

GC Gas Analysis Quick Reference Guide

This guide offers practical advice which we hope will assist users of nuances and to avoid many of the common pitfalls encountered in gas analysis. This can range from inaccurate results to instruments with significant downtime and high maintenance costs. The guide covers gas analysis from trace level analytes (ppb) that may require preconcentration devices (remote or instrument configured) or specialised detectors all the way up to bulk gas (100%).

Before Commencement

- Ensure you understand the requirements of the analysis and sampling
- If the instrument is not configured or cannot conform to your analysis requirements it may require modification or renewal (please refer to [Analytical Instrument Purchasing Quick Reference Guide](#))
- The instrument has been installed to manufactures specification and all maintenance logs/service history are current and up to date.

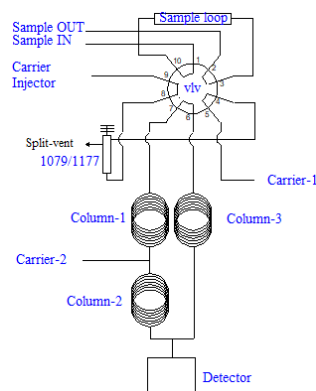
Sample State

The sample state is the next item to consider. How can you introduce this into the gas chromatographic process in a safe and representative way to produce accurate and reliable results? The sample maybe from a reaction process and may not be at ambient temperature and pressure. There also maybe other compounds or the matrix that will interfere and either at best compromise results or actually react with the materials in the sample path. These are additional questions you should ask.

- Vessel (Type, size, material, connections, seals/caps)
- Sample pressure & temperature (range)
- Sample stability & storage

Instrument Configuration

The configuration of a gas analysis GC could be simple a one injector , one column and one detector, however most tend to be a little more complex that are provided with plumbing diagram in order to understand what is happening and also to trouble-shoot any problems that may occur. There maybe additional hardware such as methanizers/Jetanizer™ which can convert an inert gas to methane for a greater response on an FID. Valves maybe plumbed upstream of a injector to enabled variations in sample loading. Flows also maybe changed/diverted, analytes trapped and this may involve multi port valves and/or pressure switching.



Gas Sample Path/Introduction

Firstly if your sample is from an above temperature and pressure (e.g. reactor) you want this to be introduced directly and should use a valve. In this case you may have to consider the use of trace heating lines to the instrument and temperature/pressure ratings of the valves. The other ways to introduce your sample is by a syringe. Both can be manual or automated. and typical sample volumes are between 0.25 - 1.0 ml Automated is always a better option with regard to repeatability and valves are a preferred choice as the ingress of air can be minimised, through purging the loop and if necessary purging the valve housing. Rotary and diaphragm are the choices.



When sampling several different sample points a stream selection valve maybe incorporated into the GC configuration. Manual sampling/injection using a syringe (gas tight or glass to glass seal) can have safety and analysis implications from pressurised vessels and directly introduced into GC injection ports.

The compatibility of material that comes in contact with the sample always needs to be considered particularly on analytes and matrices that absorb or react on these surfaces.

Columns

Pick column dimensions and material, and phase which depends on the application.

- Packed (1/4", 1/8", 1/16") or capillary (0.25mm - 0.53mm)
- Porous polymers, molecular sieves, thick film liquid phase columns

Porous polymers come in a range of polarities and molecular sieve columns are specifically to separate O₂ and N₂ and can separate H₂/He, CO & CH₄. CO₂ and >C₂ will not elute from molecular sieve columns. Conditioning and upper temperature limits may vary dramatically so care maybe needed when they are located in the same oven.

Detectors

There are some specifically used for gas analysis such as TCD, PDHID, IMS and PED, however PFD/PFPD/SCD, FID and MS are used in certain applications.

Conclusion

If these guidelines are considered you will encounter fewer issues with your gas chromatograph and gas analysis results.

ChromSolutions Ltd

What we offer at ChromSolutions is our wealth of experience in analytical instrument sales and support (over 110 years distributed through the members of our company). We can help you from defining your requirements to the implementation of a robust gas analytical method fit for purpose.

For more information on GC & GC/MS gas analysis please contact

