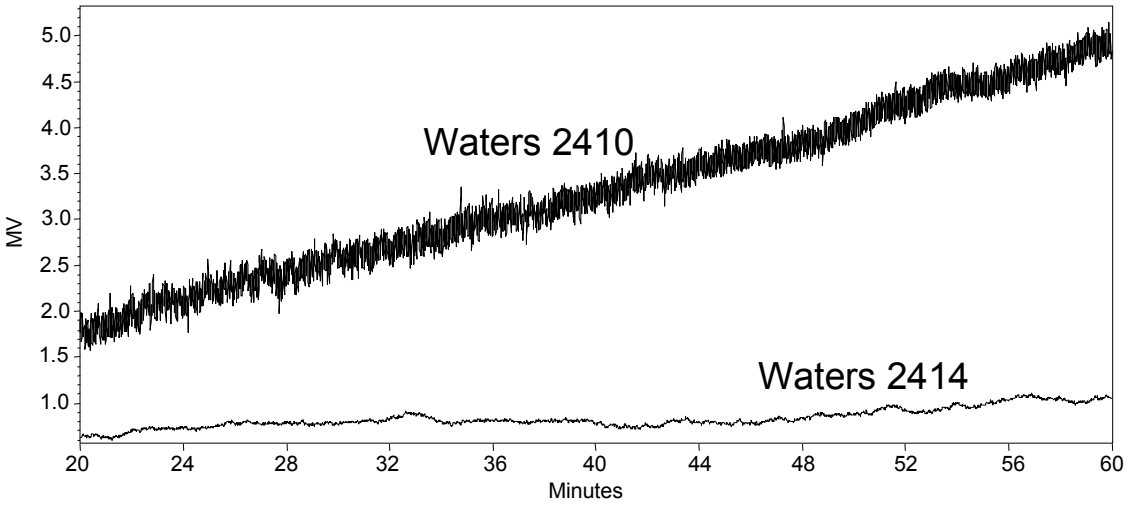
**Improved Baseline Stability:** Measurement of refractive index detector stability is measured by evaluating detector signal drift. Drift is simply the tendency of the detector baseline to rise or fall over a defined period of time. Detector drift is significantly influenced by variations in eluent temperature during an analysis. To minimize baseline drift, the Waters 2414 uses a unique polymeric insulated oven, conductive heating design, and novel fluidics to control eluent temperature stability within the detector housing. Figure 2 compares the noise and baseline drift characteristics obtained on Waters 2414 vs. 2410 RI detector using conditions listed in Figure 1. Again, the superior performance of Waters 2414 RI detector enhances the ability to obtain consistent and reproducible results regardless of the application.

Figure 2. Baseline Drift Comparison on Waters 2410 vs. 2414 RI Detectors




**Extend Column Life:** Lower detector noise also allows analysts to inject smaller sample volumes and still achieve high S/N values necessary for reliable detection and quantitation. Smaller sample volumes can increase column life by reducing the amount of contaminate material introduced onto a GPC or HPLC column.

**Summary:**

- Next generation technology contained in Waters 2414 Differential Refractive Index Detector reduces detector baseline noise and drift compared to traditional products.
- The ability to obtain lower limits of detection and quantitation, when methods are developed and run using the Waters 2414 RI detector, are now possible.
- Lower detector noise also allows analysts to inject less sample for an analysis. This can increase column life by reducing the amount of contaminate material introduced onto the HPLC or GPC column.
- Waters 2414 RI detector is designed to provide superior detection for a wide variety of application including high performance liquid chromatography (HPLC) and gel permeation chromatography (GPC).