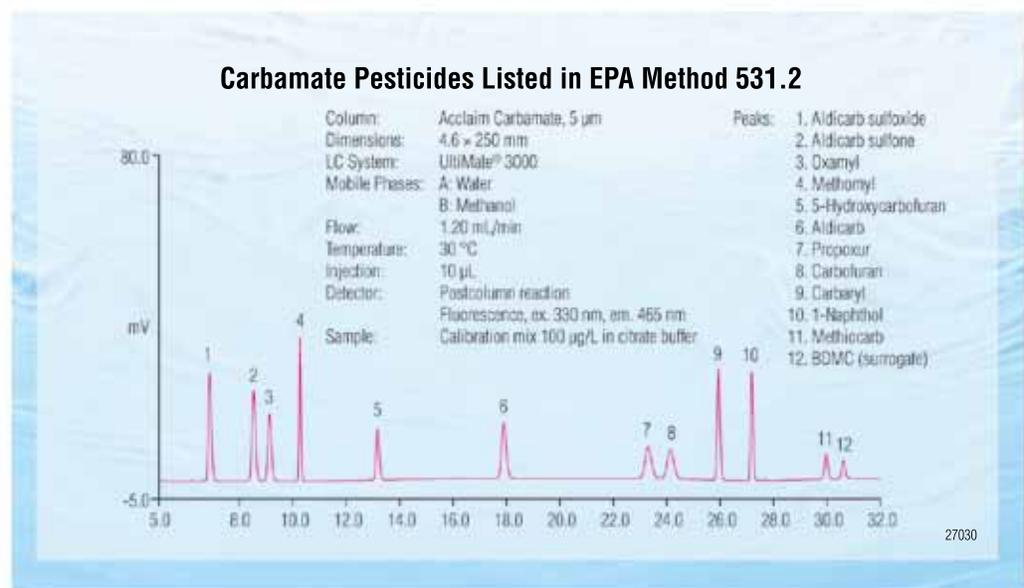


The Acclaim Carbamate Column—A Superior Solution to Carbamate Pesticide Analysis (U.S. EPA Method 531.2)



The Acclaim® Carbamate columns are designed for the baseline separation of carbamates specified in the U.S. EPA Method 531.2, using LC-postcolumn derivatization-fluorescence or LC-MS detection.

- Baseline separation of carbamate pesticides specified in the U.S. EPA Method 531.2.
- Use with either LC-postcolumn derivatization-fluorescence or LC/MS detection.
- Compatible with both binary (methanol/water) and ternary (acetonitrile/methanol/water) mobile phase gradients.
- High efficiency, extremely low column bleed, and rugged column packing.

N-methylcarbamates and *N*-methylcarbamoyloximes are among the most widely used pesticides worldwide. The residual carbamates pollute drinking water sources causing environmental and health concerns.¹ The U.S. EPA method 531.2 provides guidelines for monitoring these compounds in ground and surface waters, and also drinking water.² Reversed-phase high performance liquid chromatography (RP-HPLC) is the preferred method for separating carbamates. Most alternate methods for analysis have significant limitations. Gas chromatographic analysis is unsuccessful due to degradation of the analyte compounds during vaporization. HPLC with UV detection

fails to offer adequate sensitivity or specificity required for the sample matrices of interest. Postcolumn derivatization with fluorescence detection following a reversed-phase HPLC separation is consistent with the U.S. EPA Method 531.2.³ This method delivers highly sensitive determination of carbamates. LC-MS with positive mode electrospray ionization mass spectrometry has been shown to be a promising alternative, especially when high sensitivity and/or identification are required.⁴

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LC-Postcolumn Derivatization-Fluorescence Method

The Acclaim Carbamate column is guaranteed to produce baseline separation of carbamate residues specified by the U.S. EPA Method 531.2. Figure 1 illustrates the separation of 12 carbamate compounds listed in the method using a LC-postcolumn derivatization-fluorescence method on a 4.6×250 mm Acclaim Carbamate column. Resolutions between all critical pairs meet or exceed the chromatographic requirements of the U.S. EPA 531.2 monograph method, demonstrating the column's suitability for this application. To conserve organic solvent and increase sample throughput at the same time, a 3.0×150 mm Acclaim Carbamate column can be used and all 12 carbamates are well separated within 20 min (Figure 2).

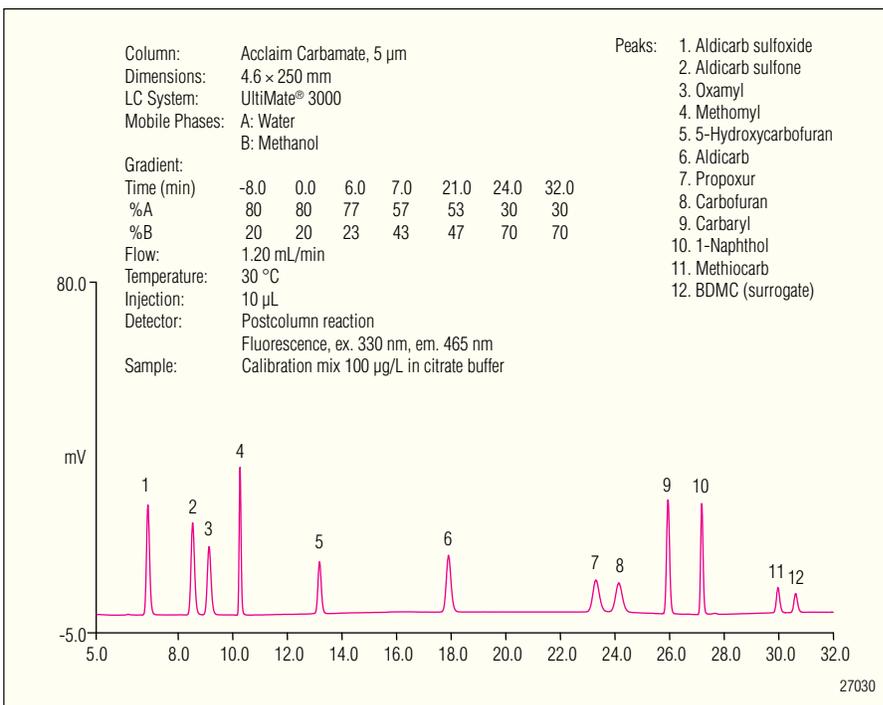


Figure 1. Carbamate pesticides listed in EPA Method 531.2, separated using a 4.6×250 mm Acclaim Carbamate column.

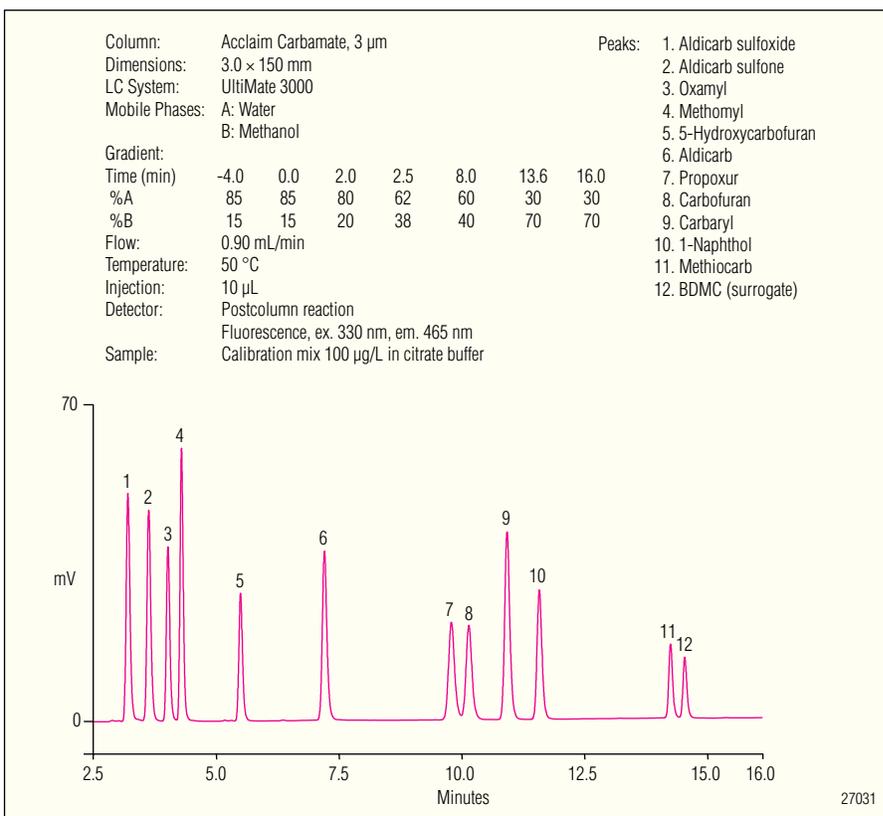


Figure 2. Carbamate pesticides listed in EPA Method 531.2, separated using a 3.0×150 mm Acclaim Carbamate column.

LC-MS Method

Compared to fluorescence detection, mass spectrometric detection can significantly improve method selectivity and sensitivity. Figure 3 demonstrates excellent separation, high throughput (20 min run time), and enhanced selectivity and sensitivity with MS detection achieved on a 2.1 × 150 mm Acclaim Carbamate column. This method has been successfully applied to the determination of carbamates in various types of water samples and performance was evaluated with respect to linearity, calibration range, detection limits, and recovery from a simulated ground water matrix.⁵

Multiple Column Formats

The Acclaim Carbamate columns are available in various column formats: 4.6 × 250 mm, 5 μm for high resolution routine analysis; 4.6 × 150 mm, 3 μm for high throughput routine analysis; 3.0 × 150 mm, 3 μm for high throughput analysis with reduced solvent consumption; 2.1 × 150 mm, 3 μm for LC-MS analysis.

Reproducible Manufacturing

Each Acclaim Carbamate column is manufactured to stringent specifications to ensure excellent column performance. Each column is shipped with a lot validation sheet showing the test results and specifications for the lot of bonded silica packed into the column. In addition, each column is individually tested and shipped with a test chromatogram that validates column performance.

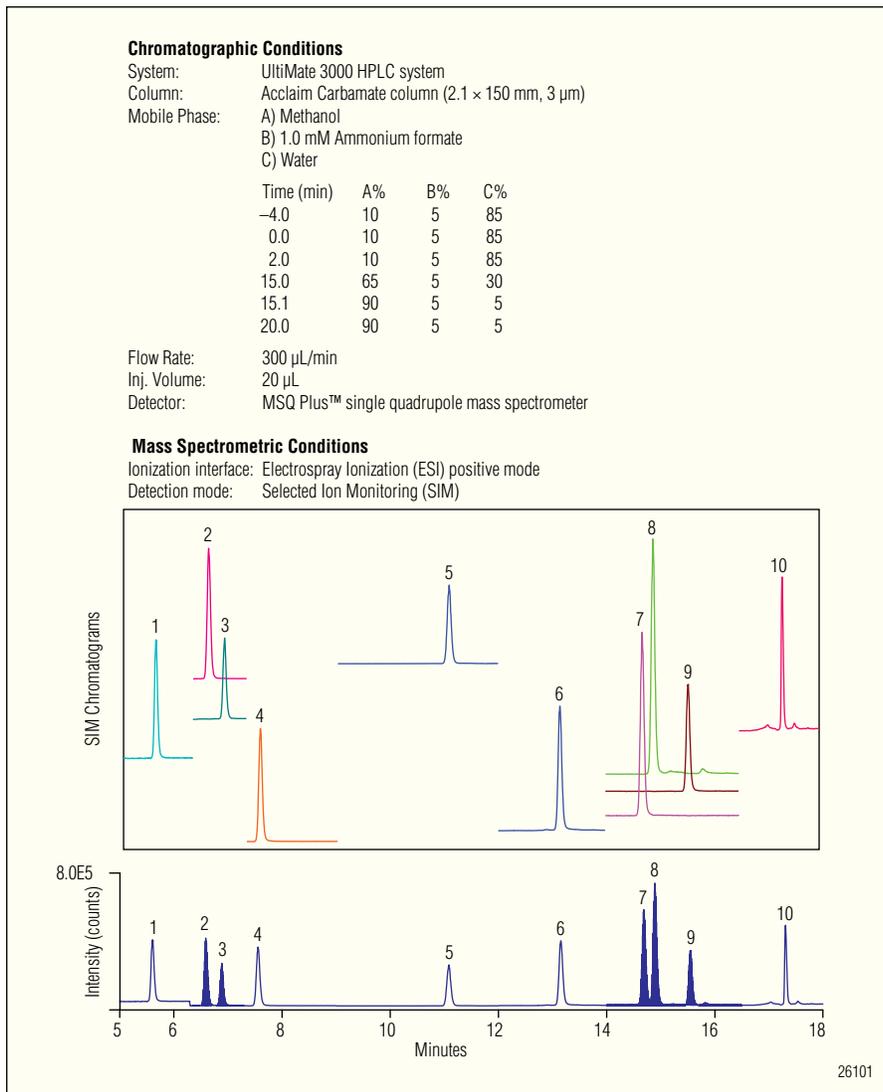


Figure 3. Carbamate pesticides by LC-MS.

SPECIFICATIONS	
<i>Column Chemistry:</i> Proprietary alkyl group	<i>Pore Size:</i> 120 Å
<i>Base Silica:</i> High purity, spherical, porous	<i>pH Range:</i> 2.5 to 7.5
<i>Particle Size:</i> 3 μm or 5 μm	<i>Temperature Limit:</i> 80 °C

ORDERING INFORMATION

In the U.S., call (800) 346-6390 or contact the Dionex Regional Office nearest you. Outside the U.S., order through your local Dionex office or distributor. Refer the following part numbers:

Acclaim Carbamate, Analytical, 5 µm, 4.6 x 250 mm	072924
Acclaim Carbamate, Analytical, 3 µm, 4.6 x 150 mm	072925
Acclaim Carbamate, Analytical, 3 µm, 3.0 x 150 mm	072926
Acclaim Carbamate, Analytical, 3 µm, 2.1 x 150 mm	072927
Acclaim Carbamate, Guard, 5 µm, 4.6 x 10 mm.....	072928
Acclaim Carbamate, Guard, 5 µm, 3.0 x 10 mm.....	072929
Acclaim Carbamate, Guard, 5 µm, 2.1 x 10 mm.....	072930
Guard Holder (V-2)	069580
Guard Holder Kit V-2 (Holder V-2 and coupler).....	069707
Guard coupler (V-2).....	074188

References

1. U.S. EPA, Revised *N*-Methyl Carbamate Cumulative Risk Assessment, September, 2007 (http://www.epa.gov/oppsrrd1/REDS/nmc_revised_cra.pdf).
2. U.S. EPA Method 531.2 (http://www.epa.gov/safewater/methods/pdfs/methods/met531_2.pdf).
3. PCX 5200 Postcolumn Analysis of Carbamate, Application Manual, Version 3.0, Pickering Laboratories: Mountain View, CA, 2003.
4. Goto, T.; Ito Y.; Yamadaa, S.; Matsumotoa, H.; Okab, H.; Nagase, H. *Anal. Chimica Acta* **2006**, 555(2), 225–232.
5. Wang, L., Liu, X., Henday, S.M. and Schnute, W.C. Improved LC-MS Method for the Determination of Carbamates in Water Samples (<http://www.dionex.com/en-us/webdocs/77385-PO-HPLC-Carbamates-01Jul2009-LPN2295-01.pdf>).

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