



## Carbamates in Fruits and Vegetables

---

Waters Corporation



This is an Application Brief and does not contain a detailed Experimental section.

---

### Abstract

Carbamates have been identified as a health risk. They affect the nervous system by reducing the ability of cholinesterase, an enzyme, to function properly in regulating the neurotransmitter acetylcholine.

---

## Introduction

Carbamates have been identified as a health risk. They affect the nervous system by reducing the ability of cholinesterase, an enzyme, to function properly in regulating the neurotransmitter acetylcholine.

---

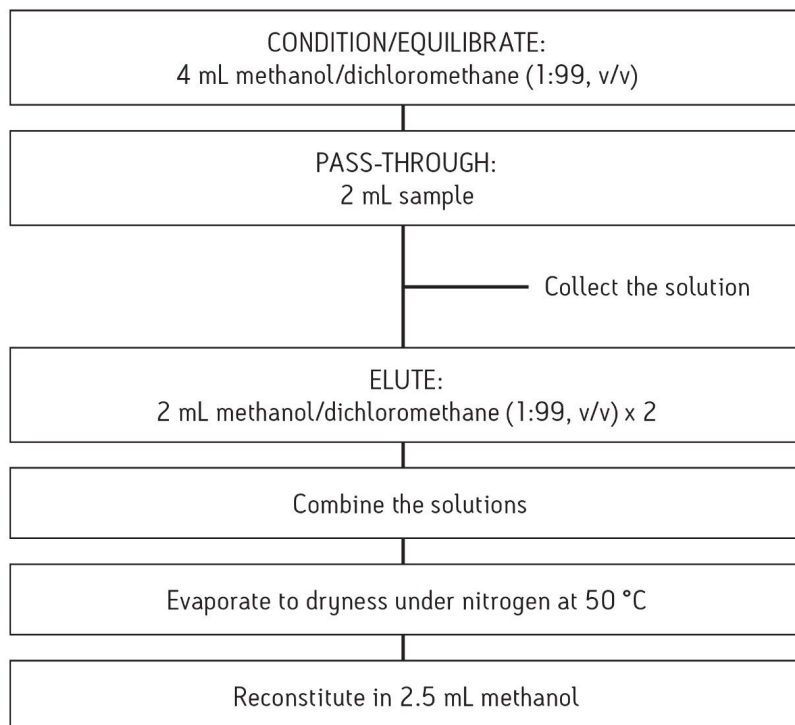
## Experimental

### Pre-treatment

1. Add 50 mL of acetonitrile to 25 g of sample. Homogenize for 2 minutes and filter.
2. Collect 40-50 mL of filtrate into a flask containing 5–7 g sodium chloride.
3. Shake vigorously for 1 minute. Leave to stand at room temperature.
4. Take 10 mL aliquot from the acetonitrile layer and evaporate sample to dryness (80 °C under nitrogen or air).
5. Reconstitute with 2 mL methanol/dichloromethane (1:99, v/v).

## SPE Procedure

Sep-Pak® Aminopropyl 6 cc/500 mg



## LC Conditions

|                 |   |
|-----------------|---|
| System:         | Alliance HPLC 2695                      |
| Column:         | Carbamate Analysis Column, 3.9 x 150 mm |
| Flow rate:      | 1.5 mL/min                              |
| Mobile phase A: | Water                                   |
| Mobile phase B: | Methanol                                |
| Mobile phase C: | Acetonitrile                            |
| Sample:         | 10 ng of each analyte on column         |

Injection volume: 400 µL

Post column addition: OPA\*/NaOH @ 0.5 mL/min

Detector: 2475 Multi Wavelength Fluorescence Detector

Excitation wavelength: 339 nm

Emission wavelength: 445 nm

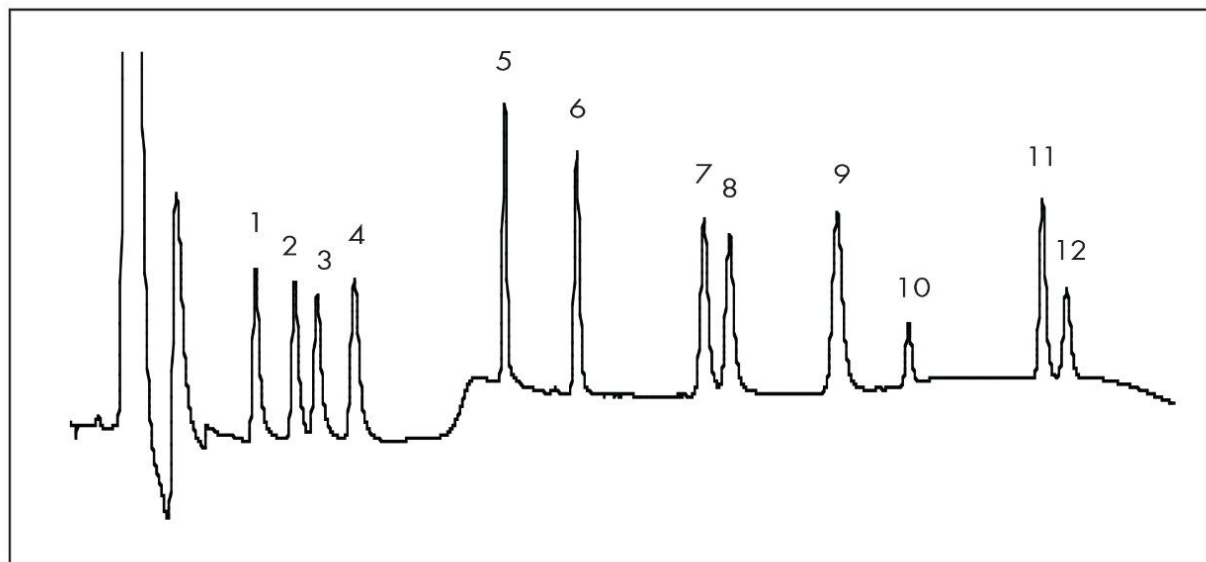
*\*OPA: Orthophthaldehyde*

### Gradient:

| Time (min) | A% | B% | C% |
|------------|----|----|----|
| 0.00       | 88 | 12 | 0  |
| 5.30       | 88 | 12 | 0  |
| 5.40       | 68 | 16 | 16 |
| 14.00      | 68 | 16 | 16 |
| 16.10      | 50 | 25 | 25 |
| 20.00      | 50 | 25 | 25 |
| 22.00      | 88 | 12 | 0  |
| 30.00      | 88 | 12 | 0  |

---

## Results and Discussion



---

*Chromatogram of aldicarb standards.*

| Peak | Analyte             | 400 $\mu$ L |
|------|---------------------|-------------|
| 1    | Aldicarb Sulfoxide  | 3.77        |
| 2    | Aldicarb Sulfone    | 4.66        |
| 3    | Oxamyl              | 5.17        |
| 4    | Methomyl            | 6.03        |
| 5    | 3-Hydroxycarbofuran | 9.83        |
| 6    | Aldicarb            | 11.46       |
| 7    | Propoxur            | 14.35       |
| 8    | Carbofuran          | 14.94       |
| 9    | Carbaryl            | 17.37       |
| 10   | 1-Naphthol          | 18.99       |
| 11   | Methiocarb          | 22.02       |
| 12   | BDMC                | 22.56       |

---

*Expected retention times for aldicarb standards.*

---

## References

1. Ministry of Agriculture, China (NY/T 761.1 – 2004 and NY/T761.3 – 2004).

---

## Featured Products

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

720002598, April 2008