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As we continue the gas chromatography (GC) conversation, an important topic arises—*choosing the correct GC column based on column dimension*. When investing in **GC columns**, it's important to choose a reliable source. Manufacturers perform multiple tests on the column before it finds its way to the customer. These tests include resolution of critical pairs, bleed test, retention factor of probe analytes, efficiency of the column and so on. Choose a reliable source that performs testing on individual columns instead of batch testing. After identifying a reliable GC column source, it is recommended to choose optimal dimension for GC separation.

Before we dive into real-life scenarios, let's cover the basics. To maximize efficiency for a GC column, the dimensions, including length, internal diameter (ID) and film thickness, each have a significant effect. Knowing the effect of column dimensions on a GC separation will not only help select the right column dimension, but also help pick an alternate dimension to achieve efficient chromatographic separation, as well as possibly reduce the analysis time.

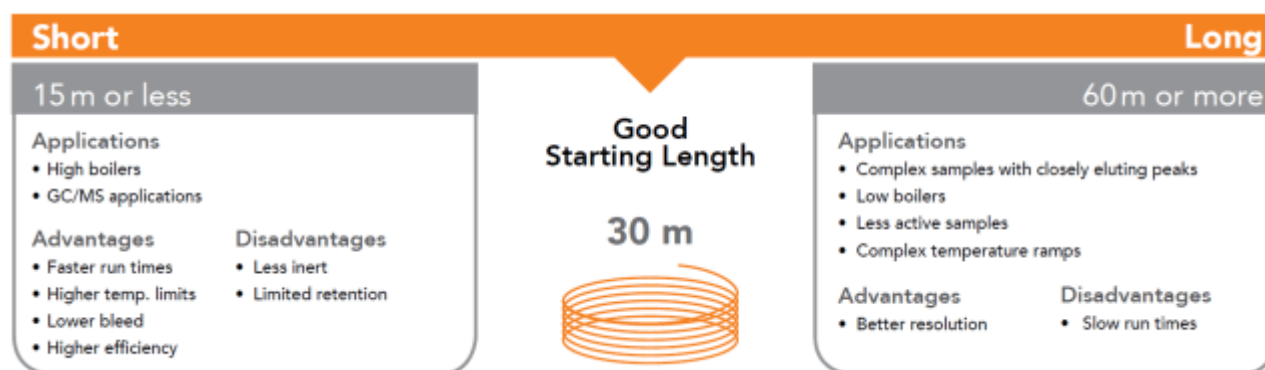
The following real-life example illustrates the importance of column dimension. In this example, the analytes of interest were volatile. First, I tried the analysis on a ZB-1, 30m, 0.32mm and 0.25 micron column and all 4 peaks eluted with the diluting solvent as shown in **Figure A**. I took the same analytes and injected on a Zebron®-1, 30m, 0.32mm and a 3.0 micron column and there was a clear separation of all 4 analytes as shown in **Figure B**. Volatile analytes have exceptionally low boiling points and need a thicker coating of stationary phase in order to achieve retention. In the first experiment, I chose a thin film

column which was not enough to give adequate retention of volatiles. In the second experiment, I took a GC column that had thicker stationary phase coating to retain the volatile analyte. The take home message here is that column dimension selection plays a very important part in GC method development.

Column Length

The length of your column affects the rate of resolution improvement. As the length of the column increases, so does the resolution improvement. However, it will also increase run times. Under isothermal conditions, doubling column length increases resolution by 41 %, but doubles the run time! Choose a column length that balances efficiency with acceptable run times.

Figure A



Internal Diameter

Column internal diameter (ID) has a major impact on both resolution and sample capacity. Unlike column length, using smaller ID columns can actually lead to faster run times, because the column length required with a small ID is often shorter due to increased efficiency.

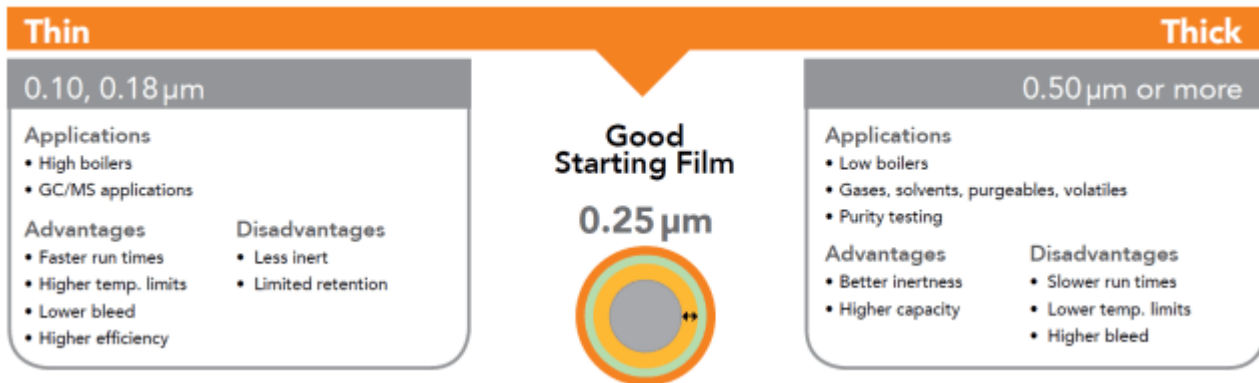
Figure B



Film Thickness

Film thickness determines solute retention and plays an important role in column sample capacity. Thin film columns are faster and provide higher resolution, but lower sample capacity. In most instances, choose the thinnest film possible that still provides adequate retention. When working with active samples, using a slightly thicker film can significantly improve peak shape.

Figure C



Check out this technical note [that shows increased resolution of propylene glycol](#) that is attained by choosing high-efficiency GC column.

In the next session, I will talk about Zebron GC column classification and Phenomenex web tools that can help you [choose the right Zebron GC column](#) for your method in just seconds!

Still need help finding the right column for your method? Chat with our nearly [24/7 technical support scientists!](#)

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Summary



Article Name

Dr. Ram Speaks Gas Chromatography—From Injection to Detection: Part 2

Description

Dr. Ram continues the gas chromatography discussion by talking about choosing the correct GC column based on column dimension

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