

More recently, a new flavor of TO-14 has emerged as TO-15. TO-15 uses more sophisticated canister technology. The analytical equipment today is capable of seeing parts per trillion of certain volatile organic compounds. The GC/MS instrument also makes it possible to look at 'unknown compounds' and make tentative identifications. It is this versatility that makes TO-15 one of the most powerful tools that an investigator can use for any initial evaluation.

#### **ADVANTAGES OF TO-15 OVER CONVENTIONAL SORBENT TUBE COLLECTION METHODS**

TO-15 stands out from other sampling and analysis methods. TO-15 sampling protocol is very easy to perform. TO-15 produces more reliable data than most methods. TO-15 can be used for a wide breadth of compound types. Some important toxic volatile organic compounds are best handled by the TO-15 whole air approach. Some compounds aren't easily desorbed after adsorbing onto sorbent media, such as the collection methods outlined in TO-1/TO-2 and most NIOSH methods.

Alternative approaches to whole air analysis in canisters are thermal desorption and solvent desorption. In the thermal desorption approach, the chemist inserts the collection tube into a specially designed GC/MS interface, and heats the tube to drive the toxic compounds and introduce them into the GC/MS instrument. Losses can occur if the compounds are thermally unstable and decompose during heating. Other losses can be seen with low molecular weight and extremely volatile compounds such as propane and the freons just to name a few. The solvent desorption method, such as many NIOSH methods utilize, dilute out the toxic compounds with solvent preventing low level detection. Either you thermally decompose your analytes or you dilute them out. Either choice has major drawbacks that affect your data. TO-15 collection and analysis affords the best approach to the isolation and identification of your problem toxic volatile organic compounds. Your odor-causing compound simply may not be seen with the other techniques.

#### **TO-15 SAMPLING CONSIDERATIONS**

There are several choices when considering your next TO-15 sampling event. There are several sizes of sampling canisters available for sample collection. Your analytical laboratory can provide 6 liter and 400 ml mini-cans, which are among the most popular sizes. The 6-liter canister affords the best detection limit possible due to the introduction of a 500-ml sample size. The 6-liter canister is recommended for regulatory compliance projects and for those projects where no perceptible odor is detected. The 400-ml minican is an excellent choice because of its compact size and ease of use. This is a good choice where an odor is detected and the identity and concentration of the problem odorcausing compound is needed. Next, you must choose the sampling regulator. Regulators control the flow of air into the canister and range from 5 minute grab samples to as long as 24 hours. The sampling canister size may limit your sampling interval choices. Ask your laboratory about the available choices.



## TO-15 Fact Sheet

Do you have a client complaining of odors at home or in the workplace? Do they get headaches or feel nauseous? You may want to conduct testing for a general Volatile Organic Compound (VOC) scan? The best way to sample the widest range of compounds with the greatest of ease is TO-15. This article will guide you through the process of implementing TO-15 testing. The sampling of air in the field has long been a problem for the industrial hygienist and project scientist. Should we use a sampling pump with a sorbent tube or is there a better approach to use?

There is a better approach. With the advances made in instrumentation design and sensitivity, an analytical tool has emerged which provides the best and easiest way to determine the concentration and identity of as many organic compounds with a simple and easy sampling technique.

### **TO-15's HISTORY**

Over 20 years ago the EPA authored a series of 'Toxic Organic Compound' methods in ambient air. These methods are more commonly referred to as the 'TO' methods. The first useful pair of methods were TO-1 and TO-2 where organic compounds were collected on sorbent traps and introduced into a specially designed cryogenic focussing interface connected to a GC/MS (gas chromatograph/mass spectrometer). This method was the method of choice for the EPA for the determination of organic compounds in ambient air at Superfund sites and other toxic sites. To use TO-1/TO-2, the investigator needed to use an air pump to draw large volumes of air across these sorbent traps. The pumps needed to be calibrated and added to the complexity of the sampling event.

Within a few years, TO-14 began to replace TO-1/TO-2 as the method of choice. The main difference to the sampling method employed with TO-1/TO-2 was that a stainless steel vessel that resembles a basketball with a metal frame and valve was used to collect the sample. The vessel, also known as a 'SUMMA Canister' was cleaned and evacuated in the laboratory. The SUMMA canister was sent to the field where the investigator opened the valve and the sampling event would begin and end without the use of calibrated pumps and complicated media for collection.