Methylene Chloride-Specific Measurements Using The UltraRAE

OSHA Standard Drops 20-fold

More than 200,000 workers in the USA alone handle methylene chloride (dichloromethane, or DCM). OHSA's most recent standard cuts exposures to the solvent as much as 20-fold (62 FR 1494), to protect workers from methylene chloride, which is used as a:

- Paint stripper in industries from airlines to furniture refinishers to ship building
- Solvent for cleaning chemical tanks
- Solvent in the manufacture of plastics, flexible foam, sealants, and photographic film stock
- Adhesive in the assembly of plastic parts

Limit Drops from 500 to 25 ppm

Under the latest standard, employers have had to reduce exposures from 500 ppm, dating from the 1970s, to 25 ppm measured over an eight-hour, time weighted average period (TWA). The 15-minute Short Term Exposure Limit (STEL) is now 125 ppm. With an olfactory threshold of 160 ppm, these new levels are well below the ability of someone to smell the methylene chloride. Therefore, measurement is required to establish worker exposures.

Measurement Can Reduce Compliance Cost

The standard was expected to cost employers about $100 million each year, or about $426 per exposed worker, according to OSHA. Direct measurement of methylene chloride can help reduce the cost of laboratory testing and engineering controls by immediately establishing levels of the chemical. If levels of methylene chloride are under 25 ppm, then the area is safe for workers and further testing or engineering controls are not necessary.

Using PIDs to Measure Methylene Chloride

Photoionization detectors (PIDs) can measure volatile organic compounds (VOCs) in parts per million and provide a very effective means of determining worker exposures to methylene chloride. Because methylene chloride has an ionization potential of 11.3 eV, an 11.7 eV lamp must be used in any PID measuring methylene chloride.

When is Specificity Needed?

PIDs are a very effective means of measuring total VOCs, but they are typically not specific to any compound. Many companies that use methylene chloride also use other solvents that typically have lower toxicity but can cause high total VOC readings. When using methylene chloride, if the PID measures 25 ppm or less with an 11.7 eV lamp, then no further analysis is needed. But if the total VOC reading is over 25 ppm, then a RAE-Sep™ halocarbon tube can be used to remove the cross-sensitizing gases so that only methylene chloride is measured.

UltraRAE for Methylene Chloride

The UltraRAE can monitor methylene chloride in the presence of atmospheric concentrations of other industrial solvents, such as toluene, ethyl acetate, and acetone. Methylene chloride can be measured in the range of 0 to 200 ppm with a resolution of 0.2 ppm within 30 seconds. A VOC tube is first inserted into the UltraRAE to check for total VOC concentrations greater than 25 ppm. A one-shot RAE-Sep™ halocarbon tube can then be inserted to determine the exact methylene chloride concentration. Chlorinated solvents such as chloroform and carbon tetrachloride can also be measured, but at lower sensitivities and at longer measurement times (45 and 60 seconds, respectively).

Table 1. Response to potential DCM interferences.

Compound	Concentration (ppmv)	Apparent DCM Response
Acetone	300	0.0
Ethanol	300	0.0
Ethyl acetate	300	0.0
Methane	25000	0.0
n-Octane	200	0.0
Tetrahydrofuran	300	0.0
Toluene	300	0.0

RAE Systems Inc.
3775 N. First St., San Jose, CA 95134-1708 USA
Phone: +1.888.723.8823
Email: raesales@raesystems.com
Web Site: www.raesystems.com