

PASSIVE AIR SAMPLING FOR VOLATILE ORGANIC COMPOUNDS

Health Impacts

Ozone

Financial Savings

The Maxxam Advantage

Measuring VOCs in Ambient Air at Trace Levels

There is a rapidly growing interest in passive air sampling systems for quantifying ambient concentrations of gaseous air pollutants. Passive air samplers are inexpensive, easy to use and do not require electricity to operate. Because of this, they are particularly useful in remote and wilderness areas and in regional-scale air quality assessments.

Passive samplers originally designed to monitor elevated concentrations of pollutants in working areas have been adapted in the last few years to low-level monitoring. They have been determined to be a sensitive and reliable method for the determination of Volatile Organic Compounds (VOCs) at environmental concentration levels.

Health Impacts

The principle health concern arising directly from atmospheric VOCs is from long term exposure to low levels of those which are known to be (or are suspected to be) carcinogens.

Benzene is a non-threshold toxicant - a substance for which there is considered to be some probability of harmful effects at any level of exposure. On the basis of available data, benzene is rated as carcinogenic to humans. The implementation of the Canada-wide Standard (CWS) for Benzene will reduce Canadians' exposure to this known human carcinogen. The Alberta Ambient Air Quality (AAAQ) Guidelines for one-hour benzene concentrations is 30 $\mu\text{g}/\text{m}^3$ (micrograms of benzene per cubic meter of air).

Ozone

Most VOCs contribute, in varying degrees, to the net production of tropospheric ozone by effectively interfering with the equilibrium. Such VOCs produce peroxy radicals in the presence of sunlight (photochemically) and these, in turn, oxidize nitric oxide to nitrogen dioxide, resulting in a net production of ozone.

Long term exposure has been seen to damage vegetation and materials. Because of their role in ozone formation, VOCs are contributors to global warming, and are subject to the 1992 Climate Change Convention and the Kyoto summit agreements.

Financial Savings

With a knowledge of sources of VOCs, a site can effectively target maintenance programs. This can generate a financial benefit through reducing the loss of valuable refined species. For example, by being able to pinpoint where their emissions were coming from, a refinery in Sweden was able to reduce their VOC emissions and save an estimated \$1 Million per annum.



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Analysts in the Edmonton Passive Air Laboratory.

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By using gas chromatography-mass spectrometry (GC-MS) analysis for the majority of our passive air projects, we are able to deliver industry-leading detection limits that are much lower than current regulatory requirements. Please refer to the table of "Target Compounds with Minimum Detection Limits" for a summary of the parameters measured.

In addition to VOC analysis, Maxxam's passive air laboratory offers the convenience of expert consulting and analysis of additional pollutants such as: SO₂, H₂S, NO₂, O₃, NO_x and NH₃.

As your partner in science, you can count on expert help from Maxxam.

Target Compounds with Minimum Detection Units

Target Compounds	MDL, µg/m ³
Chloroform	0.078
1,1,1-Trichloroethane	0.089
Carbon tetrachloride	0.111
Benzene	0.144
Heptane	0.078
Trichloroethylene	0.067
Methylcyclohexane	0.022
4-Methyl-2- pentanone (MIBK)	0.111
Toluene	0.044
Octane	0.044
1,1,2-Trichloroethane	0.100
Tetrachloroethylene	0.111
2-Hexanone	0.111
Chlorobenzene	0.044
Ethylbenzene	0.033
Total Xylene	0.144
Nonane	0.100
Styrene	0.044
Isopropylbenzene	0.033
3-Ethyltoluene	0.044
1,3,5-Trimethylbenzene	0.078
Decane	0.100
1,2,4-Trimethylbenzene	0.033
d-Limonene	0.156
1,4-Dichlorobenzene	0.044
1,2-Dichlorobenzene	0.067
Undecane	0.156
Dodecane	0.089
Naphthalene	0.233

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