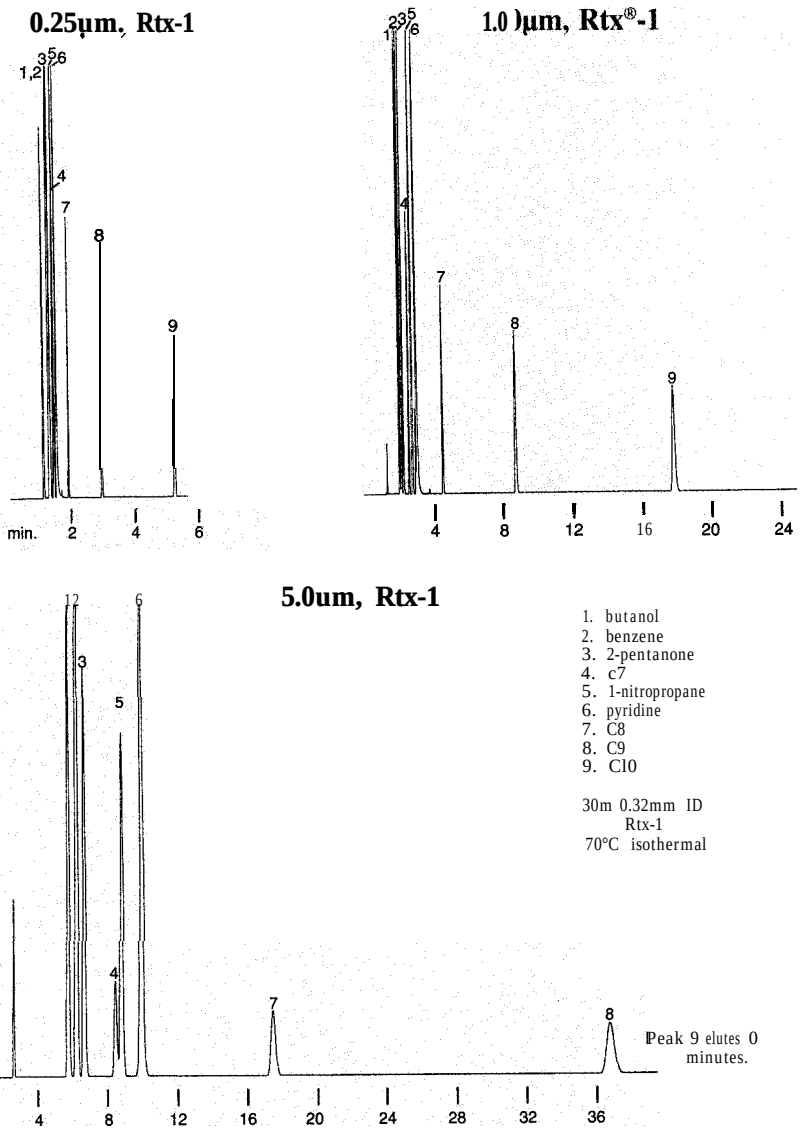
The following chromatograms show a sample containing low boiling compounds analyzed on a 0.25, 1.0, and 5.um column with all other variables held constant. Notice that the 0.25um column does not resolve butanol from benzene (peaks 1 & 2). The 1.0um column provides about 80% resolution of this pair. Note that the retention times of the compounds eluting on the 0.25pm column more than double on the l.0um column. Now, compare the 5.0um to the 0.25 and 1.0um columns. The resolution between butanol and benzene (peaks 1 & 2) is not any better than the 1 .Oumcolumn, and the retention times have increased six times over the 0.25um. For this particular sample, the 1.0urn column is best. The resolution is better than the 0.25um column and the 5.0um column does not offer any additional improvements. If our true interest was in resolving the compounds prior to butanol (peak l), then the 5.0um column would be the preferred film thickness.

Would you like to know more about **WHICH COLUMN** to use for your analyses?

Have one of Restek's chromatography seminars presented in-house. Call your local distributor for information.

Film Thickness Effects

A sample containing low boiling components shows the diflerences in resolution between 0.25, 1.0, arad 5.0um columns. The 1.0um offers better resolution than the 0.25um and the 5.0um does not offer any further improvements for compounds eluting after C6.



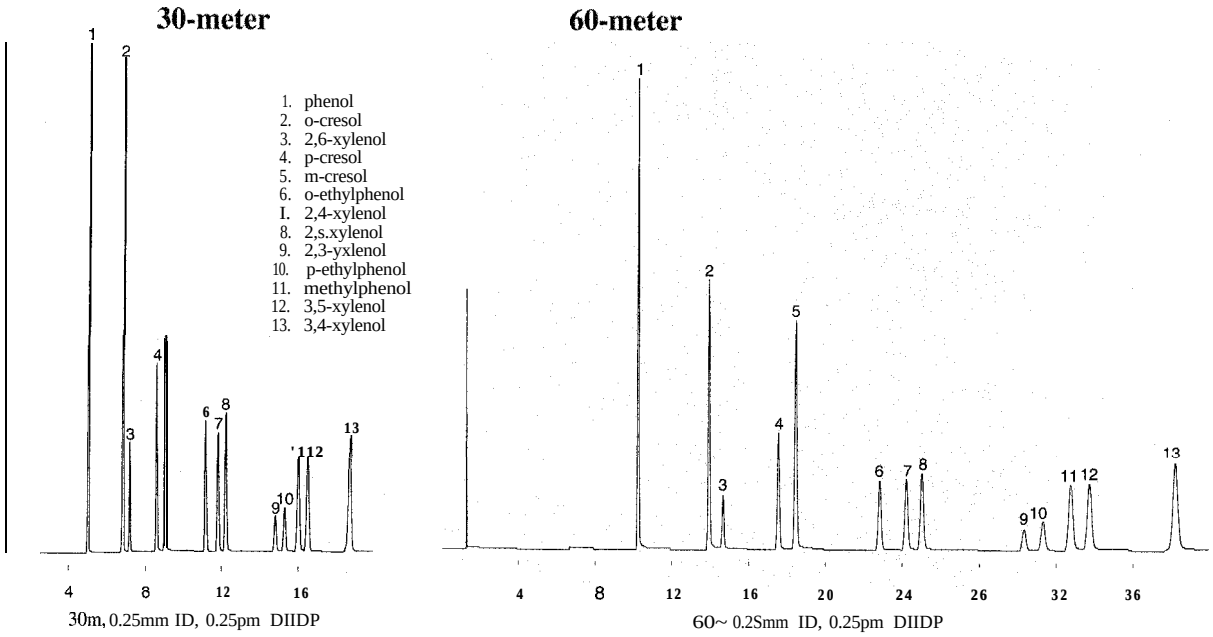
- *Length*

Longer columns provide more resolving power, increase analysis times, and cost more. Often an analyst must determine whether the amount of resolution increase is worth the extra time and expense. The benefits of using longer columns differ depending on whether isothermal or temperature programmed analyses are being performed.

For an isothermal analysis, retention time is dependent on length of the column. If the column length is doubled, the analysis time will double as well. However, the increase in resolution is only approximately 40%, since resolution is calculated using the square root of the length.

isothermal Analysis

When using a 60-meter column in an isothermal analysis, the resolution increases but the artalysis time is approximately double that of the 30-meter column.



30m, 0.25mm ID, 0.25pm DIIDP

60~ 0.2Smm ID, 0.25pm DIIDP

LENGTH EFFECTS

Length affects resolution and speed of analysis.

$$\text{Resolution} = \frac{1}{4}\sqrt{\frac{L}{h}} \times \frac{k}{k+1} \times \frac{\alpha-1}{a}$$

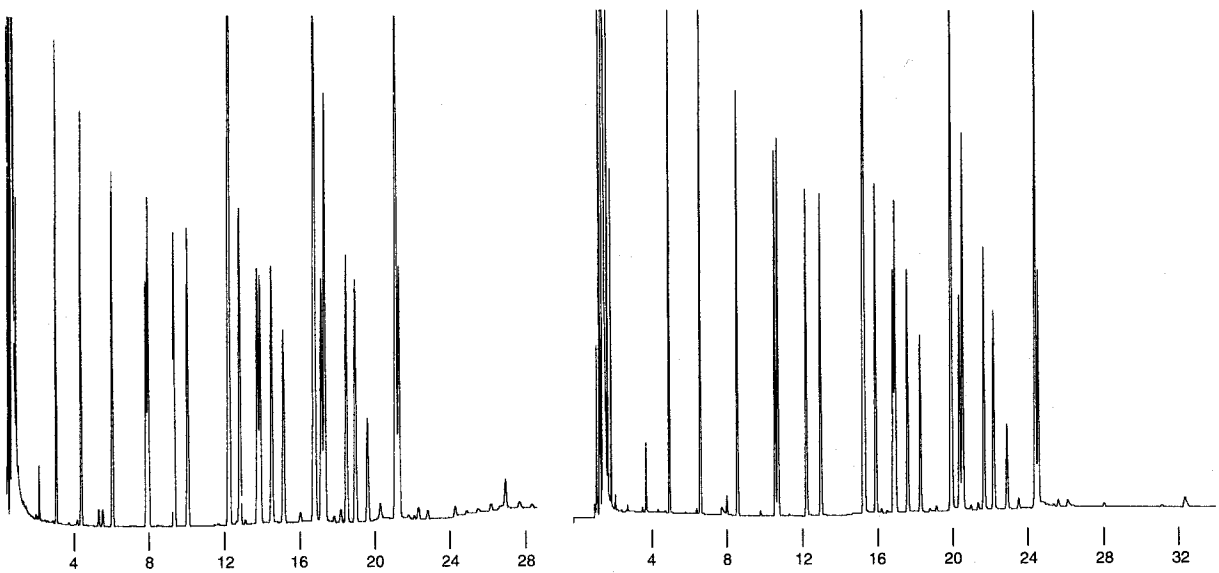
L = length
h = HETP
k = capacity factor
a = selectivity

In the case of temperature programmed analyses, retention times are more dependent on temperature than column length. The increase in resolution is the same as an isothermal run, but there is only a marginal increase in analysis time.

Temperature Programmed Analysis

When using temperature programming, 60-meter columns provide better resolution than 30-meter columns without a significant increase in analysis time.

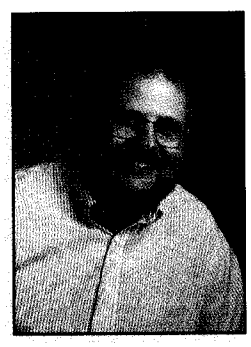
30-meter **60-meter**



30m, 0.53mm ID, 0.50µm Stabilwax®

60m, 0.53mm ID, 0.50µm Stabilwax®

30 vs. 60m column
Bacterial Acid Methyl Esters
130°C (hold 2 min.) to 250°C @ 4°C/min.



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