What You Need to Consider When Using Narrow Bore (0.10mm) GC Columns

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The number one question I get asked is…"how do I speed up my method?" By now you may be considering Narrow Bore (0.10mm ID) columns as a way to achieve that goal. This is an exciting technology, but there are some things to consider.

Injector

Split Ratio or Injection Volume:

The 0.10mm ID columns have far less capacity than the standard columns. The trade off is that you get higher efficiency and less band broadening. This means your peaks are usually narrower and taller, which means you can afford to inject less to get the same signal. An optimized system will provide adequate sensitivity for most established methods.

Carrier Gas:

If head pressure becomes an issue, and it will, you might consider moving to Hydrogen. Hydrogen requires less pressure to achieve the same flow rate. An added benefit is that Hydrogen provides higher efficiencies as you begin moving above its optimum linear velocity (van Deemter plot). This will help you further speed up your methods without sacrificing resolution.

Head Pressure:

As stated, head pressure will probably become an issue during development, especially when working with a flow-controlled system. Expect head pressures to routinely start at >75psi. As the temperature increases, your flow controller will increase pressure to maintain flow rate (remember, gas viscosity increases with temperature requiring higher pressures to maintain the same flow rate). It is not uncommon for head pressure to exceed 100psi. For more information on your system's capabilities, please contact the manufacturer.

Liner:

Consider using a 2mm ID liner instead of the usual 4.0mm ID. Narrow ID liners provide several benefits including: decreased activity, faster sample transfer onto the column, and reduced inlet discrimination. In fact, this may be something to consider for your other analyses as well.

Column installation:

Many of us don't measure that small distance the column protrudes above the column nut; we simply "eyeball it." Now that you have made the step to 0.10mm ID, you will want to pay closer attention to this measurement. The placement of the column at the bottom of the liner can dramatically affect your results. Therefore, we suggest you take extra care when installing a new column.

Oven

Oven Ramp Rate:

Most GC's accommodate ramp rates of at least 35-40°C/min. With the added resolution 0.10mm columns provide you will want to ramp at a much faster rate in order to fully optimize your method. This may require that you purchase an auxiliary heating unit or, if you are buying a new instrument, you might consider one that allows for faster oven temperature ramps.

Detector

Scan Rates:

Fast GC means sharper, narrower peaks; some only seconds wide! In this case, you will need a detector with a fast scan rate. Flame ionization detectors (FID) are traditionally fast enough for most methods, but an older MS detector may only scan at a rate of 1-4Hz. If you have a peak that is only 1-sec wide, you may not have enough scans to get an accurate reading. The newer systems have been designed with fast GC in mind. Listed below are the scan rates for common detectors included on new systems.

Flame Ionization Detector (FID):	~200Hz
Electron Capture Detector (ECD):	~50Hz
Nitrogen Phosphorous Detector (NPD):	~200Hz
Mass Spectrometer (MS):	20-100Hz

Ordering Information

GC Column Phase	Dimensions	Order No.
Zebron ZB-1ms	10meter x 0.10mm x 0.10µm	7CB-G011-02
Zebron ZB-5ms	10meter x 0.10mm x 0.10µm	7CB-G010-02
Zebron ZB-Wax	10meter x 0.10mm x 0.10µm	7CB-G007-02

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