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TECHNICAL ARTICLE

How to Choose a GC Capillary Column...

When selecting a capillary column for an application, there are four basic parameters that need to be considered:

1	Stationary Phase
2	Column Internal Diameter
3	Film Thickness
4	Column Length

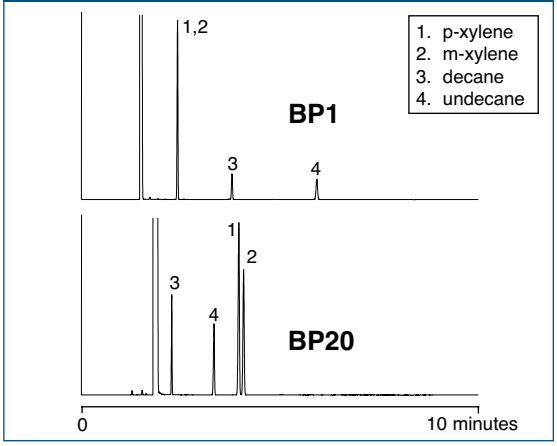
Choosing a Stationary Phase

Select a relatively non-polar stationary phase. SGE recommends a 5% phenyl phase which can be used for over 80% of analyses. It offers just enough polarity to be useful, but will still essentially separate components on boiling point.

Use a specialized phase when recommended by standard methods, for example BPX70 for Fatty Acid Methyl Ester (FAME) analysis.

Figure 1 demonstrates the effect of different phase polarities on the same analysis. BP1 is 100% dimethylpolysiloxane, which is non-polar, while BP20 is a moderatley polar polyethylene glycol phase.

Figure 1. Effect of Phase Type



Stationary Phases:

- **BP** Industry Standard Phases
- **BPX** MS Premium Phases
- **HT** Very high temperature Phases

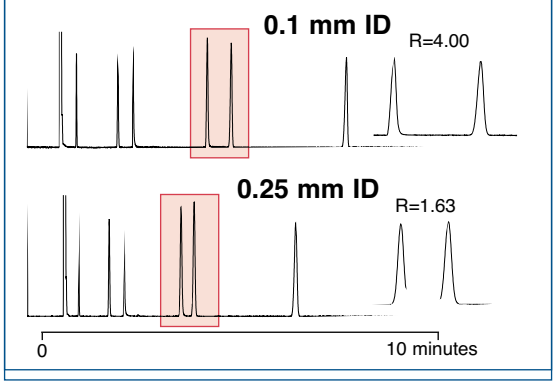
Choosing the Column Internal Diameter

Of the four parameters to be considered when selecting a capillary column, internal diameter is often the easiest to select.

- A 0.25mm ID column is a good general selection for most applications.
- Columns with a larger bore (e.g. 0.53mm ID) will be more rugged and have a larger sample capacity.

Figure 2 shows the effect of changing the internal diameter of a column will have on an analysis. Decreasing the diameter will increase resolution(R), or you will achieve the same resolution with a FASTER run time.

Figure 2. Effect of Column Diameter



Film Thickness

Increasing the film thickness will increase retention and improve resolution (figure 3). Thicker films will reduce the possibility of large overloaded peaks co-eluting with other compounds.

A large range in solute concentrations will require a thicker film, while if the separation of solutes is sufficient and co-elution is unlikely, a thinner film can be used. Thicker films should be used for analysis of volatiles.

A change in the film thickness of a column will directly affect the temperature at which a compound will elute, the thicker the film, the greater the retention and thus the higher the elution temperature.

Figure 3 shows the effect varying a column's film thickness will have on an analysis.

Column Length

Length is often the last parameter to be considered when selecting a column.

- The longer the column; the greater the efficiency.
- Select the shortest column length which will provide the necessary resolution.
- If the maximum available column length gives inadequate resolution, consider a change in stationary phase or phase ratio.
- Resolution is proportional to the square root of column efficiency, doubling the column length will only increase the resolving power of a column by approximately 40%.

Figure 4 shows how various column lengths affect an analysis.

Figure 3. Effect of Film Thickness

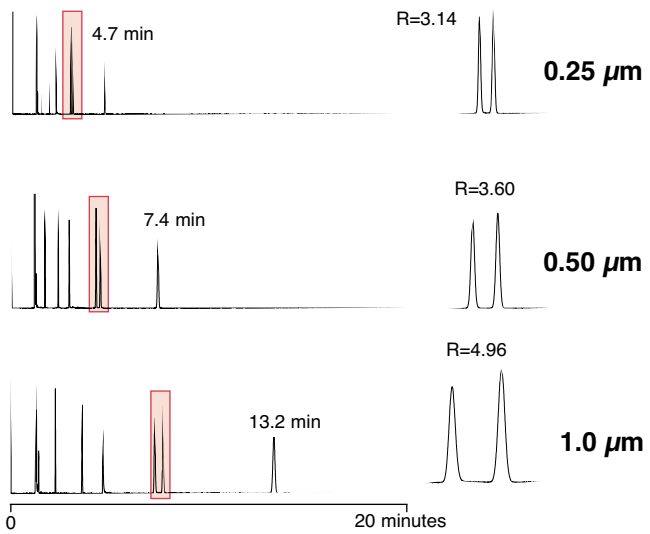
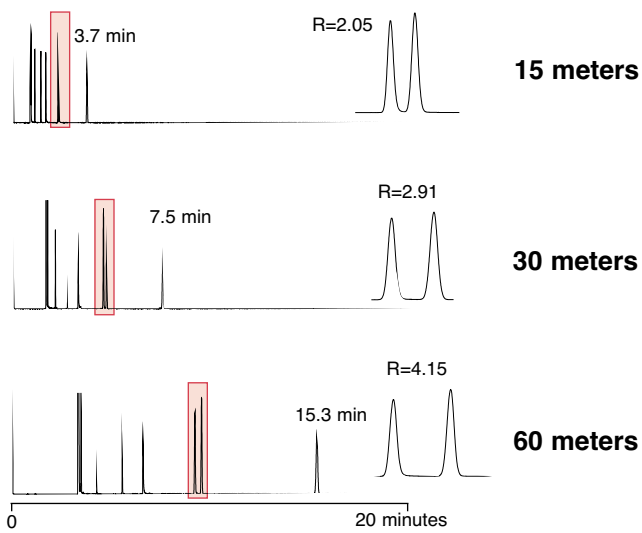
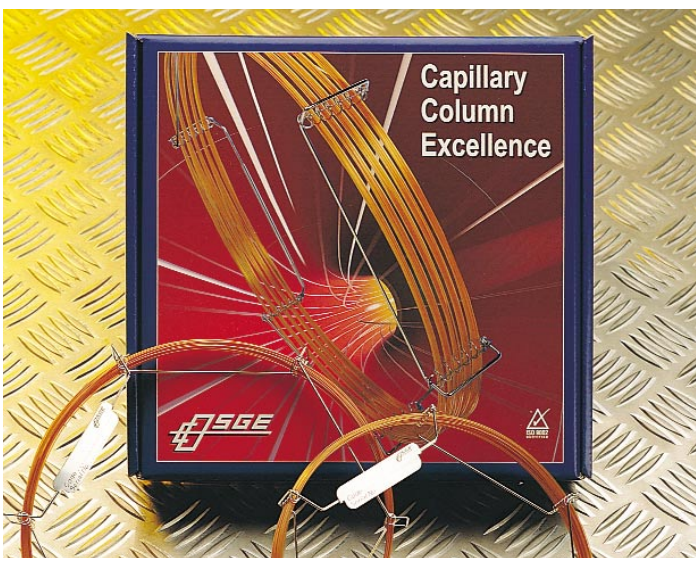


Figure 4. Effect of Column Length





EXPERT Tips

1. If peak shape deteriorates, replace your inlet liner and cut approximately 30cm from the front end of the capillary column.
2. When removing a column from the GC, seal the ends with an old septum to preserve column for future use.

For further information, contact your nearest SGE office or distributor.