

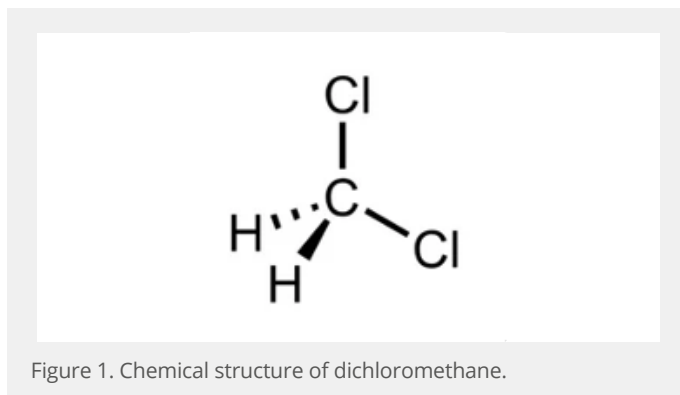
APPLICATION NOTE



# Analysis of Dichloromethane in Ambient Air

## Introduction

Dichloromethane (synonyms methylene chloride, methylene dichloride, CH<sub>2</sub>Cl<sub>2</sub>) is colorless, volatile liquid used for the extraction, purification, and synthesis of active pharmaceutical ingredients. Although dichloromethane is very versatile in its uses, short term exposure to dichloromethane may result in harm to the central nervous system and long term exposure may result in damage to the liver and/or lungs.



## Workplace Monitoring

Life safety monitoring within pharmaceutical facilities permits for early, fast detection of potentially life-threatening dichloromethane releases. Potential exposures are mitigated with monitoring which ensures immediate identification of health and safety concerns in the workplace and allows for immediate action to reduce worker health and safety risks.

Global, national, and state organizations, such as the Occupation Safety and Health Administration (OSHA), American Conference of Governmental Industrial Hygienists (ACGIH), and the Division of Occupational Safety and Health of California (CAL OSHA) offer guidance on exposure limits for hazardous chemicals. Table 1 shows the OSHA and CAL/OSHA permissible exposure limits (PELs), along with the ACGIH threshold limit value (TLV), for dichloromethane.

Chemical	OSHA PEL (USA)	ACGIH TLV (USA)	CAL/OSHA PEL (USA)	OEL (EU)	WEL (UK)	MAK (Germany)	MAX300™ - TGM Detection Limit
Dichloromethane	25 ppm	50 ppm	25 ppm	100 ppm	100 ppm	50 ppm	0.1 ppm

Table 1. Actionable levels by chemical compared to the lower detection limit of the MAX300™ - TGM

Source: <https://www.osha.gov/chemicaldata/572>

Mass spectrometry has several technical advantages for continuous monitoring of dichloromethane in ambient air. The large diameter quadrupole used in the MAX300-TGM provides excellent sensitivity enabling the detection of dichloromethane down to approximately 0.1 ppm. This detection limit allows measurement far below the published occupational exposure limits shown in Table 1.

In addition, the MAX300-TGM is quick to respond to dichloromethane at low (ppm) levels enabling for fast response before hazardous levels are reached. The quick response times of the MAX300-TGM are demonstrated in Figures 2 for the introductions of approximately 0.7 ppm of dichloromethane.

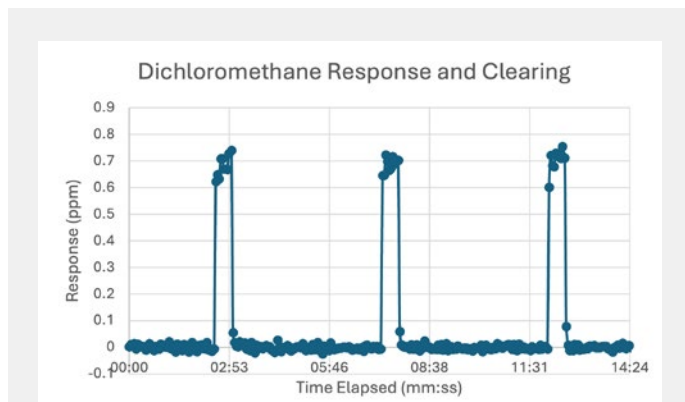


Figure 2. Introduction of approximately 0.7 ppm (700 ppb) dichloromethane to the analyzer. The T90 response and clearing are less than 10 seconds.

Figure 3 shows the linearity of dichloromethane readings from approximately (0.175 ppm to 3.498 ppm). Linearity across this range ensures concentrations are not reported artificially low or high, providing confidence in readings in the event of an alarm and allowing for accurate incident reporting.

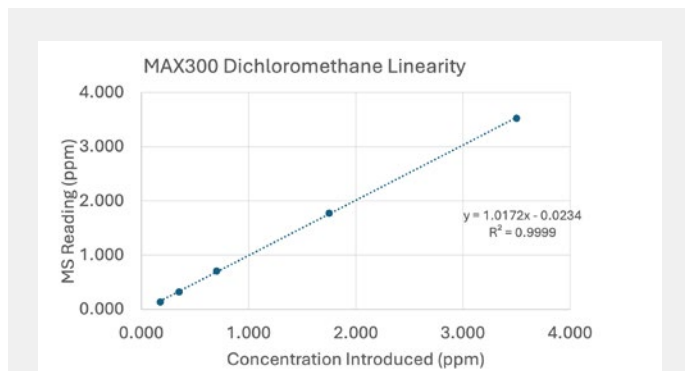


Figure 3. Demonstrated linearity of dichloromethane across a range of concentrations (0.175 ppm to 3.498 ppm).

## Optimized for Toxic Gas Monitoring

The MAX300-TGM mass spectrometer, from Process Insights, offers streamlined operation with a centralized analyzer; capable of analyzing 16 to 46 sample points. Additional hazardous chemicals can also be added to meet additional monitoring needs while still maintaining chemical selectivity. The analyzer can easily be updated in the field to increase the number of sample points or chemicals if monitoring requirements change.

While keeping analytical performance in mind, Process Insights' MAX300 Questor5™ software was designed for flexible and configurable ambient air monitoring. The software allows for user defined alarm levels to be specified for each chemical. Figure 4 shows the configurable results display, which allows for an at-a-glance overview of active alarms. These alarms are also easily output to plant control for immediate action when safety is at risk. The software can also be programmed to "revisit" sample points triggering an alarm for confirmation while still cycling through additional sample points.



Figure 4: Questor5 software user interface showing Level 1 (yellow) and Level 2 (red) alarms.

## Summary

Ambient air monitoring for dichloromethane using the MAX300-TGM provides fast and accurate measurements to help meet the recommendations of Environmental, Health and Safety initiatives. In addition to site safety, the versatile and flexible analyzer platform allows for multiple sample points on a single analyzer and avoidance of costly false alarms. For additional information on how our products meet these and other application needs, check out the MAX300-TGM product notes or visit [www.process-insights.com](http://www.process-insights.com).

## GAIN REAL-TIME INSIGHT INTO YOUR PROCESS

Process Insights delivers premium analytical sensors, analyzers, instrumentation, software and solutions that are mission-critical to keep your operations, personnel, and the environment safe. Our commitment to customer satisfaction is evident through our diverse range of products, programs, and services, designed to accommodate various budgets and application needs.

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## CENTERS OF EXCELLENCE

### Process Insights – The Americas

14400 Hollister Street, Suite 800B, Houston, TX 77066, USA

☎ +1 713 947 9591

[info.americas@process-insights.com](mailto:info.americas@process-insights.com)

### Process Insights – EMEAI

ATRICOM, Lyonerstrasse 15, 60528 Frankfurt, Germany

☎ +49 69 20436910

[info.emeai@process-insights.com](mailto:info.emeai@process-insights.com)

### Process Insights – CHINA

Wujiang Economic and Technology, Development Zone No. 258 Yi He Road,  
215200 Suzhou, Jiangsu Province, China

☎ +86 400 086 01


[info.cn@process-insights.com](mailto:info.cn@process-insights.com)

### Process Insights – APAC

Premier@Kaki Bukit, 10 Kaki Bukit Ave 4, Blk 10 #05-65, Singapore 415874

☎ +65 6489 6612

[info.apac@process-insights.com](mailto:info.apac@process-insights.com)



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