Synergist® Solutions: Air Sampling

Developing Air Sampling Solutions When the Unexpected Happens
By Debbie Dietrich

Logically, we all know that nothing lasts forever. However, most of us would not even consider that sample collection media specified in long-standing methods could become obsolete. Unfortunately, it happens all too often. When it does, technical experts in the health and safety community must collaborate to quickly find suitable alternatives.

It is no surprise to AIHA® members that the industrial hygiene profession is a small market for large multibillion-dollar supply companies. Air sampling equipment companies such as SKC Inc. purchase bulk sorbents by the pound for sorbent tubes, while companies in larger markets purchase solid sorbents by the ton for other applications. Therefore, the sample media needs of the health and safety community are of little significance to big business.

In the recent past, several solid sorbent materials used to collect high-profile contaminants have become obsolete. With little notice, bulk sorbent materials of the proper mesh size were made unavailable; once existing inventories were depleted, the sorbent tubes and corresponding sampling/analytical methods were rendered obsolete. Examples include Hopcalite and Hydrar® sorbents specified in government agency methods for inorganic mercury; Chromosorb® 104 specified in methods for n-butyl mercaptan; and Anasorb® CMS sorbent specified in methods for anesthetic gases enflurane, halothane, and isoflurane as well as several other target compounds. Currently, silica gel in the proper mesh size is in short supply in the global marketplace. This could put methods for high-profile contaminants like formaldehyde in jeopardy.

One of the biggest blows to the air sampling community was the loss of petroleum-based charcoal. This versatile sorbent material was used to collect many target compounds, including ethylene oxide. The original OSHA Method 50 was validated in 1985 using petroleum-based charcoal coated with 10 percent hydrobromic acid (HBr). By 2006, however, petroleum-based charcoal and, consequently, OSHA Method 50 had been made obsolete. Without a sampling method for compliance, OSHA had to quickly deploy resources to address the issue. A solution came in March 2007 when OSHA published Method 1010 for ethylene oxide using HBr-coated Anasorb 747 charcoal beads for sample collection.

Solid sorbents are not the only materials that have suddenly become unavailable for air sampling. The global supply of PVC filters for sampling of hexavalent chromium, respirable crystalline silica, and other respirable dusts was nearly depleted a few years ago when the filter manufacturing facility was relocated.

At a time when implementation of the final OSHA rule for hex chrome was in full swing, sampling media for this contaminant was in very short supply.

Another shock to the air sampling world occurred in March 2009 when DuPont®, the manufacturer of Tedlar® film, announced plans to “phase out support” for Tedlar film in the sample bag market. The decision was based on the high
demand for Tedlar in other larger markets, such as solar panels. The withdrawal of Tedlar material was a shock to both industrial hygiene and environmental professionals who had standardized on Tedlar bags. For many years, Tedlar bags had been the mainstay collection medium in health and safety investigations of soil gas, odor complaints, stack emissions, biogas, and more.

The good news is that advance notice from DuPont provided time for health and safety equipment companies to identify other films and served as a catalyst for the study and utilization of new films as alternatives to Tedlar. Now there are more sample bag options for users to consider for the collection of organic vapors, sulfur compounds, and other gases.

To help health and safety professionals choose a suitable sampling bag in 2011 and beyond, SKC researchers published data showing storage stabilities for an extensive list of target compounds in new bag materials.

Even though the unexpected happened and Tedlar was no longer available for our market, health and safety professionals provided solutions for whole-air sampling with a new generation of sample bags, including the following:

**SamplePro® FlexFilm**, a proprietary material that offers lower total VOC background and good storage stability for VOCs. A 2010 AIHce poster session by SKC showed that FlexFilm’s total VOC background was three times lower than Tedlar’s and exhibited greater than 80 percent recovery for 14 VOCs after two days of ambient storage.

**Kynar**, a polyvinylidene fluoride (PVDF) film that offers low background levels for VOCs and some sulfur compounds. Analysis within 24 hours is required, however, to achieve greater than or equal to 80 percent recovery for most sulfur compounds.

**FlexFoil®,** a four-layer bag that provides sample stability for gases including hydrogen sulfide, methane, carbon dioxide, and carbon monoxide. The multiple layers prevent permeation in and out of the bag, and the inert inside surface minimizes absorption/adsorption of collected compounds. FlexFoil bags are being used frequently in biogas studies.

**FluoroFilm FEP,** bags made of fluorinated ethylene propylene (FEP), which is the most chemically inert material. Collected compounds, however, must be analyzed within 24 hours to achieve recoveries that are greater than or equal to 80 percent.

The next time you collect an air sample, take a moment to appreciate all the research and validation that went into the development of the air sampling method and the sampling media you are about to use. Consider what would happen if that sampling media was suddenly gone.

When sampling media unexpectedly become obsolete, professionals from all areas of practice collaborate to find solutions. Equipment manufacturers search for new materials, government agencies expedite method validations, and users determine the full range of applications in the field for new collection media. While change is not easy—no one wants to move away from sample collection devices that have been gold standards for decades—alternative solutions have been determined through careful study and often provide the unexpected benefit of improvement in performance.

*Debbie Dietrich, CIH, is vice president and corporate IH for SKC Inc. She can be reached at (281) 373-3056 or skcdebbie@aol.com.*