Thank you for purchasing the Supelco VOC-TD Diffusive Sampler. This unique diffusive sampler is easy to use and accurate. The diffusive membrane provides high sampling rates, which allows for lower detection limits.
**Principle**
Volatile organic compounds (VOCs) pass through the diffusive membrane and are adsorbed by the graphite carbon. The VOCs are eluted with carbon disulfide, and then analyzed by GC or GC-MS.

**Specifications**

- **Adsorbent:** Carbotrap, 190mg +/- 5%
- **Particle Size:** 24/40 mesh

Storage of New Samplers: Room temperature.
Storage of Samplers after Use: Room temperature. Samples should be analyzed within 1 week of storage.

**Identification of Parts**
Procedure

**Sampling Method**

1. Open the foil pouch and remove the tube.
2. To begin collecting the sample, unscrew and remove the VOC-TD Sampler from the storage tube.
3. Invert the sampler so the graphite carbon is contained in the white diffusive membrane.
   
   **CAUTION:** Don’t touch the surface of the diffusive membrane. Finger oils can block the membrane pores and impede diffusion.

   The VOC-TD Sampler can be used for both area and personal sampling.

4. To collect a sample from the center of the room hang the sampler from the ceiling. Connect a string (not provided) to the VOC-TD Sampler by placing it into the top of the sampler. Connect the other end of the string to the ceiling using a thumbtack, or other suitable hardware, so the sampler is positioned at the desired height.

5. Using the lapel clip (21019-U) the VOC-TD Sampler can be used for personal monitoring by attaching the lapel clip to the person’s clothing.

6. When sampling is completed, insert the Sampler back into the storage tube. Place the Sampler storage tube assembly into the foil pouch and reseal.
Desorption Method

General Description of the Desorption Procedure

1. Open the foil pouch and remove the tube.
2. The graphite carbons from the diffusive membrane to the thermal description tube.
3. The thermal description tube set into the thermal description device.
GC Analysis Conditions

Indoor Air (GC/MS)

Column: Equity-1, 30m x 0.25mm ID, 1.0µm (Cat. No. 28040-U)
Oven: 50°C (3 min.) to 100°C @ 8°C/min. to 250°C @ 20°C/min. (10 min.)
Inj.: 250°C
Det.: MSD, Scan range 33-350 amu, 260°C transfer line
Flow: Helium, 30 cm/sec @ 35°C
Injection: 1.0µL split 10:1
Liner: Split, cup design
Sample: 100ng on-column of the Japanese Indoor Air Standards Mix (Cat. No. 47537-U)

Excellent Peak Shape and Resolution

1. Ethanol
2. Acetone
3. 2-Propanol
4. Methylene Chloride
5. 1-Propanol
6. 2-Butanone
7. Hexane
8. Ethyl acetate and Chloroform
9. 1,2-Dichloroethane and 2,4-Dimethylpentane
10. 1,1,1-Trichloroethane
11. Benzene and 1-Butanol
12. Carbon Tetrachloride
13. 1,2-Dichloropropane
14. Bromodichloromethane, Isococane, Trichloroethene
15. Heptane
16. 4-Methyl-2-pentanone
17. Toluene
18. Chlorodibromomethane
19. n-Butyl acetate
20. Octane
21. Tetrachloromethane
22. Ethylbenzene
23. m-Xylene and p-Xylene
24. Styrene
25. o-Xylene
26. Nonane
27. alpha-Pinene
28. 3-Ethyltoluene
29. 4-Ethyltoluene
30. 1,3,5-Trimethylbenzene
31. 2-Ethyltoluene
32. beta-Pinene
33. 1,2,4-Trimethylbenzene
34. Decane
35. 1,4-Dichlorobenzene
36. 1,2,3-Trimethylbenzene
37. Limonene
38. Nonanal
39. Undecane
40. 1,2,4,5-Tetramethylbenzene
41. Decanal
42. Dodecane
43. Tridecane
44. Tetradecane
45. Pentadecane
46. Hexadecane

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Sampling Rate Determination

Sampling rate data for the VOC-SD Sampler is presented in the table and was obtained using a method utilizing gaseous standards in a test chamber. The process is outlined below. Alternatively, sampling rates can be determined by comparison to an active sampling method.

Standard gases in chamber method:
1. Gas standards (100ppm) were introduced into the test chamber at >500mL/min.
2. The VOC-SD sampler was set in the chamber for 24 hours.
3. VOCs were desorbed with carbon disulfide and quantified using GC-MS analysis.
4. Sampling rates are calculated by dividing the mass of VOC collected (ng) by the sampling time (min) multiplied by the actual concentration inside the test chamber (ng/mL).

\[
\text{Sampling Rate [mL/min]} = \frac{\text{ng}}{\text{min} \times \text{ng/mL}}
\]

Sampling Rate Determination

Sampling rate data for the VOC-SD Sampler is presented in the table and was obtained using a comparison to an active sampling method. The process is outlined below. Alternatively, sampling rates can be determined by comparison to utilizing gaseous standards in a test chamber method.

Active sampling comparison method:
Location: Samplers from both indoor and outdoor atmospheres.
1. Active and passive sampling is performed in various indoor and outdoor locations.
2. A typical active sampling tube such as active sampling tube can be used at 10mL/min for 2 hours. A mass flow controller is used to accurately achieve 10mL/min-sampling rate and a wet-type gas meter is used to verify the sample volume. The VOC-TD Sampler is used for 2 hours in the same location.
3. VOCs are desorbed from both samplers and quantified using GC or GC-MS analysis.
4. The effective sampling rate is obtained by multiplying the slope of the graph by 10mL/min.

Standard gases in chamber method:
1. Gas standards (100ppm) were introduced into the test chamber at >500mL/min.
2. The VOC-TD sampler was set in the chamber for 2 hours.
3. VOCs were desorbed with carbon disulfide and quantified using GC-MS analysis.
4. Therefore Uptake Rate is ug/100ppm/2hours. (ug= GC-MS analysis)
1. We prefer those rates are checked by yourself.
**Uptake Rate Calculation**

The uptake rate is the amount of sample collected (ug) at a concentration of 1 ppbv (part per billion by volume) for 1 hour. The uptake rate can be calculated from the sampling rate for each compound. The collected volume is calculated from the sampling rate at 25°C, 1 ppbv concentration and 1-hour sampling time. The collected volume is converted to weight by using the following equation.

\[
\text{Uptake Rate}[\text{ug/(ppbv x hour)}] = \frac{\text{Sampling Rate (ml)} \times 60 (\text{min}) \times 10^{-3} \text{ Liter} \times \frac{273\text{K}}{\text{Temp}\text{K}} \times 1 \text{ mole} \times \frac{\text{M.W}(\text{grams})}{\text{mole}} \times 10^6 \text{ (ug)} \times 10^{-9}}{22.414 \text{ Liter} \times 25\text{°C} - 273}
\]

**VOC Concentration Calculation Using Uptake Rate**

The concentration in air (ppbv) can be calculated from the VOC weight in micrograms (based on GC-MS analysis), exposure time in (hours) and the uptake rate, [ug/(ppbv x hour)] using the following equation:

\[
\text{ppbv} = \frac{\text{ug detected}}{\text{Uptake rate} \times \text{ppbv x hour} \times \text{Sampling Time (hour)}}
\]

**VOC Concentration Calculation Using Sampling Rate**

The concentration in air (ug/m^3) at 20°C can be calculated from the VOC weight in micrograms (based on GC analysis) and the exposure time in (hours) and the sampling rate (mL/min) determined at 25°C using the following equation.

\[
\text{\(\mu g/m^3\)} = \frac{\text{\(\mu g\) detected}}{\text{Sampling Time (hour)} \times (273 + 20)/(273 + 25) \times \frac{\text{Sampling Rate (ml)}}{\text{min}} \times 60\text{min} \times \frac{10^6 \text{ m}^3}{\text{ml}}}
\]