Removal of Methane from Air for the Best Stability of Your FID

Parker

ENGINEERING YOUR SUCCESS.

Removal of Methane from Air for the Best Stability of Your FID

By Reginald Bartram

References
1. D.J. Jeffery, G.C. Slack, and H. M. McNair, Parker Hannifin Bulletin AGS-D, 70-71.

2. D. Ryan, ISO 8573.1, Contaminants and Purity Classes, 1-3

This application note explores the best purification methods to obtain air for an FID. This will allow the best signal-to-noise ratio for the best analysis available.

When running a GC with an FID an analyst tries to have as stable a baseline as obtainable. The more you can differentiate the area count generated by an emerging peak from that of the baseline the better off you are. The effect of contaminants in the air used for an FID on a baseline was studied and reported on by Prof Harold M. McNair at the Department of Chemistry, Virginia Polytechnic Institute, and State University at Blacksburg, Virginia. The scientists studied the sensitivity of an FID versus air purity under isothermal conditions. Air was included from a Parker Balston® Zero Air Gas Generator, breathing air from cylinders (at two pressures), and house air from an in-house compressor. Figure 1 shows the results of the runs.

As can be seen in Figure 1, the high purity zero air and the air from a zero air generator provides the best baseline. (The term zero air refers to air with all hydrocarbons removed and specifically, methane removed.)

If bottled gases or gases from a compressor are used, the trapped hydrocarbons must be removed. Most labs use purifiers that contain absorbents intended to remove these hydrocarbons. The typical purifier uses activated carbon to stop hydrocarbons and may use molecular sieves and or silica gel adsorbents. These purifiers remove most hydrocarbons (C3+) but do not remove methane. Methane and sometimes very light single or double-carbon compounds can move through an adsorbent purifier in hours to days.

Even though these purifiers remove hydrocarbons, they do not remove methane. At best, they only slow light contaminants. Only the use of a zero air generator that catalytically removes methane will remove the methane and other hydrocarbon contaminants (C1 +) present in most air cylinders.

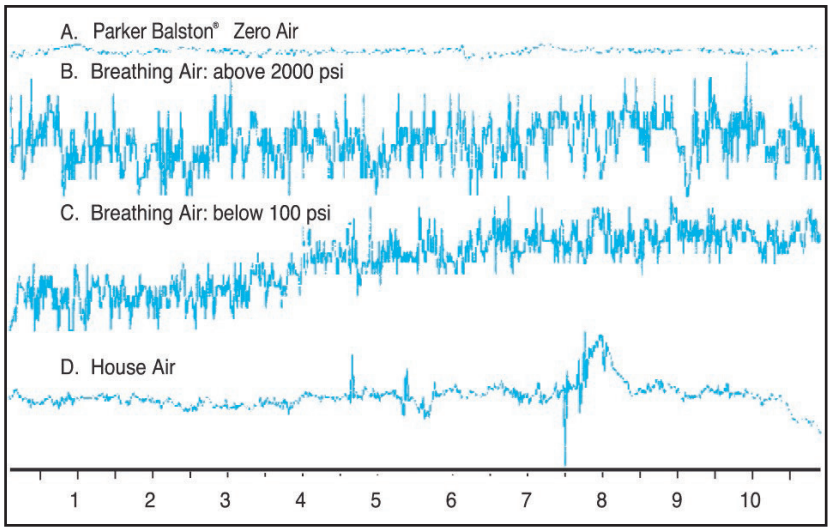

Figure 1: Baseline Signals – Random spike at 6 minutes for Zero Air (A) Baselines are raw data (mA) on equivalent scales.

A zero air generator is recommended to obtain the best zero air for your FID. The Zero Air Generator mode of operation is straightforward and involves very little operator interaction.

The unit includes first a prefilter designed to remove moisture, particulates, and other liquids. A heated hydrocarbon catalyst module breaks hydrocarbons down into CO and CO2 follows it. Neither of these compounds will respond on an FID. The hydrocarbon content is reduced to <0.05 ppm hydrocarbons. The air as it exits the catalyst module goes through an after cooler and then a final filtration device. The gas leaving the unit will have no particulate contamination larger than 0.5 microns. See figure 2 for the Flow Schematic for Zero Air Generator.

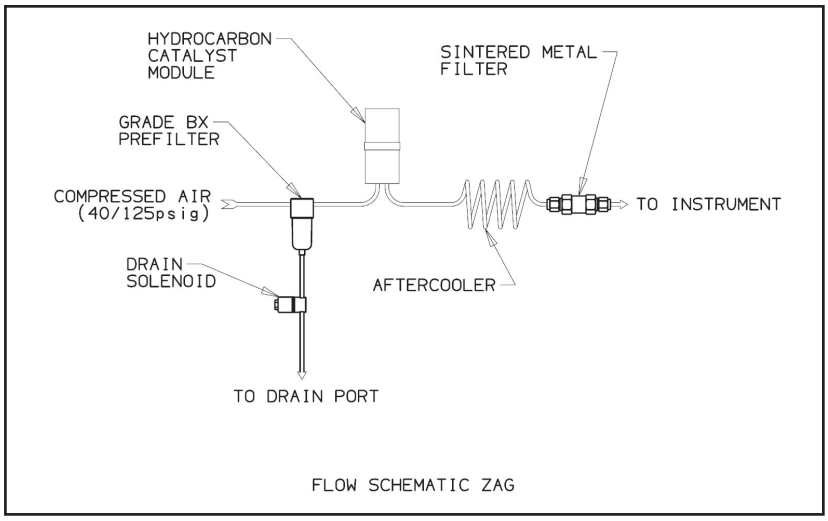

Figure 2: Flow Schematic for Zero Air Generator

Figure 3: Picture of a benchtop Zero Air Generator

The use of a zero air generator has many benefits when employed in conjunction with house air compressors or with breathing air cylinders. The typical payback on a zero air generator is one year. A zero air generator produces a consistent supply of UHP Zero Air (<0.05 ppm hydrocarbons) continually. A zero air generator increases the signal-to-noise ratio for the baseline allowing for the best stable baseline, operates silently, and requires minimal operator attention.

Conclusion

A zero air generator will provide the highest purity zero air available for a GC FID detector. Methane and other light contaminants are removed methane that would otherwise cause baseline disturbances and unstable baselines.

PKR_WP-Zero Air_042023

Parker Hannifin Corporation
Industrial Gas Filtration and Generation Division
242 Neck Road
Haverhill, MA 01835
Phone 800 343 4048
www.parker.com/labgas