A Brief Tutorial

A Case for the Use of Gas Traps

Gas traps are small columns containing reactants or adsorbents that remove impurities from gases. They are useful in a variety of applications, but are most commonly installed in the carrier gas lines of gas chromatographs (GCs).

Originally designed to improve the purity of commercial quality gases for use as GC carrier gases, gas traps are used today with ultra high purity (UHP) grade gases. LINWELD's UHP/Zero argon, helium, and nitrogen, the three most common GC carrier gases, have a purity of at least 99.999% ("five nines"). "Why," you ask, "should I pay for ultra high purity gas and then pay more to purify it further myself?" The answer is very simple. UHP gases can have up to 10 parts per million (ppm) impurities, normally consisting of nitrogen, oxygen, hydrocarbons, and water. The level of these impurities can vary considerably from cylinder to cylinder and still be within the guaranteed and published specification. Three of these four impurities (oxygen, hydrocarbons, and water) can be the cause of analytical inaccuracies, premature separation column deterioration, and detector malfunction.

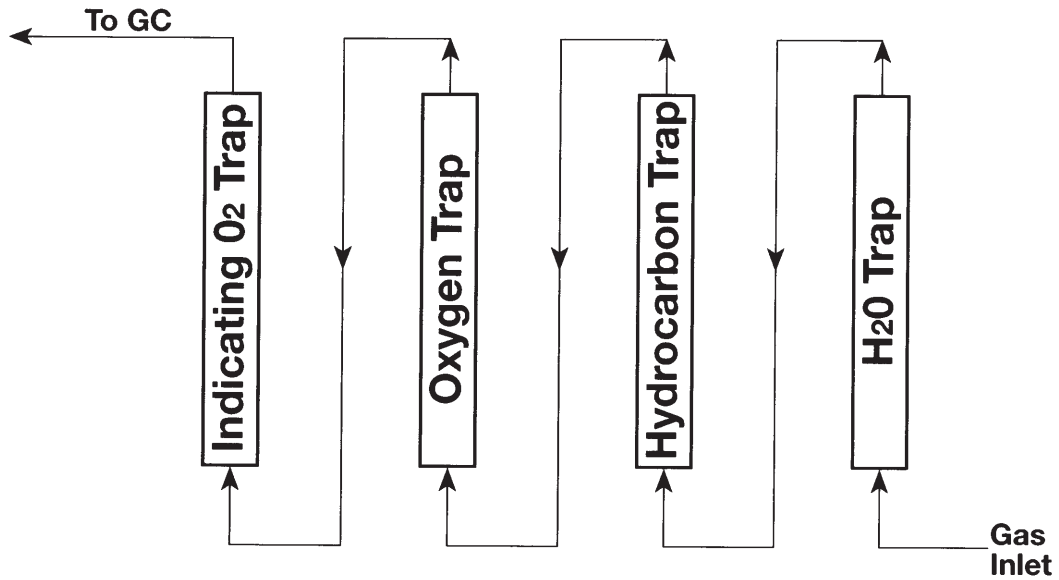
Hydrocarbon impurities are particularly annoying when they are present in the air, hydrogen, and carrier gases used with flame-ionization detection (FID) detectors. Varying amounts of hydrocarbon impurities will cause baseline noise that can contribute to analytical inaccuracies, particularly when one is trying to detect very low concentrations. A Model 8200 hydrocarbon trap designed to remove organics, such as alcohols, aromatics, chlorinated hydrocarbons, esters, ethers, hydrocarbons, and ketones, will eliminate the small amounts of varying hydrocarbon impurities in the carrier gases and ensure a consistent low-level concentration that will provide a more stable baseline with little or no background noise. Although there is no built-in indicator to let you know when to change the hydrocarbon trap, breakthrough can usually be determined by an increase in the background noise level of your instrument. When this occurs, the trap can either be replaced or refilled.

Moisture and oxygen impurities in your carrier gases will contribute to early deterioration of expensive separation columns and contribute to inconsistencies in your results. Water can be removed by installing Series 8012, 8020, or 8040 moisture traps which are constructed of clear Lexan polycarbonate tubing and contain a mixture of 13X and indicating 4A molecular sieves. The blue indicating sieves turn buff color when they are spent. The trap can either be replaced entirely or refilled.

Removal of oxygen is accomplished using a Series 6300 oxygen trap. This trap has the capacity to remove 630 mg of oxygen. This is the equivalent of removing 5 ppm oxygen from thirteen 250 cubic foot cylinders of helium, nitrogen, and hydrogen used with thermal conductivity (TC) or FID GCs, or P-5 and P-10 mixtures, electron capture gases which can be found on page 93. Due to the nature of the reactant in the oxygen trap, it is not refillable and the all metal housing does not provide a means to determine when the unit is spent. An indicating oxygen trap (Series 6200) is available for installation after the Series 6300 unit to determine when the 6300 is spent. The 6200 unit indicates by a change in color when oxygen is present; it is at this point that a new 6300 oxygen trap should be installed. By monitoring the progress of the stain against the centimeter scale, this indicating unit can be used as an indicator for a considerable number of larger traps.

Installation of a system of gas traps in each of your GC carrier gas lines is a wise investment that will enhance your instrument's performance while reducing maintenance costs.

The order of installation of traps in a purification array is important. A typical array of traps is shown in the figure below. Note that for maximum effectiveness, all traps are oriented in the vertical position; mounting clips are available to facilitate installation.



Typical Gas Trap System Configuration