



## **Knitted Delay Tubes Decrease Peak Broadening**

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### **Abstract:**

A comparison of peak widths at half height for separated peaks after traversing delay tubes show that peak broadening is decreased by 60 % when comparing knitted vs. linear tubes of the same length.

### **Introduction:**

Knitted reactor coils are widely used in HPLC analysis for both chemical and photochemical post column derivatizations. They are also used in detector mediated fraction collection in preparative chromatography to allow a delay in the collection of fractions as indicated by uv, fluorescence and mass spec. detectors. The advantages of knitted reactors over linear ones have been reported. We now show the decrease in peak broadening in delay tubes 5 meters with 1mm ID by knitting the tubing.

### **Experimental Conditions:**

The HPLC instrumentation consisted of a Hitachi L-7100 pump, a Valco injection valve with a 10 microliter loop, a Milton Roy SM 4000 programmable wavelength detector set at 254 nm, a Supelco Discovery HS 3  $\mu$ m, 15 x 0.46 cm reverse phase column thermostated at 40 degrees Celsius with an Aura CJB-14 column jacket and water circulator. The chromatograms were recorded and integrated on a Spectro Physics SP 4270 integrator. Two delay tubes were used: knitted, 5 meters long, 1 mm ID (AURA Cat # KDT 5-100), and linear delay tube 5 meters long, 1 mm ID.

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The eluent was 40-60, 0.01 M Phosphoric acid- Acetonitrile v/v at 1 ml/ min. The analyte was a mixture of 10 and 20 microliters respectively of dimethylphthalate and diethylphthalate in 100 ml 50-50 Methanol-Water v/v. The tubes were inserted between the column and the detector.

### Results and Discussion:

Figure 1 shows the chromatogram of the analyte mixture with the column connected directly to the detector.

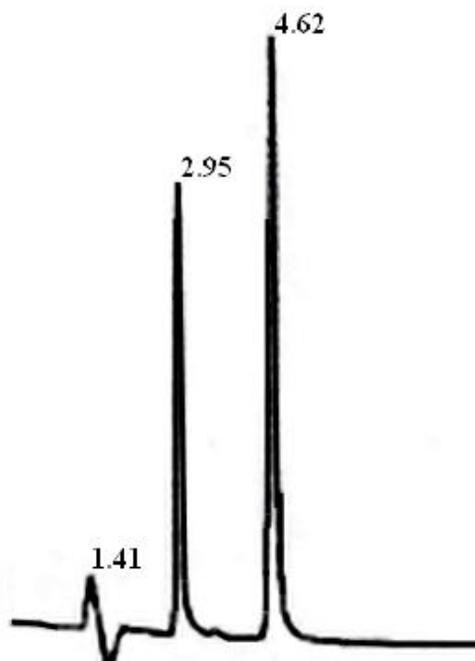


Figure 1. Chromatogram of dimethylphthalate (2.95 min) and diethylphthalate (4.62 min).

Figure 2 (top) shows the same chromatogram as in figure 1 except that a 5 meter linear delay tube is inserted between the column and detector. Figure 2 (bottom) shows the same chromatogram as in Figure 1 except that a 5 meter knitted delay tube is inserted between the column and the detector.

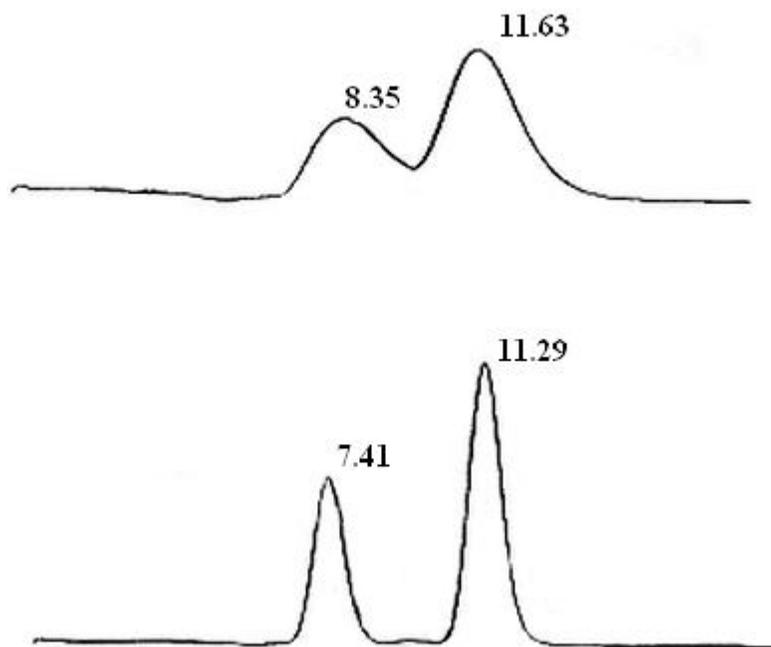


Figure 2. Top: chromatogram of dimethyl- (8.35 min) and diethylphthalates (11.63 min) with linear 5 meter delay tube between column and detector. Bottom: chromatogram of dimethyl- (7.41 min) and diethylphthalates (11.29 min) with 5 meter knitted delay tube between the column and detector.

The peak width at half height for the diethylphthalate peak in the chromatogram shown in figure 2 (top) is 20 mm while the peak width at half height for the diethylphthalate peak in the chromatogram shown in figure 2 (bottom) is 8 mm. Thus the knitted delay tube reduces peak broadening by 60 % when compared to the peak broadening in the linear tube of equal length. Alternatively, the diethylphthalate peak in the linear delay tube case is two and a half times as wide as in the knitted tube case.