

It is well known in the art of chromatography that leaks can influence the system performance and in applications where toxic mixtures are used, a leak can be dangerous. It is consequently important to validate the leak integrity of any gas chromatograph. However, care must be taken.

There are many techniques used to identify leaks. A common one consists of using soap liquid. If a leak is present, bubbles are generated. However, despite being a simple technique to identify leaks, the soap liquid can have adverse impacts on the gas chromatograph performance and even damage components such as chromatographic valves. Just like a laboratory sink aspirator will draw a vacuum on a small side line while water is running through the mainline, a leak will draw in gas or liquids as it allows gas to leak out. If there is a leak in a line, any liquid leak detector could be siphoned into your system<sup>1</sup>. An example of contamination is shown on figure 1. In this case, liquid leak detector was used to identify leaks on the valve heads. As leaks were present, the liquid contaminated the valve and caused chromatographic issues. In figure 2, a similar liquid was used to leak test the actuation inlet. In this case, the actuation section of the valve was contaminated. The chromatographic performance was not affected, but the life time of the valve was as the lubricant is contaminated.



Figure 1 – Valve head contamination



Figure 2 – Actuator contamination

In order to avoid such a problem, it is instead recommended to use an electronic leak detector (ex: Restek Electronic Leak Detector). Those leak detectors are normally based on a TCD and are very sensitive to helium or hydrogen. Helium is typically used to pressurise the system as it is less hazardous than hydrogen. This technique consequently avoids damaging the instrument while still being able to identify small leaks.

<sup>1</sup> *Modern Practice of Gas Chromatography*, Robert L. Grob and Eugene F. Barry, Wiley, p.525