

Application Note

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

---

Waters Corporation



---

## 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 manu-facturing 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 $\mu$ m, 4.6 x 150 mm @ 35 °C
Injection:	20 $\mu$ L 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  $\mu$ m 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.

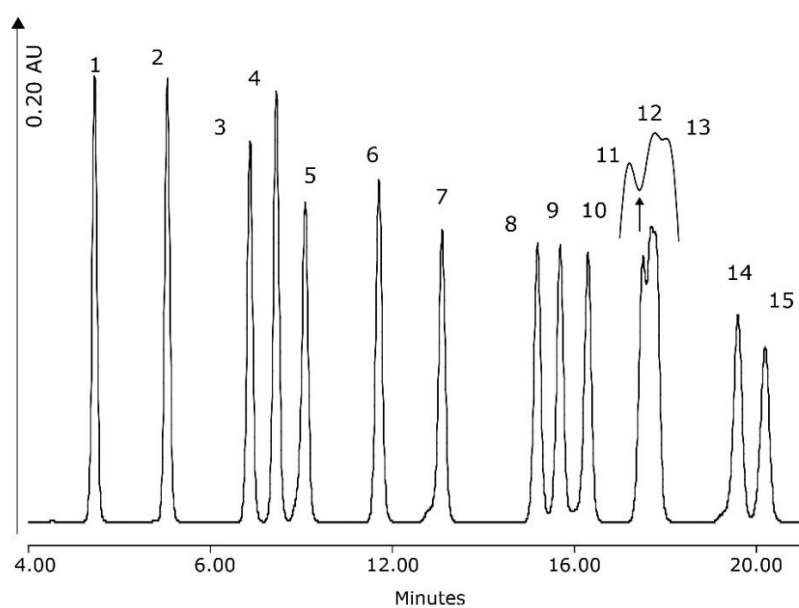
Time	Flow	%A	%B	Curve
Initial	1.5	70	30	-
20	1.5	36	64	6
22	1.5	36	64	6
22.1	1.5	70	30	6

## Eluent gradient for EPA Methods TO11 and 8315 Option 2.

Time	Flow	%A	%B	Curve
Initial	1.5	70	30	-
16	1.5	53	47	6
21	1.5	53	47	6
21.1	1.5	70	30	6

---

## 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

---

## Featured Products

Alliance HPLC System <<https://www.waters.com/534293>>

Empower 3 Chromatography Data Software <<https://www.waters.com/10190669>>

720002738, 2008

©2019 Waters Corporation. All Rights Reserved.