

Carbamate Analyzer

YL Carbamate Analyzer tests for the presence of carbamate pesticides on agricultural crops, and for Carbamate pesticides in drinking and waste water. Carbamate pesticides are a universal pesticide applied to agricultural crops and fields to minimize damage caused by harmful insects and fungi, and to control weeds. Human's exposure to Carbamate primarily occurs by ingestion of fruits, grains, and vegetables that have been treated with Carbamate pesticide during crop production, or indirectly by Carbamate pesticide entering drinking water sources used for drinking, cooking, and bathing.

Testing for the presence of Carbamate pesticides on fruits, grains, and vegetables, as well as in drinking water sources is important. Carbamate is known as an acetylcholinesterase inhibitor, which leads to increased levels of acetylcholine at nerve terminals. Increased acetylcholine levels can lead to muscle weakness and paralysis. For this reason, a simple and credible high resolution analysis method should be established to test for the presence of Carbamate residues on agricultural crops, and in drinking and waste water.

Testing for Carbamate pesticides using Post-column derivatization replaces the GC-ECD method because of an automated sample preparation and analysis procedure that is able to analyze for and to quantify residual traces of Carbamate simultaneously.

There are 13 Carbamate pesticides employed world wide, which are not included in the 10 compounds covered by the U.S. Environmental Protection Agency's (USEPA) Method 531.1 and AOAC Protocol 29.A05.

For instance, N-methyl Carbamate contains the N-methyl Carbamoyl which is extracted with a reverse column. In the presence of a basic environment and high temperature, the molecule decomposes to alcohol, CO₂ and methylamine through hydrolysis.

Isoindole which is a fluorescent molecule is produced by reacting methylamine with OPA or nucleophilic thiofluor. This test satisfies the AOAC Protocol by meeting the requirements of accuracy and precision of USEPA Method 531.1 and A05, when testing for carbamate residues.

• Useful Information

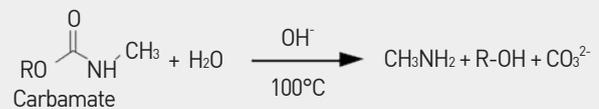
Principle of analysis

The test for Carbamate pesticides is composed of two procedures. The first procedure isolates samples through a reverse column, while the second procedure is a derivatization through post-column. In respect samples separation, the C18 column employs methanol and water gradient mobile phase to vary the composition's ratio of the eluant and time.

After separation, the eluted sample is subjected to two additional steps: 1) a hydrolysis procedure and 2) a procedure of derivatization.

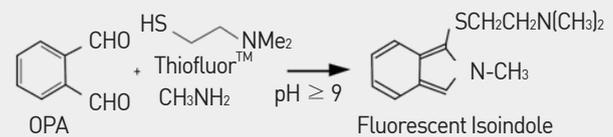
1) Hydrolysis

After column separation, each separated constituents of samples decompose to alcohol, carbonate, and methylamine by reacting with NaOH, which is reagent for hydrolysis, at 100 °C.



2) Derivatization

Isoindole, which is fluorescent molecule, is produced by reacting methylamine generated via hydrolysis with OPA reagent or Thiofluor.



Procedure of Derivatization for Carbamate Pesticides

• Application

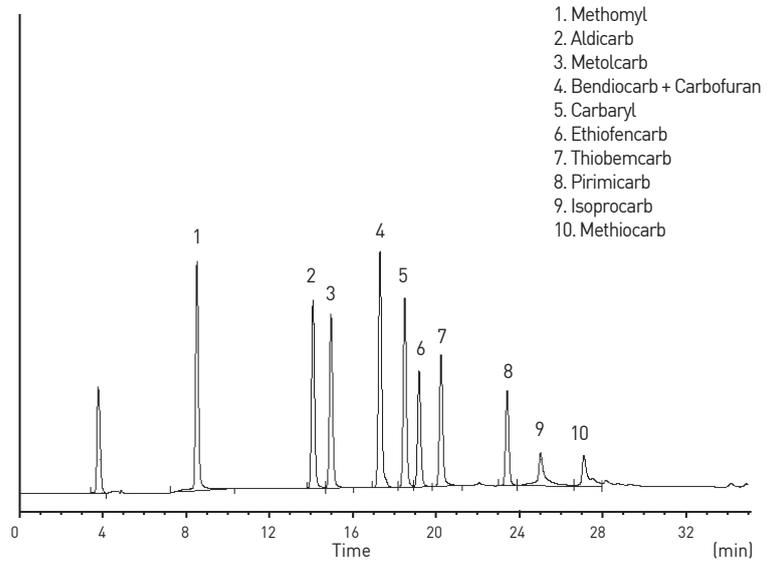
- Vegetables
- Testing of agricultural crop
- Testing of dinking water sources

■ 11 Kinds of Carbamate Standards in Agricultural Products

- Mobile phase : Water: ACN= Gradient
- Column oven : 40 °C
- Detector : FLD Ex 340 nm/Em 455 nm
- Injection volumn : 20 µl

Pinnacle PCX with 0.5 ml reactor

- Reagents flow rate : 0.3 ml/min
- Reactor : Temp 100 °C,
Hydrolysis reagent 0.3 ml/min
OPA reagent 0.3 ml/min
- Column : Carbamate C18
(4.6 mm, 250 mm, 5 µm)



1. Methomyl
2. Aldicarb
3. Metolcarb
4. Bendiocarb + Carbofuran
5. Carbaryl
6. Ethiofencarb
7. Thiobemcarb
8. Pirimicarb
9. Isoprocarb
10. Methiocarb

■ Iminoctadines

- Mobile phase : A - Water 28 % : Ammonia Solution (69:1) Mixture
(pH 2.5/60 % adjustment with HClO4)
B - 40 % Methanol
- Column oven : 40 °C
- Detector : FLD Ex 305 nm/Em 500 nm
- Injection volumn : 100 µl

Time (min)	Flow rate (ml/min)	Mobile phase A (%)	Mobile phase B (%)
0	1	60	40
15	1	10	90
18	1	10	90
19	1	60	40

Pinnacle PCX with 0.5 ml reactor

- Post reaction pump : 0.4 ml/min,
- Reactor : Temp 80 °C, 0.5N NaOH 0.4 ml/min,
0.15 % Ninhydrin 0.4 ml/min
- Column : Carbamate rapid analysis C18
(4.6 mm, 150 mm, 5 µm)

