

Lotus Consulting Presents:

Threshold Alarming for Chlorinated Hydrocarbons (TACH)

Chlorinated solvent vapors can have serious detrimental effects on human health, especially for workers dealing with waste materials and industrial processes. Both the US Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH) publish Permissible Exposure Limits (OSHA) and Threshold Limit Values (ACGIH) for a full range of organic compounds. Three types of PEL/TLVs are defined: time-weighted average - TWA (typically on the basis of a 8 hours/day), short-term exposure limit - STEL (spot exposure

for 15 minutes), and ceiling limit - C (maximum exposure at any time). Values for TLVs vary due to the toxicity variations of differing chemical compounds. Several examples from ACGIH/ and OSHA are listed below:

Chemical	ACGIH TLV-TWA	ACGIH TLV-STEL	OSHA PEL-C
Carbon Tetrachloride	5 ppmV	10 ppmV	25 ppmV
1,1,1-Trichloroethane	350 ppmV	450 ppmV	-
Chloroform	10 ppmV	-	50 ppmV
Methylene Chloride	50 ppmV	100 ppmV	-



Bruker 450 Gas Chromatograph mounted on a portable cart with supply gases on bottom shelf.

Gas chromatography is the ideal analytical technique to assess many of these compounds, especially with specific detectors, such as electron capture for chlorinated analytes, or photoionization for aromatics and olefins. And having the whole system, including workstation, supply gases and standards, mounted on a portable cart, allows the unit to be placed near work areas for monitoring ambient air.

The Bruker 450 Gas Chromatograph is the **perfect** instrument to measure these compounds, with its ability to possess up to three detectors, and to report results from all three within a single sampling procedure. Figure 1 illustrates a typical measurement of a standard mixture with electron capture detection.

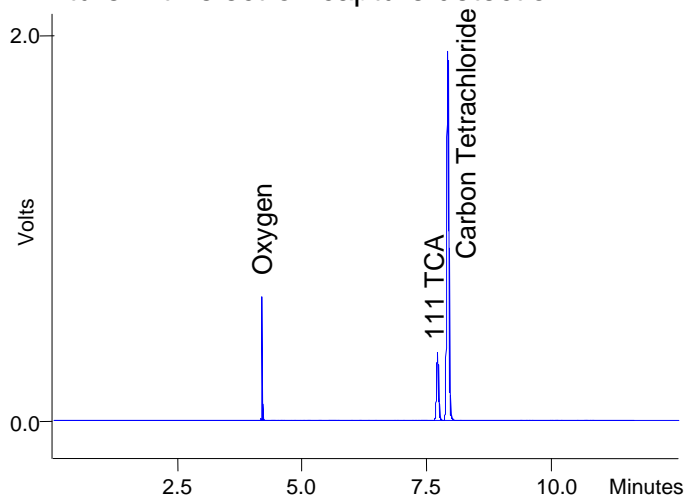
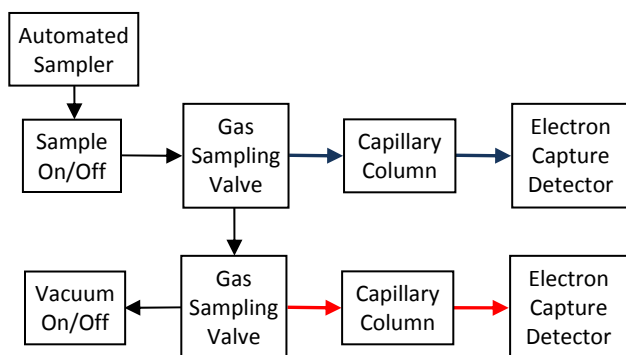


Figure 1. Typical ECD chromatogram of 10 ppmV standard of 1,1,1 Trichloroethane and Carbon Tetrachloride, 30 µl sample, split 1:10.

Results are typically reported every 15-20 minutes, depending on the chromatography for the target compounds. Data are continuously collected without operator interactions. A custom software program gathers all of the data and compares results to established Threshold Limit Values. When the analyte level exceeds these action levels, an alarm is triggered with flashing lights and audible horns.

An automated sampler is included to allow measurements at several sites away from the locale of the instrument. And two positions are reserved for a system blank and a calibration/verification mixture that can be chosen through the workstation, at preselected intervals in the sampling sequence.



Typical plumbing scheme for measuring chlorinated hydrocarbons with two parallel chromatographic pathways.

Electron capture responses for chlorinated hydrocarbons can vary by significant amounts, depending on the number of chlorines attached to the central carbon(s). In the chromatogram above, even though the two analytes have equal concentrations, Carbon Tetrachloride with four chlorines yields a signal 6 times that of 1,1,1 Trichloroethane with three chlorines. To ensure that the signals generated match target levels, two or three independent chromatographic paths are provided, with one detuned to keep high responders on scale, while enabling lower ones to be properly detected with second and/or third channels.

Specifications

Gas Chromatograph

- Capable of simultaneous and independent operation of up to three detectors.
- Up to 15 independent time-programmable valve actions with at least 99 separate timed steps.
- All valve actions under full control of chromatograph and Workstation.
- All valves physically mounted within independently heated enclosure.
- Automated sampler with preselected 4, 6, 8, 10, 12 or 16 positions, with complete control from Workstation.
- Column temperature range from ambient +4 °C to 450 °C programmable in 0.1 °C/min to 100 °C/min ramp rates.
- Time-programmable column split ratios from 1-10,000 (column dependent).
- Ethernet (TCP/IP) connection to Workstation with Windows 7.
- Mounted on self-contained cart, needing only external electrical power.

Electron Capture Detector

- ✓ Pulsed ⁶³Ni radioactive source.
- ✓ General radioactivity license – **NO** troublesome site-licensing mandated; wipe test required once every 3 years.
- ✓ Detectivity: < 7 fg/sec Lindane
- ✓ Maximum data rate - 100 Hz
- ✓ Linear dynamic range: >10⁴
- ✓ Maximum temperature: 450 °C

TACH Alerts

- Unattended monitoring of analyte concentration levels in ambient air.
- User-configurable TLV and ½ TLV action levels for specified compounds.
- Light tree activated when action levels are exceeded, with user-selectable actions.
- Warning settable if results are not available after specified time interval, or fail control check criteria.
- Results summarized and available for uploads in variety of formats.

Lotus Consulting

310/569-0128

email ebramstoncook@msn.com



5781 Campo Walk
Long Beach, California 90803