C37 Air Samples Collected in Tedlar® Bags

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After attending this presentation, attendees will understand the implications of sample handling, storage conditions, and holding times on samples collected in Tedlar bags and Summa canisters.

The impact of this presentation is to allow for a more informed choice regarding the use of Tedlar® bags or Summa canisters to accurately and cost effectively assess a site.

The purpose of this paper is to present results for air samples collected in Tedlar® bags and Summa® canisters in support of an on-going monitoring program. Implications of sample handling, storage conditions, and holding times on both sampling devices will be discussed.

A three-day holding time from the date of sample collection is specified for all samples collected in Tedlar® bags. Air samples collected in Summa® canisters are considered stable for up to fourteen days from the date of sample collection. Vapor permeation values are provided for many of the volatile organic compounds collected in Tedlar® bags because the manufacturers are aware that permeability is inherent to this collection device. Summa® canisters are not permeable. So, why would you use Tedlar® bags to collect air samples? Usually costs are the deciding factor. Tedlar® bags can be purchased at a fraction of the cost of Summa® canisters. In addition, shipping of Tedlar® bags is significantly less than the cost of shipping the much heavier Summa® canisters. Tedlar® bags for trace analyses are disposed after use while Summa® canisters must be decontaminated after each use and shipped back to the field, both of which incur additional charges. But are we sacrificing a true assessment of a site to save money?

For an on-going project, samples of untreated influent and treated effluent are collected on a daily basis in Tedlar® bags or Summa® canisters. Method TO-15 is used to analyze the samples for chloroform and carbon tetrachloride. Occasionally, Method TO-14A was used to analyze the samples when the dedicated Method TO-15 instrument was not functioning properly. A reporting limit of 0.50 parts per billion by volume (ppbv) was used for both target analytes and a calibration range of 0.50 ppbv to 40 ppbv was employed for this project. Many of the samples for this project required significant dilution to obtain concentrations of carbon tetrachloride within the established calibration range of the instrument.

Initially, the daily influent and effluent samples were placed in the same sample cooler for shipment to the laboratory. When collected in Summa® canisters, concentrations in the influent sample were consistently and significantly higher than in the effluent sample demonstrating that the facility was using an effective treatment process. However, when the daily samples were collected in Tedlar® bags and shipped together in the same sample cooler, the target analyte concentrations were very similar in the influent and effluent samples. This suggested that either the treatment process was not working properly or that an equilibration of chloroform and carbon tetrachloride concentrations was occurring between the Tedlar® bags. The client was requested to place each Tedlar® bag in its manufacturer's original box immediately after sample collection. When the separate boxes were submitted to the laboratory for analysis, the concentrations of the target analytes in the influent samples were again consistently higher than in the effluent samples.

Subsequently, during the course of the project, it was noted that the concentrations of chloroform and carbon tetrachloride were again very similar in the influent and effluent samples collected in Tedlar® bags. The client was contacted and we were assured that the samples collected in Tedlar® bags were being submitted to the laboratory in separate boxes. The laboratory was then contacted to see if any changes had been made to the laboratory sample-handling process. It was discovered that during sample log-in, the Tedlar® bags were currently being removed from their boxes and the samples were placed side-by-side in the air lab until analysis. The laboratory was requested to replace each Tedlar® bag in the box it was received in until analysis. After this procedure was implemented, the concentrations of the target analytes were again consistently higher in the influent samples.

Using four years of data, we have also observed declining concentrations of carbon tetrachloride between samples analyzed within one day of sample collection and the same samples re-analyzed between two and six days after sample collection. In some cases, the concentration of chloroform increased, suggesting degradation of the carbon tetrachloride, but in most cases the concentrations of both carbon tetrachloride and chloroform decreased, suggesting loss of these volatile compounds from the Tedlar® bags. No losses of similar magnitude were noted in the samples collected in Summa® canisters. It is apparent that Tedlar® bags are far more permeable than most people think

To increase the chances of getting an accurate measure of the target analyte concentrations, samples collected in Tedlar® bags should be shipped in their original boxes, scheduled for next day receipt at the laboratory, and analyses should be performed as soon as possible after sample receipt. To minimize cross contamination as well as loss of volatile organic compounds, we feel the use of Summa® canisters is far preferable for the collection of air samples.

Tedlar® Bags, Summa Canisters, Air Samples

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