TraceGOLD Fast GC Columns

GC chemists are continually striving to reduce analysis times to increase sample throughput. TraceGOLD Fast GC columns are shorter, smaller ID columns compared with conventional GC columns. This means that analysis times can be reduced.

Faster analysis with the same separation

Analysis times can be decreased by using the following:

- Shorter columns
- Quicker oven temperature ramp rate
- Higher carrier gas linear velocity

These changes also decrease resolution – however, this can be offset by the following:

- Narrow ID columns
- Hydrogen as a carrier gas
- Small film thickness

When decreasing column length and ID, it is important to maintain the phase ratio between your conventional column and fast GC column. Using the table below will help to ensure the correct dimensions of column are selected:

Phase Ratio

Phase Ratio is the ratio of the volume of mobile phase to the stationary phase.
It is an important value when changing the column dimensions in a method:

Phase Ratio (β) – column ID (µm) / 4 x film thickness (µm)

Column diameter, d_c (mm)	Film thickness, d_f (µm)										
	0.15	**0.18**	**0.25**	**0.5**	**1**	**1.4**	**1.5**	**1.8**	**2.65**	**3**	**5**
0.15	250	208	150	75	38	27	25	21	14	13	8
0.18	300	250	180	90	45	32	30	25	17	15	9
0.25	417	347	250	125	63	45	42	35	24	21	13
0.32	533	444	320	160	80	57	53	44	30	27	16
0.53	883	736	530	265	133	95	88	74	50	44	27

A 0.25mm x 0.25µm GC column has the same phase ratio as a 0.15mm x 0.15µm column, so will show the same selectivity provided the column stationary phase is kept the same. However, the efficiency on the 0.15mm ID column will be greater, allowing for a similar separation to be performed with a shorter column length.

The performance of a 30m x 0.25mm x 0.25µm column can therefore be achieved with a 20m x 0.15mm x 0.15µm column in up to 30% less time.

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Faster analysis with the same separation

Selection of the most appropriate TraceGOLD Fast GC column will ensure that column performance and separation is maintained while decreasing analysis time.

Benefits of faster analysis:

- Increase speed of analysis by a factor of 3-10 times
- Faster method development
- Reduction in analysis costs
- Run any application with no compromise in the quality of results

Easy optimization of conventional methods

TraceGOLD Fast GC columns can be applied to any application in any industry. Conventional GC methods can easily be transferred to Fast GC columns without compromising performance, through consideration of the following parameters:

- Column length
- Column ID
- Column film thickness
- Carrier gas linear velocity

A reduction in column length will increase speed of analysis, but will lead to a decrease in resolution. This decrease can be offset by a decrease in column ID.

The table below shows approximate column dimensions that can be replaced with a TraceGOLD Fast GC column in order to achieve faster GC analysis. The ratio of column length to ID and phase ration are kept the same, provided the carrier gas flow rate and fast oven ramp rate are adjusted to give similar performance.

Present Column	Fast GC Column
15m x 0.25mm x 0.25µm	10m x 0.15mm x 0.15µm
30m x 0.25mm x 0.25µm	20m x 0.15mm x 0.15µm
60m x 0.25mm x 0.25µm	40m x 0.15mm x 0.15µm
15m x 0.32mm x 0.25µm	10m x 0.15mm x 0.15µm
30m x 0.32mm x 0.25µm	15m x 0.15mm x 0.15µm
60m x 0.32mm x 0.25µm	30m x 0.15mm x 0.15µm