



1,4-Dioxane in Aqueous Environmental Samples

Until recently, the compound 1,4-dioxane has received little attention from regulating authorities throughout the U.S. It was developed as a stabilizer compound to enhance solvent life and prevent decomposition from light, heat, oxygen, acids, etc. and is listed by the EPA as a Class B2 probable carcinogen. Solvents such as trichloroethane (TCA) contain 1,4-dioxane and have been used in metal cleaning, degreasing, electronics and many other applications. 1,4-dioxane is also used as a solvent in lacquers, paints, oils and plastics. (EPA 749-F-95-010a)

Although 1,4-dioxane is listed as a volatile compound in SW-846 8260B and the Appendix IX list of compounds, the EPA has not included it in the Target Compound List (TCL) or Priority Pollutant List (PPL). Thus, site investigations and remedial designs may have failed to account for its presence.

Regulations

The EPA has not yet established Maximum Contaminant Levels (MCL) for 1,4-dioxane but has issued a health-based advisory level of 3 µg/L for drinking water. Project-specific limits may vary from 1 to 70 µg/L, depending on your regulator or state agency. Check with your regulator to determine what specific action limit will be applied to your project.

Sample Analysis

Due to the high solubility and polarity of 1,4-dioxane, typical GC/MS 8260 analysis achieves a method detection limit (MDL) of 70 µg/L and relative response factor (RRF) of 0.008. A RRF of 0.008 may cause your regulators to reject the data.

If you need to achieve the highest data quality available for 1,4-dioxane, our GC/MS Groups offer several options:

SW-846 8260 Selected Ion Monitoring (SIM) with Isotope Dilution

1,4-dioxane is listed within the 8260 analysis method and can be collected in 40-mL vials. This GC/MS purge-and-trap method offers improved sensitivity and response by setting the detector to SIM mode and utilizing a 1,4-dioxane-d8 internal standard. With this analysis method we can achieve:

Method Detection Limit (MDL)	0.5 µg/L
Limit of Quantitation (LOQ)	2 µg/L
Relative Response Factor (RRF)	~1

SW-846 8270

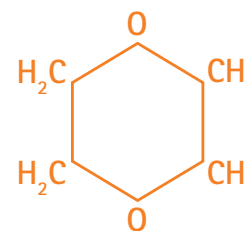
This method consists of the solvent extraction of 1 Liter of sample followed by a GC/MS analysis. It provides the economic benefit that 1,4-dioxane can be added to any Semivolatile Base Neutral analysis at no additional charge and achieves:

Method Detection Limit (MDL)	1 µg/L
Limit of Quantitation (LOQ)	5 µg/L
Relative Response Factor (RRF)	0.75

8270 SIM analysis is also available for extremely low limits of 0.05 µg/L MDL and 0.1 µg/L LOQ (RRF ~0.75). Additional analysis options are available to meet your specific application.

Chemical Properties

Formula: C₄H₈O₂
 CAS Number: 123-91-1
 Molecular Weight: 88.106
 Melting Point (°C): 11.8
 Boiling Point (°C): 101.1
 Vapor Pressure: 27 mm Hg
 Flashpoint (°C): 12



1,4-dioxane

Synonyms

- 1,4-diethylene dioxide
- 1,4-diethylene oxide
- p-dioxane
- diethylene oxide
- dioxyethylene ether
- diox
- ethylene glycol ethylene ether
- diethylene ether

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