What is FAST-GC

What is FAST-GC.

FAST-GC is a technique that allows you to reduce the analysis time while keeping an adequate resolution power, thus increasing your throughput.

FAST-GC can be applied to medium-to-high complexity mixtures analysis and provides 3-10x faster analysis compared to conventional GC.

What you need to make FAST-GC.

To accomplish the FAST-GC you will simply need:

- a shorter column with a smaller internal diameter (so-called "narrow-bore" columns). Typically a 100µm ID x 5 or 10m length columns are used.
- an high temperature rate (usually more than 15°C/min) and a fast acquisition frequency on your detector (see Figure 1 to see how the acquisition frequency does affect the peak shape in FAST-GC).

Just contact us at info@mega.mi.it to have more information.

Some fundamental theoretical notion to better understand FAST-GC.

The parameter that best describes the theoretical separation power of a gas-chromatographic capillary column is the **number of the theoretical plates (N)**.

N is calculated as:

$$N = \frac{L}{H}; \qquad (H \sim ID)$$

where L is the column length and H is the height of the theoretical plates that can be approximated very well with the column's internal diameter (ID).

Is then easy to calculate that a conventional column 0.25mm ID x 25m has 100000 theoretical plates (N). But reducing the internal diameter of the column, we can keep constant the value of N reducing the length of the column. In fact a 100µm ID x 10m has as well 100000 theoretical plates that is the same separation power provided by a conventional GC column.

Narrow bore short columns consent to use high temperature rates and high linear velocities maintaining optimal conditions during the practical usage. That is why, to reduce columns sizes allows to speed up your analysis while retaining a proper separation level.

The importance of the selectivity of the stationary phase in FAST-GC.

The selectivity of the stationary phase is a **key parameter** in gas-chromatography. It takes an even more important role in FAST-GC, where it helps to compensate a natural compression of the peaks, in particular of critical pairs of peaks, in the very short "fast" analysis time.
Have the right selectivity gives the way to solve even very difficult analytical problems but keeping all the advantages of the FAST-GC technique.
In the following pages you will find some application notes where the selectivity of the stationary phase has been investigated and where is role is emphasized.

MEGA s.n.c - Capillary Columns Laboratory - Via Plinio, 29 - 20025 Legnano (MI) - Italy - tel./fax: +39 0331.54.79.24 - info@mega.mi.it - Since 1980

Principal Parameters Comparison

Conventional GC	FAST-GC
Column: *usually columns 0.25mm/0.32mm I.D. x 25m, 30m or 50m length.*	Column: usually columns 0.05mm/0.10mm I.D. x 2.5m, 5m or 10m length.
Temperature Rates: *1 - 15°C/min.*	Temperature Rates: 15 - 60°C/min.
Injection: *using standard injection techniques, is possible to inject quite large quantities (typically 1 - 2µL of a diluted solution with a split ratio of 1:20).*	Injection: the injected quantity has to be at least 10x less than conventional GC. Usually split ratio of 1:100 or higher are used with diluted solutions (< 100ppm).
Carrier Gas: *typical flows are not less than 0.8mL/min with head pressures of 40 - 130kPa depending on column dimensions and carrier gas type (visit the "support-download" page on www.mega.mi.it to see and download the table with the recommended pressures and flows).*	Carrier Gas: typical flows do not exceed 0.9 - 1mL/min with higher head pressures (until 200-250kPa for 0.10mm I.D. columns, and until 300kPa or more for 0.05mm I.D. columns) anyway depending on column dimensions and carrier gas type (visit the "support-download" page on www.mega.mi.it to see and download the table with the recommended pressures and flows).
Peak Width: *2 - 5 seconds.*	Peak Width: 0.5 - 2 seconds.
Detector: *any type of detector for GC can be used.*	Detector: any type of detector for GC can be used. It is only necessary that the acquisition frequency is at least 50Hz (see page 4, Figure 1).
Analysis Time: *20 - 60 min.*	Analysis Time: 1 - 10 min.

MEGA s.n.c - Capillary Columns Laboratory - Via Plinio, 29 - 20025 Legnano (MI) - Italy - tel./fax: +39 0331.54.79.24 - info@mega.mi.it - Since 1980