

## CAS's Air Lab - Diffusive Sampling for Ambient Air and Other Low Level Applications

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Diffusive sampling has been a popular approach for the evaluation of workplace exposures to airborne contaminants, such as volatile organic compounds (VOCs) for some time. Typically, these "badge-type" samplers (e.g., 3M, SKC) have been used to evaluate exposures in the high part per billion (ppb) to part per million (ppm) range over an 8-hour period. A popular option, these samplers are easy to use, small in size and don't require a sampling pump.

This approach involves the passive collection of an analyte on a solid sorbent via adsorption or chemical reaction. The sampling rate (e.g., diffusive uptake rate) is a function of the diffusive coefficient, which is compound and sorbent specific, and the geometry of the sampler used. Other factors that affect performance include temperature, pressure, humidity, air velocity and transient changes in contaminant concentrations. Samples are chemically desorbed and analyzed by gas chromatography with flame ionization detection (GC/FID) or by other appropriate instrumentation.

More recently, investigators have begun utilizing these devices for applications involving lower levels of contaminants over longer periods of time. This usage has become feasible with the development of passive samplers containing solid sorbents that may

be thermally rather than chemically desorbed. This application of diffusive sampling can be useful for risk assessors and others wishing to evaluate airborne contaminant levels over extended periods of time (e.g., weeks to months).

Previously, the absence of an established method and the fact that very little data are available for longer term applications (e.g., greater than 8 hours) has proved limiting. Earlier this year, the International Organization for Standards (ISO) published a document, which defines a sampling and analytical method and also includes sampling rates for a wide range of compounds on numerous types of sorbents.

CAS Simi Valley is currently involved in a project being conducted by a regional air pollution control agency that is looking at the feasibility of utilizing diffusive samplers to monitor sub ppb levels of benzene, methylene chloride, trichloroethene and tetrachloroethene over a 30 day period. This project has presented some unique challenges that highlight some of the parameters to consider before selecting this methodology. The goal was to select a single sorbent for which there were documented sampling rates for each of the compounds of interest (preferably based on long term studies), that was also strong sorbent and hydrophobic. Chromosorb 106 was selected because it was the best compromise based on the available data. The use

of passive diffusive samplers coupled with analysis by thermal desorption/GC/MS may be a valuable tool for situations where individuals wish to monitor low level exposures over a long duration. For further information on this technology and its applications, contact Jeanette Campbell at (805) 526-7161 or [jcampbell@simi.caslab.com](mailto:jcampbell@simi.caslab.com).

