

Application Note

EPA Method TO11 Determination of Formaldehyde in Ambient Air using Adsorbant Cartridge followed by High Performance Liquid Chromatography (HPLC)

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Abstract

This application brief highlights the determination of formaldehyde in ambient air using adsorbant cartridge followed by High Performance Liquid Chromatography

Benefits

- Determination of Formaldehyde in Ambient Air
- EPA Method T011

Introduction

Formaldehyde is an important industrial chemical used in the manufacturing of other chemicals, building materials, and household products. It is one of the large family of chemical compounds called volatile organic compounds or "VOCs". At normal room temperatures these compounds vaporize. When present in air at levels above 0.1 ppm it can cause watery eyes, burning sensations in the eyes and nasal passages, as well as coughing, wheezing, and allergic reactions.

Formaldehyde has been classified as a potential carcinogen and, as such, is regulated in many countries: Japan, 0.08 ppm; World Health Organization Europe, 0.08 ppm; Sweden, 0.1 ppm; US Department of Housing and Urban Development, 0.4 ppm.

Experimental

HPLC conditions

Instrument:	Waters Alliance HPLC system with UV detection
Eluent:	Water/tetrahydrofuran/acetonitrile
Column:	Waters XBridge Phenyl, 3.5 μm , 4.6 x 150 mm @ 35 °C
Injection:	20 μL each of AccuStandard mix (M- 8315-R1- DNPH and M- 8315- R2- DNPH) diluted 1:5 in 40:60 water/acetonitrile
Flow Rate:	1.5 mL/min
Detection:	UV @ 360 nm
Data:	Waters Empower software

Sample preparation

Use Sep-Pak DNPH Silica cartridge, backflush cartridge with acetonitrile.

Eluent preparation

Filter and degas through a 0.45 μm filter.

A: 90% water, 10% tetrahydrofuran (THF). Mix 900 mL water and 100 mL stabilized THF.

B: Acetonitrile

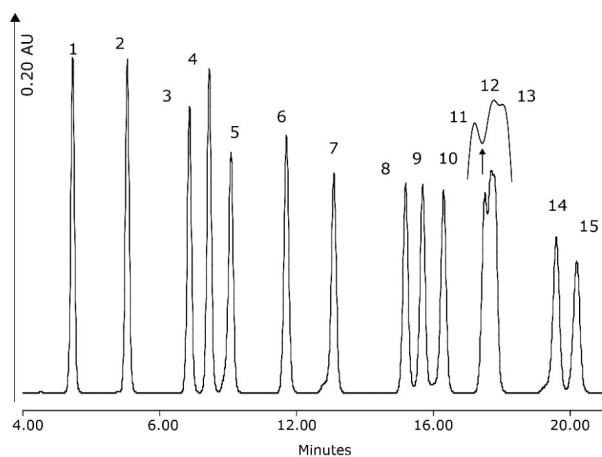
Eluent gradient. For EPA methods 554 and 8315 Option 1.

Time	Flow	%A	%B	Curve
Initial	1.5	70	30	-
20	1.5	36	64	6
22	1.5	36	64	6
22.1	1.5	70	30	6

Eluent gradient for EPA Methods TO11 and 8315 Option 2.

Time	Flow	%A	%B
Initial	1.5	70	30
16	1.5	53	47
21	1.5	53	47
21.1	1.5	70	30

Results and Discussion



Peak	Analyte	Peak	Analyte
1	Formaldehyde	9	Isovaleraldehyde
2	Acetaldehyde	10	Pentanal
3	Acetone	11	o-Tolualdehyde
4	Acrolein	12	p-Tolualdehyde
5	Propanal	13	m-Tolualdehyde
6	Crotonaldehyde	14	Hexanal
7	Butanal	15	2-5 Dimethylbenzaldehyde
8	Benzaldehyde		

*EPA method TO11 and 8315-02 analytes, 20 ppm as
DNPH analytes.*

References

1. Determination of Formaldehyde in Ambient Air 720001988EN
2. Analysis of DNPH Derivatives using XBridge Phenyl WAT60186

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[Empower 3 Chromatography Data Software](#)

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