

## The Waters™ 410 - Benefits with High Sample Concentrations

The noise level of the Waters 410 Differential Refractometer has been measured in our laboratory, and is approximately 50 times lower than that of the R401. Low noise of the 410 permits analysis at much lower sample concentration than possible before. The benefit of the extended linearity at high sample concentration, however, is easily overlooked.

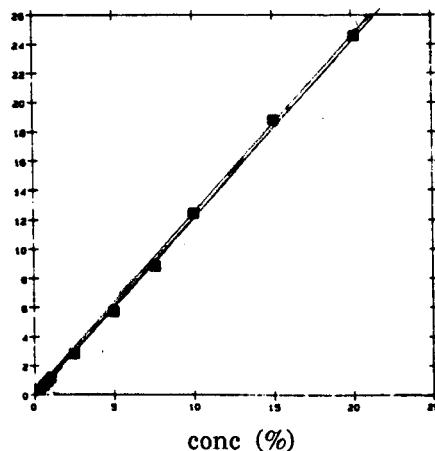
There are, in fact, applications where the desired analyte is present in high concentration. Sugar cane juice, for instance, contains approximately 15% sucrose. Sugar mill operators demand quantitation of the sucrose in the juice without dilution, so as to eliminate a potential source of operator error.

To test the linearity of the 410 detector for column chromatography with concentrated samples, a series of sucrose solutions ranging from 0.1% to 20% were prepared. The detector sensitivity was set at 2, and an M740 Data Module was used to integrate the areas of the peaks obtained by making 20 $\mu$ L injections of the sucrose solutions into a Sugar-Pak™ I Column operated with column temp. 90°C, flow 0.5 mL/min, and mobile phase 50 mg/L calcium disodium EDTA in water. The results are plotted in Figure 1. It may be seen that the detector is quite linear over this concentration range. There is, however, evidence of column overload at the higher concentrations (peak height measurements become non-linear), and a calibration based on a smaller injection volume (10 $\mu$ L) is recommended for sugar concentrations of 10% or more.

In contrast, the R401 Differential Refractometer is linear only to sucrose concentration of ca. 0.75% under the above conditions (a full scale peak at 32X attenuation). The 410 thus gives superior performance at high as well as low analyte concentrations.

Figure 1

Area x 10<sup>-6</sup>



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