

PICKERING LABORATORIES

HPLC Post-column Derivatization

- INSTRUMENTS
- COLUMNS
- METHODS
- REAGENTS



About Pickering Laboratories

Now, more than ever, Pickering Laboratories is the answer

As a chemist in the post-column HPLC field, you want to do the best job possible. Not just to help your company or agency succeed but also to earn the respect of your peers. At Pickering Laboratories we share your commitment to excellence. For over 20 years, we have designed, manufactured and supplied specialized analytical chemical instruments and solutions that are the envy of the separations industry. This reputation for innovation and reliability has made us the go-to company for the EPA, ATF, FDA, numerous state agencies and companies.

Now, in 2003, Pickering Laboratories is striving harder than ever to meet your needs. We've stepped up R&D, hired additional technical support chemists and are introducing new products and methods—all to give you an edge in today's rapidly changing world-wide environmental, pharmaceutical and biochemical laboratory markets.

Take our new PCX 5200 Control software. It makes you more productive by putting all the controls for the Pickering Laboratories PCX 5200 post-column derivatization instrument on your Windows PC. With the click of a mouse you can quickly and easily adjust settings and monitor system status from your computer. PCX5200 works side-by-side with existing software.

Want to test more Mycotoxins in less time? Then take a look at our new 4-in-1 multi-residue Mycotoxin analysis kit. For the first time ever, it enables you to screen four residues in a single run—saving time and money. Then there's our new accelerated sample prep for the Glyphosate method. By reducing the sample preparation time to a quarter of the traditional method, it allows you to analyze more Glyphosate and AMPA in many matrices faster than ever before.

Helpful information is something else customers have come to expect from us. So to make it easier to find what you're looking for we've redesigned our Web site, adding, among other things, a new reference section for post-column derivatization methods. It brings together in one place a library of research, including citations from the Linda Hall Library of Science, Engineering and Technology and the National Center for Biotechnology Technology.

There's one more benefit you ought to consider. It's our "Guaranteed Chemistry" policy. While some in the industry do not certify their chemistry for any use, we alone guarantee our chemistry for use in Post-column applications.

To discover all the ways Pickering Laboratories can help you, please look through this catalog. Much in it is new, but one thing remains constant: our determination to provide the products, service and support you won't find anywhere else.



Michael Pickering, Ph.D.

PRESIDENT, PICKERING LABORATORIES, INC.

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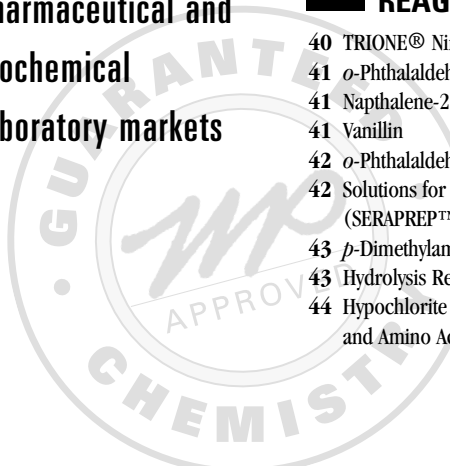
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Specialized
analytical chemistry
instruments and
solutions for the
environmental,
pharmaceutical and
biochemical
laboratory markets



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■ CUSTOMER SERVICE & TECHNICAL SUPPORT

Pickering Laboratories has earned the reputation for strong Technical Support in HPLC post-column technology: chemistry, columns, reagents, and derivatization instruments. We start with assisting our customers in identifying the best HPLC configuration required for a successful integration of our HPLC post-column system. Then we continue our support through and beyond the warranty period to ensure our customers' chromatograms reflect current standards of quality and reproducibility.

■ HOW TO CONTACT US

For Customer Service or Technical Support contact:

sales@pickeringlabs.com (pricing/quotations)

support@pickeringlabs.com (technical support)

800 654 3330

650 694 6700

Fax: 650 968 0749

■ INSTALLATION & TRAINING

We encourage you to take advantage of Pickering Laboratories' individualized two or three-day installation and training courses. For an all-inclusive fee we can provide post-column system installation and training at your site by an experienced chemist from Pickering Laboratories. The training includes performing analyses, routine maintenance and troubleshooting, and chromatogram interpretation.

Some of our authorized distributors offer their own training and installation services.

Whenever you buy installation and training by Pickering Laboratories, please call Technical Support early to schedule our visit to your site. This is especially important if you buy installation through a distributor or HPLC Company, because we need to hear all the details directly from you.

Individually-tailored courses are also given at our facility in Mountain View, California. Please telephone or fax with your requirements and we will advise cost and schedule.

■ PRODUCT RETURNS

Before returning a product for any reason, please

1. Phone or Fax requesting a Returned Goods Authorization Number.
2. Provide a Purchase Order Number for product returns intended for service and repair.
3. Package the product so that it will arrive undamaged. Use the original packing if possible. If in doubt, please call. Pickering Laboratories cannot assume responsibility for goods which arrive damaged in shipment.
4. Return the completed Health & Safety Declaration with the items intended for Service or repair (See page 4 for details.)

■ FACTORY REPAIRS

Pickering offers factory repair for its instruments (PCX Models 5200, 5100 and 3100). We will re-build or replace components as necessary in our judgment, then test the instrument to make certain that the original problem has been solved.

For repairs, we will charge for shipping, parts and labor (current shop rate).

What is Required:

Obtain a Return Goods Authorization No. (RGA) and a Health and Safety Declaration form. When the instrument is returned it must have the RGA noted on the outside of the box and a completed Health and Safety Declaration, with the instrument. To expedite your repair we request the instrument is returned with a purchase order for the cost to evaluate the system (current shop rate).

What is Done:

Upon arrival we will evaluate your system to generate an estimated cost for repairs. Once we have your approval we will complete the repair. We will replace damaged parts, pressure test the instrument, and then test the instrument to confirm the system meets the products original manufacturer's specification.

What you get:

The minimum parts replaced are: Restrictor(s), Seal(s) and Filters. If we test the instrument to determine that it meets the original manufacturer's specification, we will warranty the instrument for 1 year on all the parts that were replaced. If you request that we do not complete this test we will not warranty our work.

■ FIELD SERVICE

Because of our limited personnel, we prefer to resolve problems without site visits, but when that just is not enough, we will schedule a site visit with you. Please call for a quotation. On-site service entails an initial evaluation on the first day, with repairs potentially extending to the second day to allow for shipment of parts. The shipment of parts will be included in the invoice.

On-site repairs costs will include travel time, air fare, hotel, car rentals expenses, plus parts and labor.

■ COLUMN REPACKING SERVICE

If you have determined or suspect that the performance of your Pickering cation-exchange column or guard has degraded, consider our Repacking Service before purchasing a new column. Columns eligible for repacking include the Pickering amino acid, glyphosate and polyamine columns and their respective guards.

If you are not certain that the column or guard must be repacked, Pickering will test it for a service fee, freight or postage prepaid. This fee will be credited to any consequent repacking cost if tests indicate that repacking is needed.

For this repacking service, Pickering will charge 75% of the current list price of that particular column or guard. If the column hardware cannot be re-used, Pickering Labs will provide a new column at 85% of list price.

Repacked and tested columns and guards carry the same warranty as new columns and guards.

Analytical columns and guards will be repacked only one time.

■ HOW TO PLACE AN ORDER

Please contact us directly to place an order:

orders@pickeringlabs.com (order placement/status)

800 654 3330

650 694 6700

Fax: 650 968 0749

Pickering Laboratories, Inc.

1280 Space Park Way

Mountain View, CA 94043

When ordering, please provide the following:

- Complete shipping and billing addresses
- Catalog number and quantity of each item
- Brief product description, as found in Ordering Information
- Purchase order number (and contract number, if applicable)
- Name and telephone number of person calling
- Confirmation required
- Special instructions, e.g., package markings, mode of transit if other than UPS
- If ordering a complete post-column system, please specify the brand of HPLC with which it will be operating. We will advise you if any modifications to the HPLC are necessary.

To Contact Our European Distributor:

LCTech GmbH

Postfach/P.O. Box 1360

D-84403 Dorfen

Telefon: +49(0)-80 81-93 68-0

Telefax: +49(0)-80 81-93 68-10

email: info@lctech.de

Internet: www.lctech.de

From non-European countries, please contact Pickering Laboratories directly. We will provide the names of companies which distribute our products.

■ TERMS

- A minimum order is not required
- Net 30 days for established accounts, or prepayment in U.S. dollars, C.O.D., or Letter-of-Credit
- We accept MasterCard & VISA or Discover Card
- Prices are Ex-Works Seller's Factory, Mountain View, California

U.S. Destinations & Canada:

Freight charges are prepaid and added to the invoice. Shipments are via UPS-Ground unless otherwise specified.

Destinations Outside of the U.S.:

New Accounts: Before a credit-line has been established, new account orders must be pre-paid. Freight charges are collect.

Established Accounts in Good Standing: Freight charges are collect. Unless otherwise specified, shipments overseas will be via consolidated air-freight to keep the costs as low as possible.

Prices and specifications are subject to change without prior notice.

■ LIMITED WARRANTY

Instruments

Pickering Laboratories, Inc., (Pickering) Instruments are warranted to be free of defects in material and workmanship under normal installation, use, and maintenance, for a period of one year from the date of delivery to the customer. Pickering will replace or repair, without cost, any defective items. Expendable items such as check valves, pistons, piston seals, and filters are excluded from this warranty. In addition, physical damage, poor-quality reagent- and sample-induced damage, and instrument damage due to customer's misuse are not covered by this warranty.

Analytical Columns

Pickering's Analytical Columns are warranted for 90 days to be free of defects in materials and workmanship under normal installation, use, and maintenance, for the warranted time beginning from the date of delivery to the customer. Pickering will replace the Analytical Column under warranty if found defective in material or workmanship. However, the warranty is void if the Analytical Column was damaged due to customer's misuse.

How to Obtain Warranty Service

If there is a problem with your Instrument or Analytical Column within the warranty period, immediately notify Pickering or your local authorized representative. If the Instrument or Analytical Column was not purchased directly from Pickering, please contact the vendor where it was purchased. Any Instrument, part of the Instrument, or Analytical Column returned to Pickering for examination or repair shall have Pickering's prior approval (call for a Returned Goods Authorization Number) and be sent prepaid by the Customer. Return transportation will be at Pickering's expense if the Instrument, part of the Instrument, or Analytical Column is found to be defective and under warranty.

■ HEALTH & SAFETY DECLARATION

Instruments and columns must be decontaminated and cleaned prior to returning to Pickering. To protect and ensure the safety of Pickering personnel, customer must properly flush instrument of any and all hazards (e.g. reactive chemicals, blood borne pathogens). Please contact Pickering to obtain a Health and Safety Declaration Form (B-0107) describing return instructions and customer responsibilities. Failure to do so will result in delay of service and/or additional charges.

■ PCX5200 DERIVATIZATION INSTRUMENT

Post-column derivatization provides the selectivity, sensitivity and the chromatographic reproducibility often lacking in direct UV-Vis or pre-column derivatization methods. When combined with a standard HPLC system, the PCX5200, along with chemicals and post-column protocols, provides a reliable and precise means for selectively derivatizing and detecting analytes of interest.

The PCX5200 is a versatile post-column derivatization instrument which can be configured for a variety of post-column methods and chemistries. It replaces the earlier PCX5100 and PCX3100, which were designed for, respectively, two post-column reagents and a single post-column reagent.

With the PCX5200 it is easy to convert to other applications, whether using single or two-step post-column derivatization, by the addition of one or more Applications Kits. These Kits include columns, and might include Pickering's Chromatographic Grade™ eluants and post-column reagents. You may also add or substitute a Flow-conditioner Panel and (possibly) a Reactor with a desired dwell volume, or configure a system tailored to your own methodology and chemicals for applications not yet available from Pickering.

PCX Control software for Windows PC is included with the system for optional Windows PC control of the PCX system. Can be ordered separately. See page 10 for ordering information.

PCX5200 SPECIFICATIONS

- Dimensions: (h × w × d): 37 × 38 × 38 cm (14.5 × 15 × 15 inches)
- Weight: 13 to 15 kg (28 to 33 lb.) depending upon configuration
- Electrical: 100–120 V, 50/60 Hz, 1.7 A, 200 W or 200–240 V, 50/60 Hz, 0.8 A, 200 W (Mains voltage ± 10% of nominal) Installation (overvoltage) category II, pollution degree 2, 240 V, CE certified
- Environmental: Indoor use only. Altitude up to 2000 m; Ambient temperature 5–40 °C; Relative humidity up to 80% at 31 °C.

REAGENT PUMPS

- Independently adjustable, low-pulsation, phase-locked
- Flow rates factory pre-set at 0.3 mL/minute; adjustable from 0.05 to 0.7 mL/minute against back-pressures of up to 410 bar (6000 psi)
- Sapphire pistons
- Liquid ends, including check valve housings, type 316 stainless steel (PEEK available)
- Piston wash

Gauges and Flow Conditioning Panels

- Independent 210 bar (0–3000 psi) pressure gauges for each pump
- 70 bar (0–1000 psi) gauge displays post-column system pressure
- Diamond-packed restrictors, matched to flow rate and viscosity of reagents
- Bypass/purge valves
- Replaceable reagent and pre-column filters



REACTOR

- Heated reactor controls at ± 0.4 °C for temperatures from 5 °C above ambient to a maximum temperature of 130 °C. Range of reactor dwell volumes, depending upon application
- LCD display of actual temperature or set point
- Thermal safety switch cuts power to heater if temperature exceeds safety limits.

COLUMN HEATER

- Heater accepts 6 or 8 mm OD (0.25 or 0.31 inch) × 50, 100, 150, or 250 mm-length column and guard
- Temperature holds within ± 0.4 °C of set point; can be set with 1 °C resolution from 5 °C above ambient to 75 °C
- Solvent preheater eliminates temperature gradient through column
- LCD display of actual temperature or set point
- Insulated, hinged cover allows access to column

GAS PRESSURE MANIFOLD & REGULATOR

- Regulator maintains 0.3 bar (3–5 psi) on reagent reservoirs with 3–5 bar (45–75 psi) source pressure
- Pressure-relief valve opens at 0.6 bar (8 psi)
- Manifold with anti-siphon valves has four 1/4-28 tubing connections

PRESSURIZED REAGENT RESERVOIR

- One liter capacity (2 and 5 L reservoirs available)
- Maintained under inert gas pressure to inhibit oxidation of OPA or other oxygen-sensitive reagents
- Valve built into reservoir cap permits sparging during reagent preparation
- Reagent reservoirs fitted with 3.1 mm OD oxygen-impermeable Saran® tubing for oxygen-sensitive reagents and/or with 3.1 mm OD FEP tubing

SAFEGUARDS TO PREVENT:

- **Post-column reagent backflow**

A pressure transducer installed between LC (eluant) pump and sample injector turns off power to reagent pumps and reactor when the eluant pump pressure drops to below 35 bar (500 psi), ensuring that reagent will not flow upstream and damage the analytical

column. Low eluant pressure can result from power failure, eluant pump malfunction, automatic or intentional shut-down, or an empty reservoir. The PCX5200 will not restart automatically. Anti-siphon valves in reagent supply lines prevent pressurized reagents from continuing to flow through the pump and into the column when the reagent pump is off.

- **Post-column system over-pressure**

A relief valve pre-calibrated to open at 35 bar (500 psi) prevents rupture of the post-column reactor tubing in the event of downstream blockage, and reduces the possibility that all or part of the reagent flow will be diverted to the column.

- **Detector noise, precipitation**

Back-pressure regulator applies 7 bar (100 psi) to the detector flowcell outlet (waste) to prevent detector noise and precipitation due to solvent out-gassing or boiling.

PCX5200 CATALOG INFORMATION

CATALOG NO.	APPLICATION	REAGENT PUMP	REACTOR VOLUME	VOLTAGE
1152-1111 1152-1112	Amino Acids (OPA detection), Aminoglycoside Antibiotics, Biogenic Amines, Polyamines, Paraquat/Diquat, & Fumonisins	Single	0.15 mL	120 V 240 V
1152-1221 1152-1222	Amino Acids (TRIONE® Ninhydrin detection), Ochratoxin A	Single	0.5 mL	120 V 240 V
1152-1241 1152-1242	Formaldehyde	Single	0.5 mL	120 V 240 V
1152-1411 1152-1412	Aflatoxins	Single	1.4 mL	120 V 240 V
1152-1511 1152-1512	Cholesterol	Single	Knitted 2.8 mL	120 V 240 V
1152-2211 1152-2212	Carbamate Pesticides & Glyphosate Herbicide	Dual	0.5 mL	120 V 240 V
NEW 1152-2811 1152-2812	Micro System for Carbamate Pesticides & Glyphosate Herbicide	Dual	0.1 mL	120 V 240 V
1152-5211 1152-5212	Streptomycin	Dual	0.5 mL	120 V 240 V
1152-2341 1152-2342	Paralytic Shellfish Toxins Sullivan Method	Dual	1.0 mL	120 V 240 V
NEW 1152-1021 1152-1022	Paralytic Shellfish Toxins Oshima Method	Dual	2.0 mL	120 V 240 V
1152-2611 1152-2612	Trichothecene Mycotoxins	Dual	Knitted 1.2 and 1.6 mL	120 V 240 V
1152-4431 1152-4432	Polyether Antibiotics	Inert PEEK Dual	1.4 mL	120 V 240 V

Note: Please contact Pickering for assistance in configuring a custom PCX5200 that will meet your specific analysis needs. All configurations include gas manifold, accessories, spares, reservoir(s), power cord and operation manual. Columns and chemicals sold separately.

■ CHX700 COLUMN TEMPERATURE CONTROLLERS



The CHX700 Column Temperature Controller consists of an efficient Column Heater module with a Temperature Control module.

The versatile Column Heater can be set to control temperatures as high as 100 °C. It will accommodate two columns side by side, and its set of modular heating blocks will hold a range of column diameters up to 9.5 mm, with lengths from 50 to 300 mm. An over-temperature switch interrupts power should the temperature exceed the rated maximum.

A replaceable inlet filter (0.5 µm) and eluant heat transfer unit ensures the incoming eluant and column temperature will be the same.

CHX700 SPECIFICATIONS

- Digital LED display of actual temperature or set point in °C
- Temperature setting in 1 °C increments from 5 °C above ambient to 100 °C
- Temperature accuracy ± 1 °C; stability ± 0.4 °C
- 100-120 V, 50/60 Hz, 1.0 A; 200-240 V, 50/60 Hz, 0.5 A
- Dimensions:
Controller: (cm) 12W × 14H × 28.5L
Column Heater: (cm) 7.5W × 6H × 39L
- Column sizes up to 9.5 mm dia. × 50, 100, 150, 200, 250, or 300 mm
- CHX700 Shipping weight: 3.2 kg (7lbs)

CHX700 CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	MAX. TEMP.
1100-1005	Column Temperature Controller + Heater, 120 V	100 °C
1100-1006	Column Temperature Controller + Heater, CE Tested & Certified, 240 V	100 °C
	Replacement Column Heaters:	
1100-1015	Column Heater Assembly, 120V	100 °C
1100-1016	Column Heater Assembly, 240V	100 °C

■ CRX400 POST-COLUMN REACTORS

CRX400 Post-column Reactor is designed for use with standard liquid chromatography equipment.

Available standard reaction coil volumes are 0.15 mL, 0.5 mL, 1.0 mL, 1.4 mL, and 3.0 mL. If these volumes are not satisfactory please contact us with your specific requirements.

Replacements or substitution of a reaction coil is easily accomplished in the laboratory. Reactor Heater and Coil Assemblies are insulated, self-contained units, comprising the reactor coil with inlet and outlet tubing and fittings, and heater with electrical connection.

CRX400 SPECIFICATIONS

- Operating temperature starting from 5 °C above ambient
- Set temperature is maintained at ± 0.4 °C within control range
- 120 or 240-Volt configurations, 50/60 Hz
- Dimensions: (cm) 12W \times 14H \times 28.5L
- Shipping weight : 2 kg (4.4 lbs)



CRX400 CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	MAX. TEMP.
1100-3329	CRX400 Post-column Reactor, 0.15 mL, 120 V	150 °C
1100-3330	CRX400 Post-column Reactor, 0.15 mL, 240 V	
1100-3331	CRX400 Post-column Reactor, 0.5 mL, 120 V	150 °C
1100-3332	CRX400 Post-column Reactor, 0.5 mL, 240 V	
1100-3341	CRX400 Post-column Reactor, 1.0 mL, 120 V	150 °C
1100-3342	CRX400 Post-column Reactor, 1.0 mL, 240 V	
1100-3351	CRX400 Post-column Reactor, 1.4 mL, 120 V	150 °C
1100-3352	CRX400 Post-column Reactor, 1.4 mL, 240 V	
1100-3321	CRX400 Post-column Reactor, 3.0 mL, 120 V	80 °C
1100-3322	CRX400 Post-column Reactor, 3.0 mL, 240 V	

■ PULSE-DAMPENER: FC4870B FLOW CONDITIONER

The Pulse-Dampener is intended for use in Liquid Chromatography applications where continuous post-column derivitization is desired. Installed at the outlet of the pump, the model FC4870B Flow Conditioner provides the pulse-dampening necessary to maintain a smooth baseline. Also the following important features are provided:

- Continuous filtering of the pumped medium
- Working pressure for the reagent pump: check valves perform more reliably which results in a more stable flow
- Pressure reading (gauge) for the reagent pump
- Prime/purge valve

The gauge and pressure relief valve assembly consists of a cross for connecting a pressure gauge, an anti-siphon valve and a pre-calibrated relief valve. This is used to indicate post-column pressure and to prevent rupture of the post-column reactor tubing in the event of an overpressure condition. The anti-siphon valve prevents the reservoir gas pressure from pumping reagent while the system is turned off.

PULSE DAMPENER/FLOW CONDITIONER CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1100-0093	FC4870B Flow Conditioner, with pressure gauge & prime/purge valve, for OPA (with 1100-0200 restrictor)
1100-0094	FC4870B Flow Conditioner, with pressure gauge & prime/purge valve, for TRIONE® (with 1100-0141 restrictor)
1100-0710	Post-column Gauge & Pressure Relief Valve Assembly

■ FLOW RESTRICTORS



Pickering restrictors are tubes packed with sized diamond particles designed to provide a desired back-pressure, relative to a given flow rate and viscosity. The restrictor tube and fittings are type 316 stainless steel or PEEK. The diamond packing is chemically and chromatographically inert to all mobile phases. Features include:

- Pressure-calibrated to flow rate and viscosity
- Diamond-packed tubes with nuts and ferrules
- Improve pump efficiency
- Essential pulse-dampening component
- Trouble shooting aid for HPLC systems

FLOW RESTRICTORS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1100-0141	Flow restrictor, TRIONE® Ninhydrin reagent, 65 psi, 6 cm
1100-0200	Flow restrictor, OPA, Hypochlorite, or Hydrolysis reagent, 300 psi, 10 cm
1100-0262	Flow restrictor, 1150 psi, 20 cm
1100-0263	Flow restrictor, 550 psi, 17 cm
1100-0205	Flow restrictor, 200 psi, 6 cm
1100-0142	Flow restrictor, 100 psi, 10 cm
1100-0143	Flow restrictor, non-metallic (PEEK), 550 psi, 10 cm

Note: Listed pressures are for a flow rate of 0.3mL/min at ambient temperature with 100% water and pulse-dampened flow.

■ REAGENT PUMPS

- Independently adjustable, low-pulsation, phase-locked
- Flow rates factory pre-set at 0.3 mL/minute; adjustable from 0.05 to 0.7 mL/minute against back-pressures of up to 410 bar (6000 psi)
- Sapphire pistons
- Liquid ends, including check valve housings, Type 316 stainless steel (PEEK available)
- Piston wash

REAGENT PUMPS WITH PISTON WASH CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1452-0012	Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0013	Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0010	Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0011	Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0016	Inert PEEK, Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0017	Inert PEEK, Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0014	Inert PEEK, Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0015	Inert PEEK, Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V

Note: 240 V pumps CE certified

Please contact Pickering for pumps without Piston Wash

■ PCX5200 SOFTWARE

PCX5200 SOFTWARE CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
0103-0010	PCX Control Software—PC, Windows 95 or later
1452-0036	PCX Control RS232 Adaptor
0101-0007	PCX Control Users Manual, Windows
3560-2000	Cable, RS232, 10'
0103-1001	PCX Control Software Kit—Software, Adaptor, Manual, Cable

Pickering Laboratories columns and guards are intended for specific applications that require post-column derivatization. This technology guarantees detection of certain classes of compounds at very low concentrations—amino acids, carbamate pesticides and polyamines, for example.

Each column is packed and tested to separate the target compounds according to Pickering's chromatographic quality control standards and published analytical method. The following acceptance criteria apply to all of Pickering's columns:

- With guard column installed, produce a specified chromatogram of the compounds in a standard test mixture.
- Separate the compounds in the established order, with specified resolution of critical pairs.
- Operate within the specified range of back pressure.
- Be free of contaminating material which can cause baseline artifacts.

Only after all criteria have been met can the column's serial number and label be applied.

Quite simply, the column is guaranteed to produce a chromatogram for its intended application if it is operated according to the conditions and methods prescribed by Pickering Laboratories.



About Guard Columns

While it is true that any of our columns may be run without a guard, the practical consequence is a shorter column lifetime. Guard columns provide protection against contamination without affecting column efficiency. It is far less expensive to replace or repack a guard than an analytical column.

■ LITHIUM AMINO ACID ANALYSIS COLUMNS

Pickering Laboratories specialize in manufacturing of cation-exchange columns for amino acid analysis. No other techniques, including reversed-phase chromatography, have been shown to match post-column ion-exchange methods in quantitation and reproducibility. Advantages of this method, such as absence of matrix interferences, are especially important in analysis of native samples.

Lithium columns and buffers systems have high selectivity and are perfect for physiological fluids and food analysis.

Post-column conditions for amino acids analysis:

Reagent: TRIONE®

Reactor: 130 °C, 0.5 mL

Reagent flow rate: 0.3 mL/min

Detection:

UV-Vis detector: $\lambda=570$ nm for primary amino acids

$\lambda=440$ nm for secondary amino acids

or

Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30% Brij® 35 solution in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent flow rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm

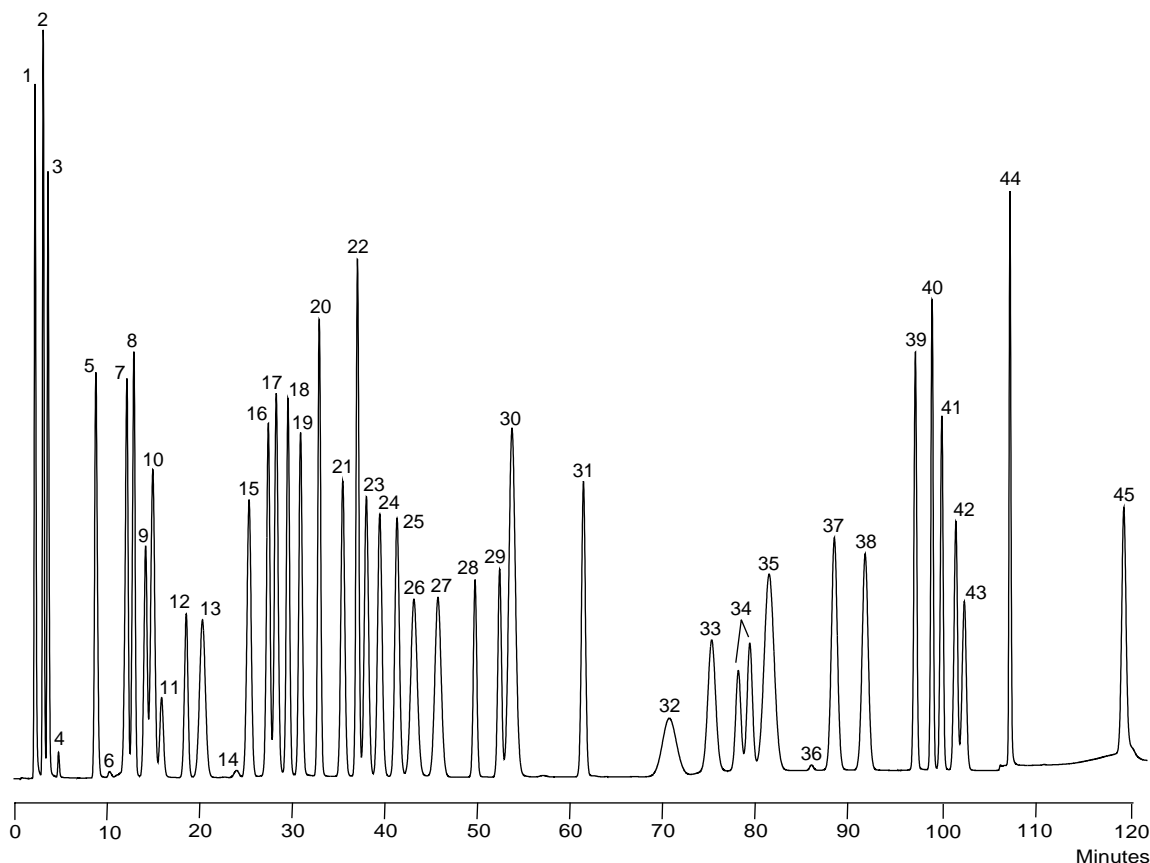
λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot changes in the columns, or improvements in the overall method. **The recommended gradient for the column will always be in the column package, and it supercedes the information in this catalog.**

3

Chromatograms, Columns & Guards

HIGH EFFICIENCY LITHIUM CATION-EXCHANGE COLUMN 0353150 (3.0 x 150 mm)
LITHIUM GUARD COLUMN 0352020 (2.0 x 20 mm)



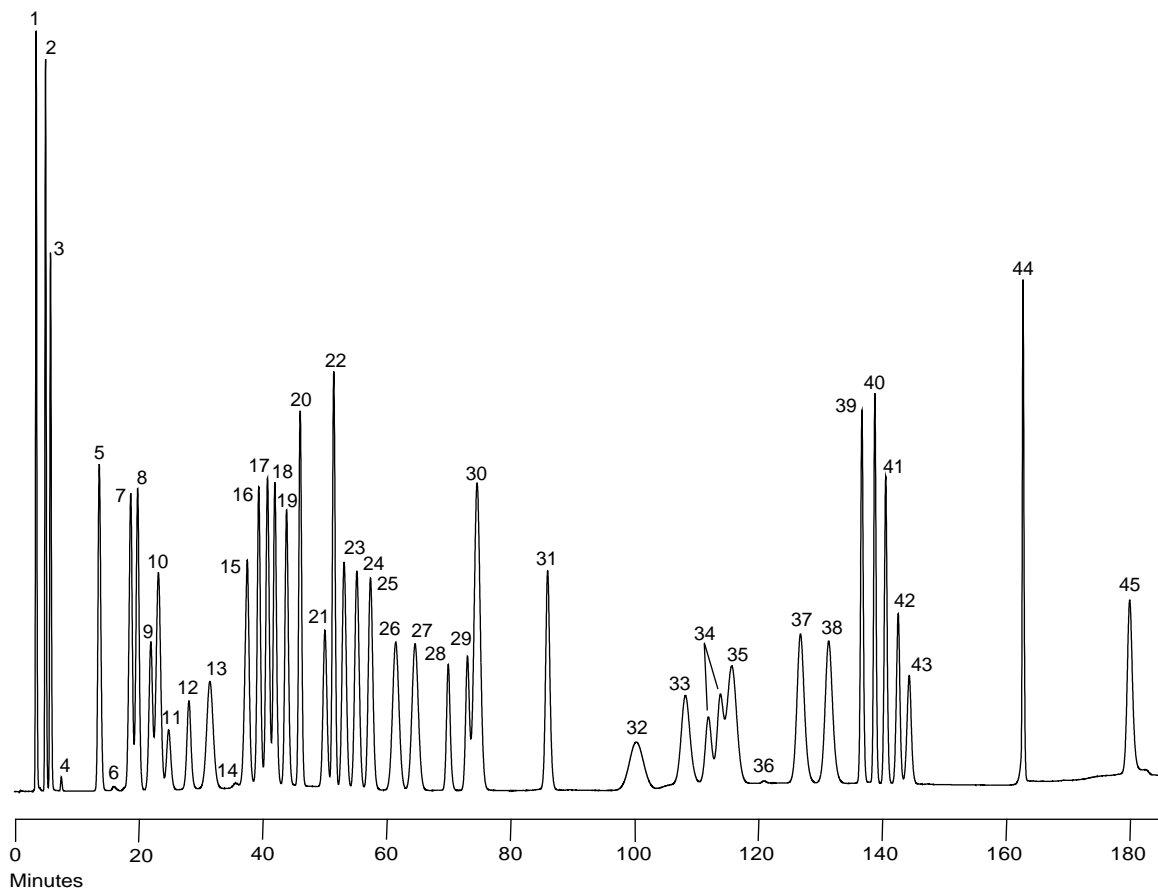
- | | |
|--|---|
| 1 Phosphoserine | 24 Leucine |
| 2 Taurine | 25 Norleucine |
| 3 Phosphoethanolamine | 26 Tyrosine |
| 4 Urea | 27 Phenylalanine |
| 5 Aspartic acid | 28 β -Alanine |
| 6 Hydroxyproline | 29 β -Amino- <i>t</i> -butyric acid |
| 7 Threonine | 30 Homocystine |
| 8 Serine | 31 γ -Aminobutyric acid |
| 9 Asparagine | 32 Tryptophan |
| 10 Glutamic acid | 33 Ethanolamine |
| 11 Glutamine | 34 Hydroxylysines |
| 12 Sarcosine | 35 Ammonia |
| 13 α -Amino adipic acid | 36 Creatinine |
| 14 Proline | 37 Ornithine |
| 15 Glycine | 38 Lysine |
| 16 Alanine | 39 Histidine |
| 17 Citrulline | 40 3-Methyl-histidine |
| 18 α -Amino- <i>n</i> -butyric acid | 41 1-Methyl-histidine |
| 19 Valine | 42 Carnosine |
| 20 Cystine | 43 Anserine |
| 21 Methionine | 44 α -Amino- β -guanidino-propionic acid |
| 22 Cystathionine | 45 Arginine |
| 23 Isoleucine | |

CONDITIONS

TIME	Li280 %	Li750 %	RG003 %
0	100	0	0
12	100	0	0
48	65	35	0
90	0	100	0
95	0	100	0
120	0	94	6
122	0	94	6
122.1	100	0	0
140	100	0	0

Flow rate: 0.3 mL/min, column temperature 40 °C, injection volume: 10 μ L of 0.25 μ mole/mL Std.

STANDARD LITHIUM CATION-EXCHANGE COLUMN 0393250 (3.0 x 250 mm)
LITHIUM GUARD COLUMN 0392020 (2.0 x 20 mm)



- | | |
|--|---|
| 1 Phosphoserine | 24 Leucine |
| 2 Taurine | 25 Norleucine |
| 3 Phosphoethanolamine | 26 Tyrosine |
| 4 Urea | 27 Phenylalanine |
| 5 Aspartic acid | 28 β -Alanine |
| 6 Hydroxyproline | 29 β -Amino- <i>t</i> -butyric acid |
| 7 Threonine | 30 Homocystine |
| 8 Serine | 31 γ -Aminobutyric acid |
| 9 Asparagine | 32 Tryptophan |
| 10 Glutamic acid | 33 Ethanolamine |
| 11 Glutamine | 34 Hydroxylysines |
| 12 Sarcosine | 35 Ammonia |
| 13 α -Aminoadipic acid | 36 Creatinine |
| 14 Proline | 37 Ornithine |
| 15 Glycine | 38 Lysine |
| 16 Alanine | 39 Histidine |
| 17 Citrulline | 40 3-Methyl-histidine |
| 18 α -Amino- <i>n</i> -butyric acid | 41 1-Methyl-histidine |
| 19 Valine | 42 Carnosine |
| 20 Cystine | 43 Anserine |
| 21 Methionine | 44 α -Amino- β -guanidino-propionic acid |
| 22 Cystathionine | 45 Arginine |
| 23 Isoleucine | |

CONDITIONS

TIME	Li275 %	Li750 %	RG003 %
0	100	0	0
17	100	0	0
65	65	35	0
128	0	100	0
145	0	100	0
185	0	94	0
185.1	100	0	6
210	100	0	0

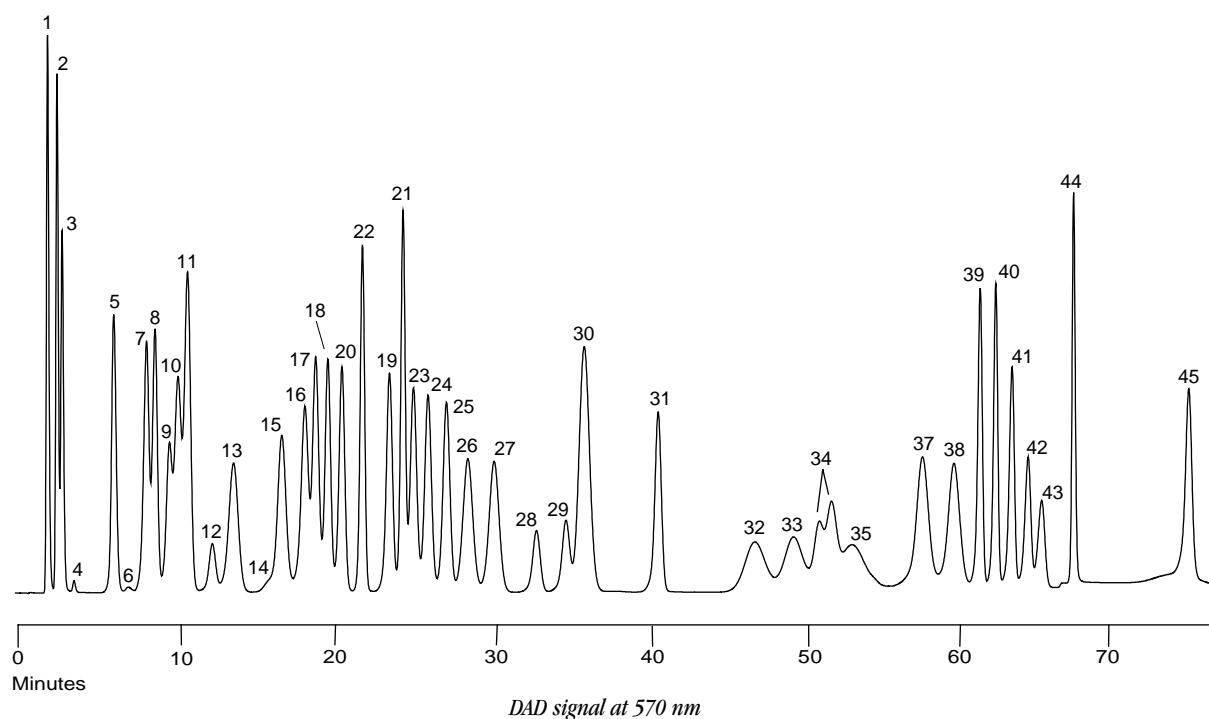
Flow rate: 0.3 mL/min, column temperature 40 °C, injection volume: 10 μ L of 0.25 μ mole/mL Std.

3

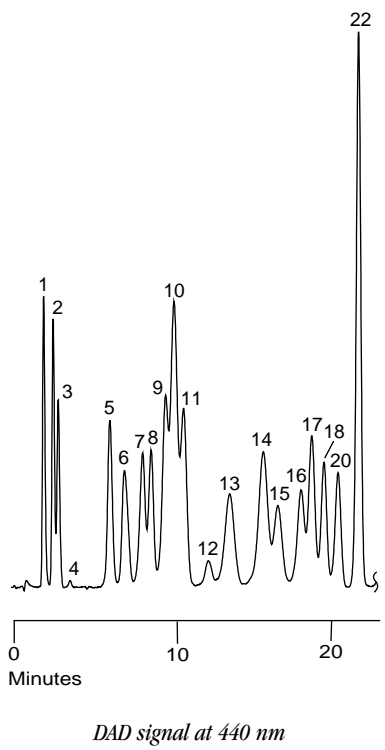
Chromatograms, Columns & Guards

**ACCELERATED LITHIUM CATION-EXCHANGE COLUMN 0355080 (5.5 x 80 mm)
LITHIUM GUARD KIT 1700-0207**

- 1 Phosphoserine
- 2 Taurine
- 3 Phosphoethanolamine
- 4 Urea
- 5 Aspartic acid
- 6 Hydroxyproline
- 7 Threonine
- 8 Serine
- 9 Asparagine
- 10 Glutamic acid
- 11 Glutamine
- 12 Sarcosine
- 13 α -Aminoadipic acid
- 14 Proline
- 15 Glycine
- 16 Alanine
- 17 Citrulline
- 18 α -Amino-*n*-butyric acid
- 19 Valine
- 20 Cystine
- 21 Methionine
- 22 Cystathionine
- 23 Isoleucine
- 24 Leucine
- 25 Norleucine
- 26 Tyrosine
- 27 Phenylalanine
- 28 β -Alanine
- 29 β -Amino-*i*-butyric acid
- 30 Homocystine
- 31 γ -Aminobutyric acid
- 32 Tryptophan
- 33 Ethanolamine
- 34 Hydroxylysines
- 35 Ammonia
- 37 Ornithine
- 38 Lysine
- 39 Histidine
- 40 3-Methyl-histidine
- 41 1-Methyl-histidine
- 42 Carnosine
- 43 Anserine
- 44 α -Amino- β -guanidino-propionic acid
- 45 Arginine



- 1 Phosphoserine
- 2 Taurine
- 3 Phosphoethanolamine
- 4 Urea
- 5 Aspartic acid
- 6 Hydroxyproline
- 7 Threonine
- 8 Serine
- 9 Asparagine
- 10 Glutamic acid
- 11 Glutamine
- 12 Sarcosine
- 13 α -Aminoadipic acid
- 14 Proline
- 15 Glycine
- 16 Alanine
- 17 Citrulline
- 18 α -Amino-*n*-butyric acid
- 19 Valine
- 20 Cystine
- 21 Methionine
- 22 Cystathionine
- 23 Isoleucine
- 24 Leucine
- 25 Norleucine
- 26 Tyrosine
- 27 Phenylalanine
- 28 β -Alanine
- 29 β -Amino-*i*-butyric acid
- 30 Homocystine
- 31 γ -Aminobutyric acid
- 32 Tryptophan
- 33 Ethanolamine
- 34 Hydroxylysines
- 35 Ammonia
- 37 Ornithine
- 38 Lysine
- 39 Histidine
- 40 3-Methyl-histidine
- 41 1-Methyl-histidine
- 42 Carnosine
- 43 Anserine
- 44 α -Amino- β -guanidino-propionic acid
- 45 Arginine

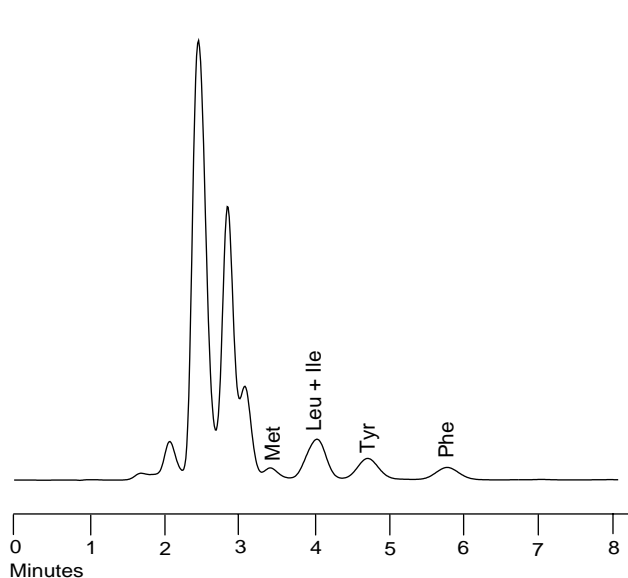


CONDITIONS

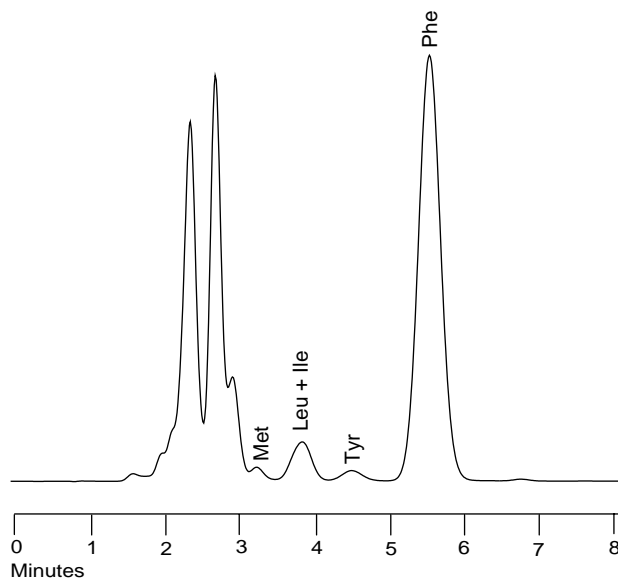
TIME	Li280 %	Li750 %	RG003 %
0	100	0	0
8	100	0	0
22	77	23	0
32	65	53	0
38	40	60	0
55	0	100	0
59	0	100	0
68	0	94	6
75	0	94	6
75.1	100	0	0
85	100	0	0

Flow rate: 0.4 mL/min, column temperature 38 °C, injection volume: 10 μ L of 0.25 μ mole/mL Std.

HIGH-EFFICIENCY CATION-EXCHANGE COLUMN FOR PKU AND MSUD SCREENS 0354050 (4.0 x 50 mm)
LITHIUM GUARD COLUMN 0352020 (2.0 x 20 mm)



Normal Neonate serum



Neonate serum with elevated Phenylalanine

CONDITIONS

TIME	Li357 %	RG003 %
0	100	0
8	100	0
8.1	0	100
10	0	100
10.1	100	0
16	100	0

Flow rate: 0.4 mL/min, column temperature 65 °C,
injection volume: 10 µL

LITHIUM COLUMNS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
0353150	High efficiency Lithium Cation-exchange Column 3.0 × 150 mm & 1700-0070 Amino Acid Test Mixture
0393250	Standard Lithium Cation-exchange Column 3.0 × 250 mm & 1700-0070 Amino Acid Test Mixture
0354050	High-efficiency Cation-exchange Column for PKU & MSUD screens 4.0 × 50 mm
0355080	Accelerated Lithium Cation-exchange Column, 5.5 × 80 mm & 1700-0070 Amino Acid Test Mixture
0352020	Lithium Guard Column, 2.0 × 20 mm (for use with 0353150 or 0354050 Column)
0392020	Lithium Guard Column, 2.0 × 20 mm (for use with 0303250 Column)
1700-0207	Guard Cartridge Holder with 2 cartridges for Accelerated Lithium Column
1700-0206	Holder for Accelerated Lithium Column
1700-0208	Guard Cartridges 2/pk for Accelerated Lithium Column

NEW

■ SODIUM AMINO ACID ANALYSIS COLUMNS

Ion-exchange chromatography followed by post-column derivatization has been a method of choice for amino acid analysis for many years. Pickering ion-exchange columns allow you to obtain consistent results with sensitivity, stability, selectivity and speed. Sodium columns and buffers systems are designed for amino acids analysis of hydrolyzed samples.

Post-column conditions for amino acids analysis:

Reagent: TRIONE®

Reactor: 130 °C, 0.5 mL

Reagent flow rate: 0.3 mL/min

Detection:

UV-Vis detector: $\lambda = 570$ nm for primary amino acids,
 $\lambda = 440$ nm for secondary amino acids

or

Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30% Brij® 35 solution in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

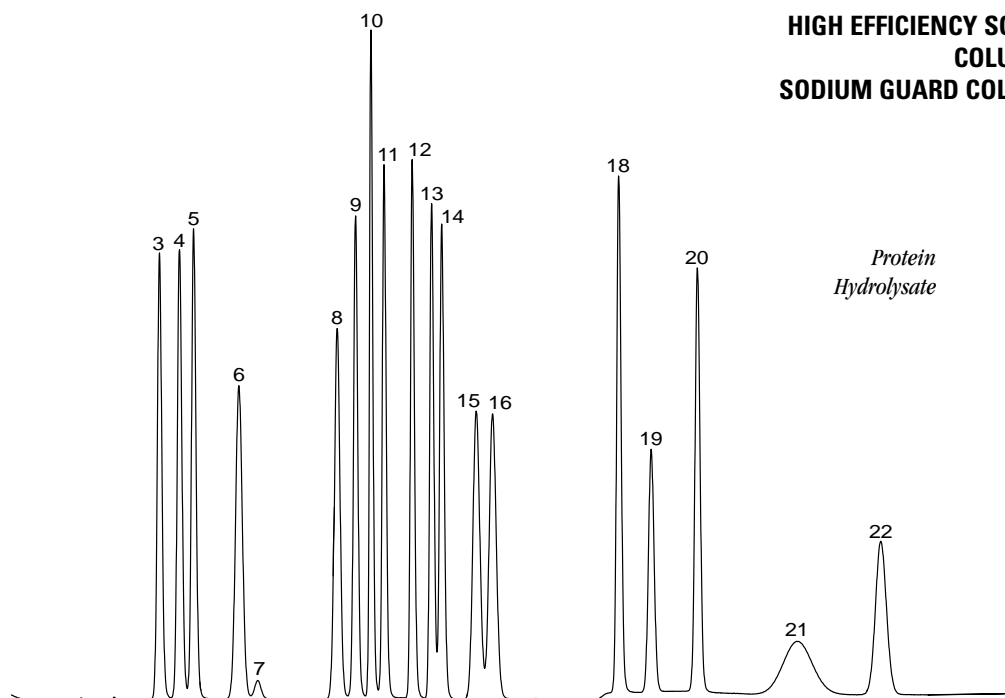
Reagent flow rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm,
 λ_{em} 465 nm

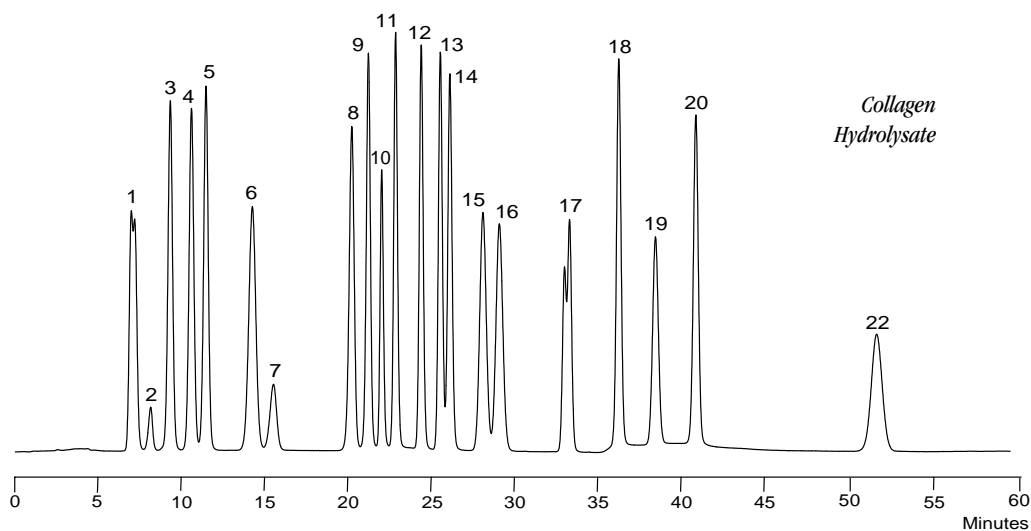
The recommended gradient conditions are subject to change without notice. This may happen because of lot changes in the columns, or improvements in the overall method. **The recommended gradient for the column will always be in the column package, and it supersedes the information in this catalog.**

**HIGH EFFICIENCY SODIUM CATION-EXCHANGE
COLUMN 1154150 (4.0 x 150 mm)
SODIUM GUARD COLUMN 1193020 (3.0 x 20 mm)**



*Protein
Hydrolysate*

- 1 Methionine-D,L,-Sulfoxide
- 2 trans-4-Hydroxy-L-Proline
- 3 Aspartic Acid
- 4 Threonine
- 5 Serine
- 6 Glutamic Acid
- 7 Proline
- 8 Glycine
- 9 Alanine
- 10 Cystine
- 11 Valine
- 12 Methionine
- 13 Isoleucine
- 14 Leucine
- 15 Tyrosine
- 16 Phenylalanine
- 17 D,L & allo-Hydroxylysine
- 18 Lysine
- 19 Ammonia
- 20 Histidine
- 21 Tryptophan
- 22 Arginine



*Collagen
Hydrolysate*

CONDITIONS

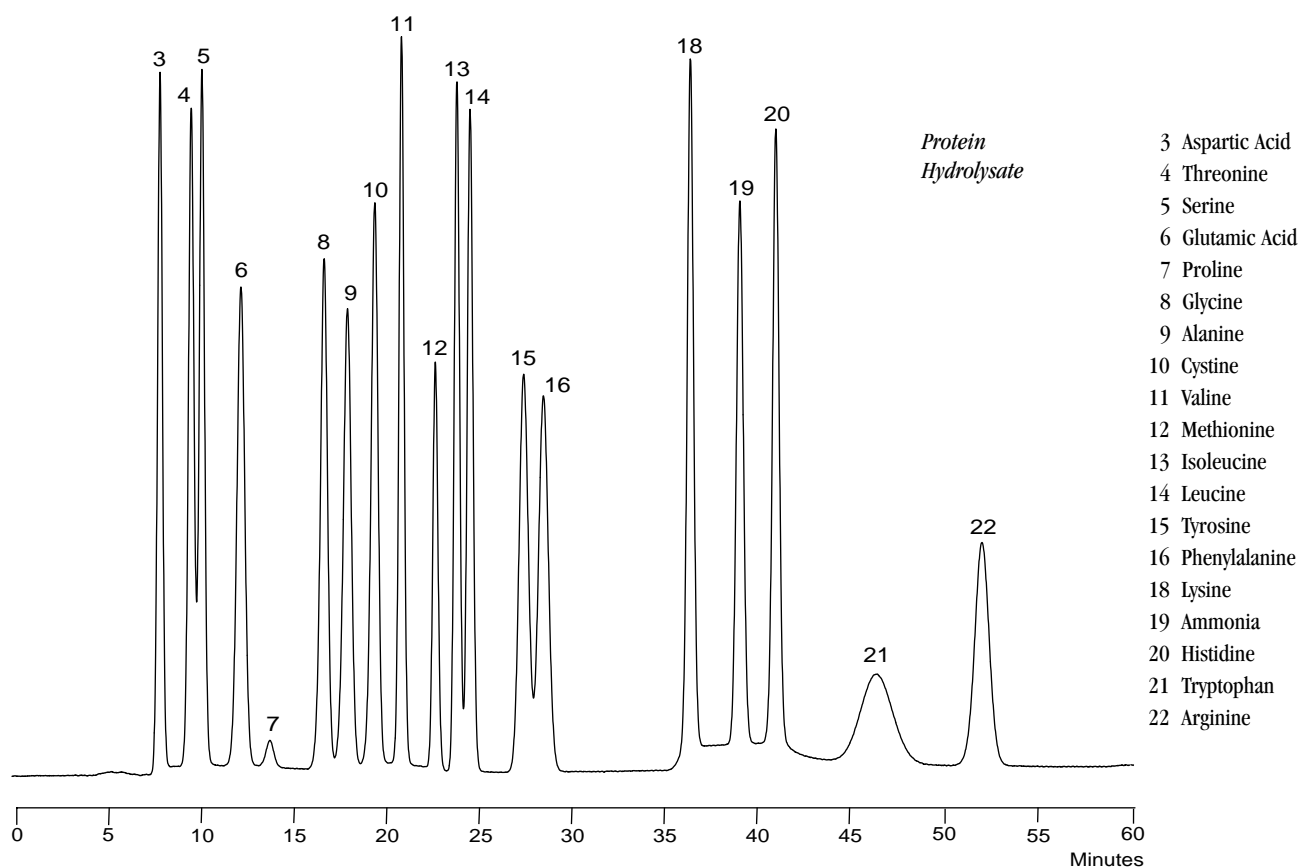
TIME	1700-0112 %	Na740 %	RG011 %
0	100	0	0
12	100	0	0
34	0	100	0
53	0	100	0
53.1	0	0	100
55	0	0	100
55.1	100	0	0
67	100	0	0

Flow rate: 0.4 mL/min, column temperature 48 °C,
injection volume: 10 µL of 0.25 µmole/mL Std.

3

Chromatograms, Columns & Guards

STANDARD SODIUM CATION-EXCHANGE COLUMN 1193250 (3.0 x 250 mm)
SODIUM GUARD COLUMN 1192020 (2.0 x 20 mm)



CONDITIONS FOR PROTEIN HYDROLYSATE SAMPLES

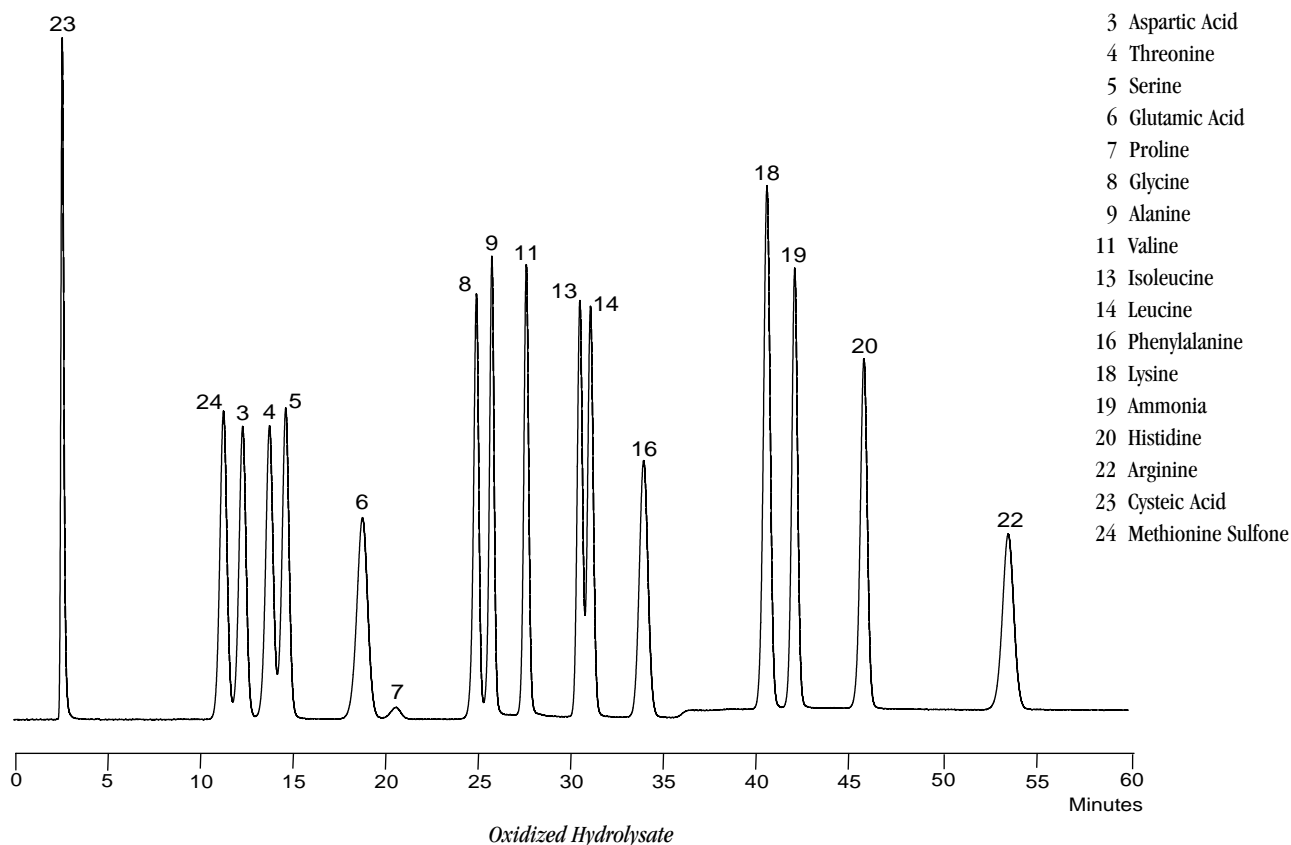
TIME	Na328 %	Na740 %	RG011 %
0	100	0	0
10	100	0	0
32	0	100	0
56	0	100	0
56.1	0	0	100
58	0	0	100
58.1	100	0	0
70	100	0	0

Flow rate: 0.3 mL/min, column temperature 48 °C, injection volume: 10 µL of 0.25 µmole/mL Std.

CONDITIONS FOR OXIDIZED SAMPLES

TIME	Na270 %	Na740 %	RG011 %
0	100	0	0
14	100	0	0
42	0	100	0
56	0	100	0
56.1	0	0	100
58	0	0	100
58.1	100	0	0
70	100	0	0

Flow rate: 0.3 mL/min, column temperature 48 °C,
injection volume: 10 µL of 0.25 µmole/mL Std.



SODIUM COLUMNS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1154150	High efficiency Sodium Cation-exchange Column 4.0 × 150 mm & 1700-0070 Amino Acid Test Mixture
1193250	Standard Sodium Cation-exchange Column 3.0 × 250 mm & 1700-0070 Amino Acid Test Mixture
1193020	Sodium Guard Column, 3.0 × 20 mm (for use with 1154150 Column)
1192020	Sodium Guard Column, 2.0 × 20 mm (for use with 1193250 Column)

3

Chromatograms, Columns & Guards

■ CARBAMATE PESTICIDE ANALYSIS COLUMNS

Pickering Laboratories Carbamate columns are guaranteed to produce the separation of carbamate residues, specified by EPA and AOAC methods. For C₁₈ columns, two water/methanol gradient conditions are available for analysis of methanolic and water samples. Expanded resolution C₈ column is capable of separating as many as 23 carbamates with either water/methanol or water/acetonitrile gradients. The difference in selectivity between Methanol and Acetonitrile protocols could be used for confirming peak identification.

Post-column conditions for pesticide analysis:

Reagent 1: Hydrolysis reagent CB130

Reagent 2: 100 mg of OPA, 2 g Thiofluor™ in 950 mL of CB910

Reactor 1: 100 °C, 0.5 mL

Reactor 2: ambient. 0.1 mL

Reagents flow rate: 0.3 mL/min

Detection:

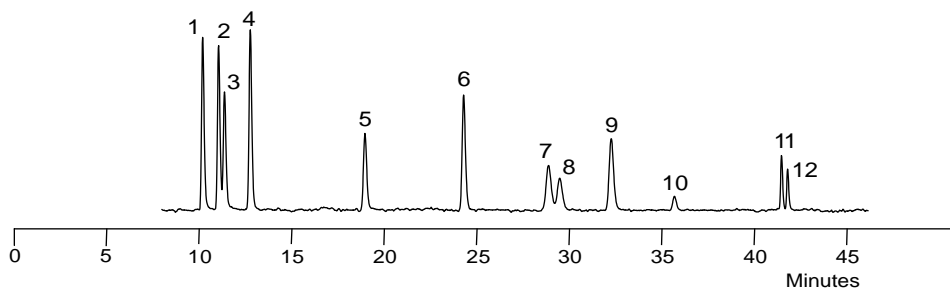
Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot changes in the columns, or improvements in the overall method. **The recommended gradient for the column will always be in the column package, and it supersedes the information in this catalog.**

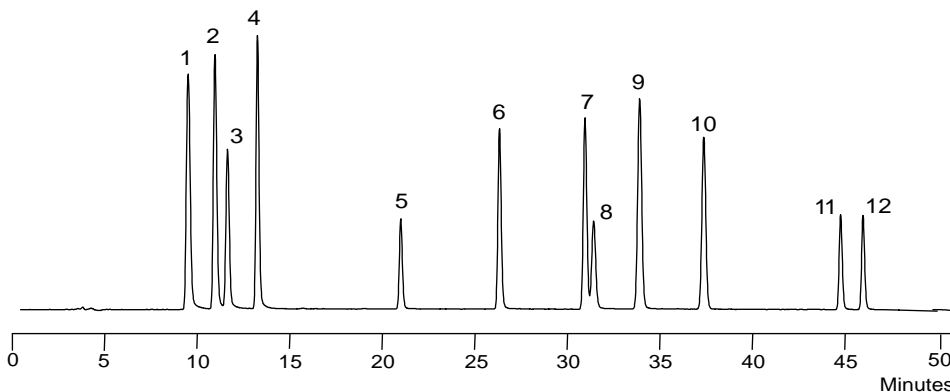
- 1 Aldicarb sulfoxide
- 2 Aldicarb sulfone
- 3 Oxamyl
- 4 Methomyl
- 5 3-Hydroxycarbofuran
- 6 Aldicarb
- 7 Propoxur
- 8 Carbofuran
- 9 Carbaryl
- 10 1-Naphthol
- 11 Methiocarb
- 12 BDMC (internal standard)

CARBAMATE COLUMN 1846250 (4.6 x 250 mm), C₁₈, 5 μm

4 ng of Carbamates in 150 μL



25 ng of Carbamates in 10 μL



CONDITIONS FOR AQUEOUS SAMPLES

TIME	WATER	MeOH %
0	100	0
1	100	0
1.1	82	18
36	30	70
39	30	70
39.1	0	100
41	0	100
41.1	100	0
55	100	0

Flow rate: 1 mL/min, column temperature 42 °C, injection volume: up to 400 μL

CONDITIONS FOR METHANOLIC SAMPLES

TIME	WATER	MeOH %
0	85	15
1	85	15
44	25	75
44.1	0	100
49	0	100
49.1	85	15
57	85	15

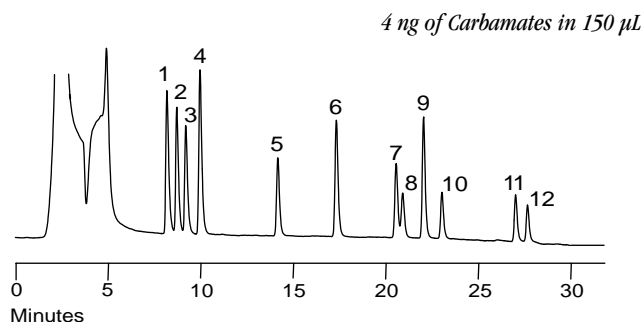
Flow rate: 1 mL/min, column temperature 42 °C, injection volume: 10 μL

CARBAMATE COLUMN 1846150 (4.6 x 150 mm), C₁₈, 5 μm

CONDITIONS FOR AQUEOUS SAMPLES

TIME	WATER	MeOH %
0	100	0
1	100	0
1.1	88	12
26	30	70
26.1	0	100
28	0	100
28.1	100	0
38	100	0

Flow rate: 1 mL/min, column temperature 42 °C,
injection volume: up to 250 μL

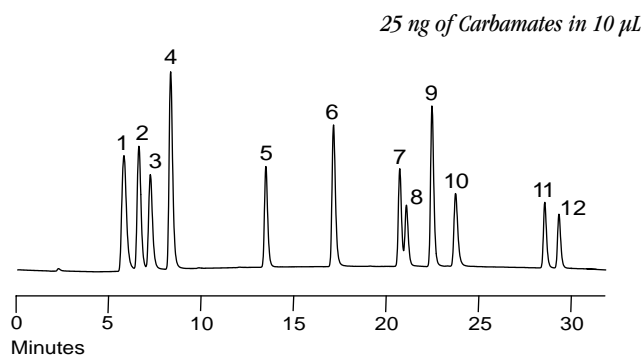


- 1 Aldicarb sulfoxide
- 2 Aldicarb sulfone
- 3 Oxamyl
- 4 Methomyl
- 5 3-Hydroxycarbofuran
- 6 Aldicarb
- 7 Propoxur
- 8 Carbofuran
- 9 Carbaryl
- 10 1-Naphthol
- 11 Methiocarb
- 12 BDMC (internal standard)

CONDITIONS FOR METHANOLIC SAMPLES

TIME	WATER	MeOH %
0	85	15
0.5	85	15
28.5	30	70
28.6	0	100
33.5	0	100
33.6	85	15
41	85	15

Flow rate: 1 mL/min, column temperature 42 °C,
injection volume: 10 μL



3

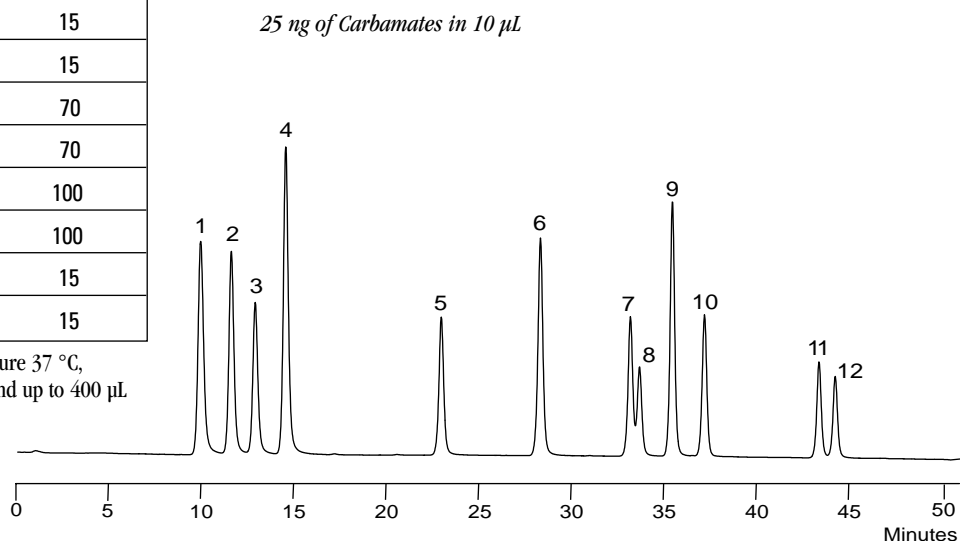
Chromatograms, Columns & Guards

**CARBAMATE COLUMN 0840250 (4.0 X 250 MM), C₁₈, 5 μM,
EXPANDED RESOLUTION FOR 23+ COMPOUNDS**

CONDITIONS FOR WATER/METHANOL GRADIENT

TIME	WATER	MeOH %
42	85	15
2	85	15
42	30	70
46	30	70
46.1	0	100
51	0	100
51.1	85	15
59	85	15

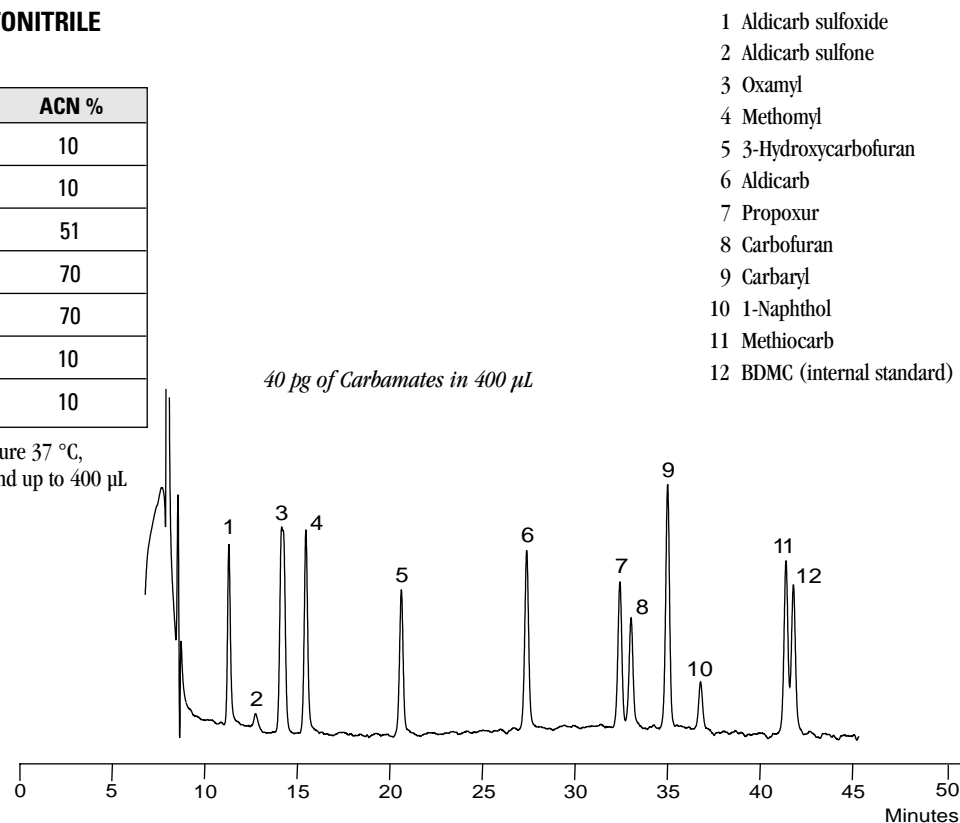
Flow rate: 0.8 mL/min, column temperature 37 °C,
injection volume: 10 μL for methanolic and up to 400 μL
for aqueous samples



CONDITIONS FOR WATER/ACETONITRILE GRADIENT

TIME	WATER	ACN %
0	90	10
2	90	10
46	49	51
46.1	30	70
49	30	70
49.1	90	10
59	90	10

Flow rate: 0.8 mL/min, column temperature 37 °C,
injection volume: 10 μL for methanolic and up to 400 μL
for aqueous samples



- 1 Aldicarb sulfoxide
- 2 Aldicarb sulfone
- 3 Oxamyl
- 4 Methomyl
- 5 3-Hydroxycarbofuran
- 6 Aldicarb
- 7 Propoxur
- 8 Carbofuran
- 9 Carbaryl
- 10 1-Naphthol
- 11 Methiocarb
- 12 BDMC (internal standard)

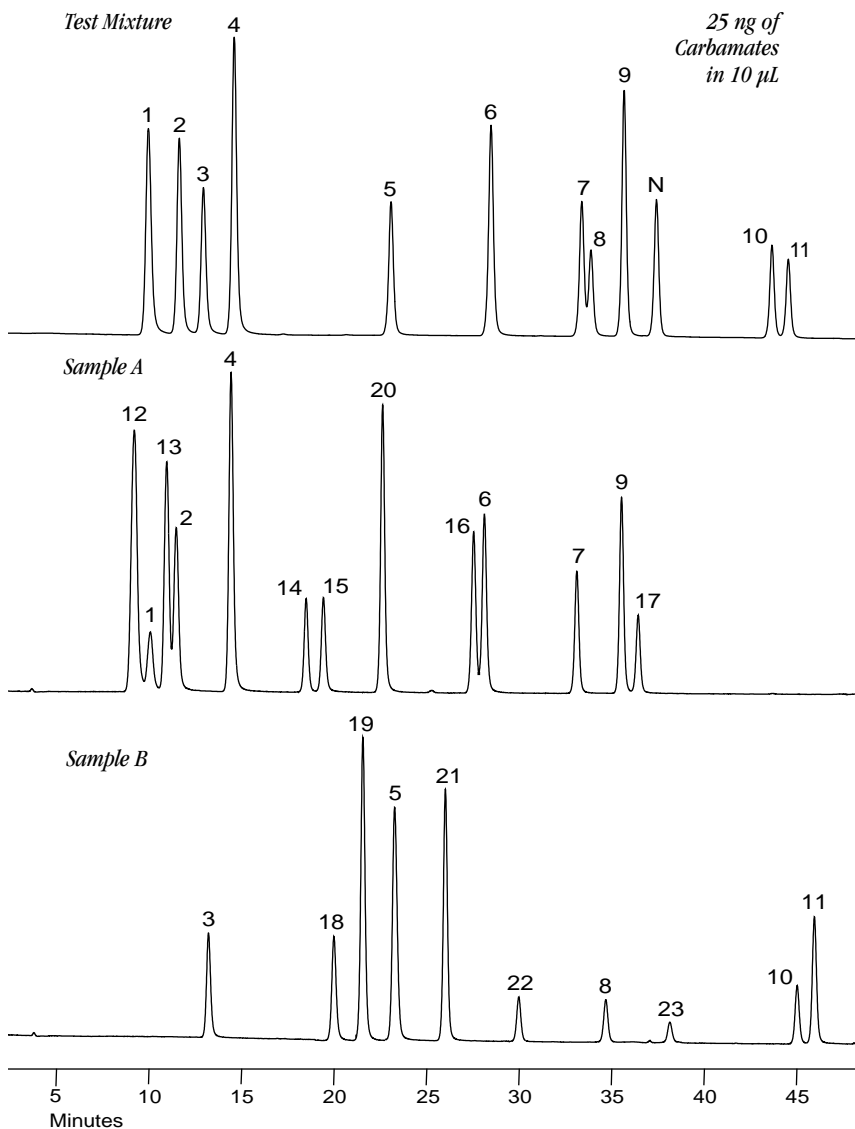
SEPARATION OF 23 CARBAMATES USING 0846250 COLUMN (4.6 x 250 mm)

CONDITIONS FOR WATER/METHANOL GRADIENT

TIME	WATER	MeOH %
0	85	15
2	85	15
42	30	70
46	30	70
46.1	0	100
51	0	100
51.1	85	15
59	85	15

Flow rate: 0.8 ml/min, column temperature 37 °C,
injection volume: 10 µL for methanolic and up to 400 µL
for aqueous samples

- | | |
|---------------------------|---------------------------|
| 1 Aldicarb sulfoxide | 13 Butocarboxim sulfone |
| 2 Aldicarb sulfone | 14 Ethiofencarb sulfoxide |
| 3 Oxamyl | 15 Ethiofencarb sulfone |
| 4 Methomyl | 16 Butocarboxim |
| 5 3-Hydroxy | 17 Ethiofencarb |
| 6 Aldicarb | 18 Thiofanox sulfoxide |
| 7 Propoxur | 19 Thiofanox sulfone |
| 8 Carbofuran | 20 Methiocarb sulfoxide |
| 9 Carbaryl | 21 Methiocarb sulfone |
| 10 Methiocarb | 22 3-Ketocarbofuran |
| 11 BDMC internal standard | 23 Thiofanox |
| 12 Butocarboxim sulfoxide | N 1-Naphthol |



CARBAMATE COLUMNS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
0840250	Carbamate Column, C ₈ , expanded resolution, 4.0 × 250 mm & 1700-0063 Carbamate Test Mixture, 2.5 µg/mL, 1.5 mL
1846250	Carbamate Column, C ₁₈ , high resolution/capacity, 4.6 × 250 mm & 1700-0063 Carbamate Test Mixture, 2.5 µg/mL, 1.5 mL
1846150	Carbamate Column, C ₁₈ , rapid analysis, 4.6 × 150 mm & 1700-0063 Carbamate Test Mixture, 2.5 µg/mL, 1.5 mL
18ECG001	Guard Cartridge Holder with 3 guard cartridges
18ECG002	Guard Cartridges, 2/pk.

■ CARBAMATE PESTICIDE ANALYSIS MICRO COLUMNS

In order to conserve solvents and reagents, increase sensitivity, and to provide for LC-MS confirmation we developed micro columns (2.1 × 100, 150 mm) for carbamate pesticide analysis. The 5 µm packing material (C₁₈, C₈) was bonded in the same fashion as our standard columns to assure the correct selectivity and ruggedness. In support of the standard methods (US EPA 531.1 and AOAC 985.32), the special post-column derivatization system was engineered to scale thereby providing the micro post-column reactor. Since our micro columns provide superior separation, operate at low flow rate with volatile mobile phases, and have low-bleed packing material they are ideal for LC-MS analysis of carbamates.

Post-column conditions for pesticide analysis using micro columns:

Reagent 1: Hydrolysis reagent CB130

Reagent 2: 100 mg of OPA, 2 g Thiofluor™ in 950 mL of CB910

Reactor 1: 100 °C, 100 µL

Reactor 2: ambient, 20 µL

Reagents flow rate: 60 µL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot changes in the columns, or improvements in the overall method. **The recommended gradient for the column will always be in the column package, and it supersedes the information in this catalog.**

MICRO CARBAMATE COLUMN 1821100 (2.1 x 100 mm), C₁₈, 5 µm



CONDITIONS FOR AQUEOUS SAMPLES

TIME	WATER	MeOH %
0	100	0
1	100	0
1.1	88	12
18	60	40
23	55.5	44.5
30	20	80
30.1	0	100
35	0	0
35.1	100	0
48	100	0

Flow rate: 0.2 mL/min, column temperature 42 °C, injection volume: 150 µL

CONDITIONS FOR METHANOLIC SAMPLES

TIME	WATER	MeOH %
0	100	0
0.1	88	12
15	60	40
20	55.5	44.5
27	20	80
27.1	0	100
33	0	100
33.1	100	0
45	100	0

Flow rate: 0.2 mL/min, column temperature 42 °C, injection volume: 3 µL

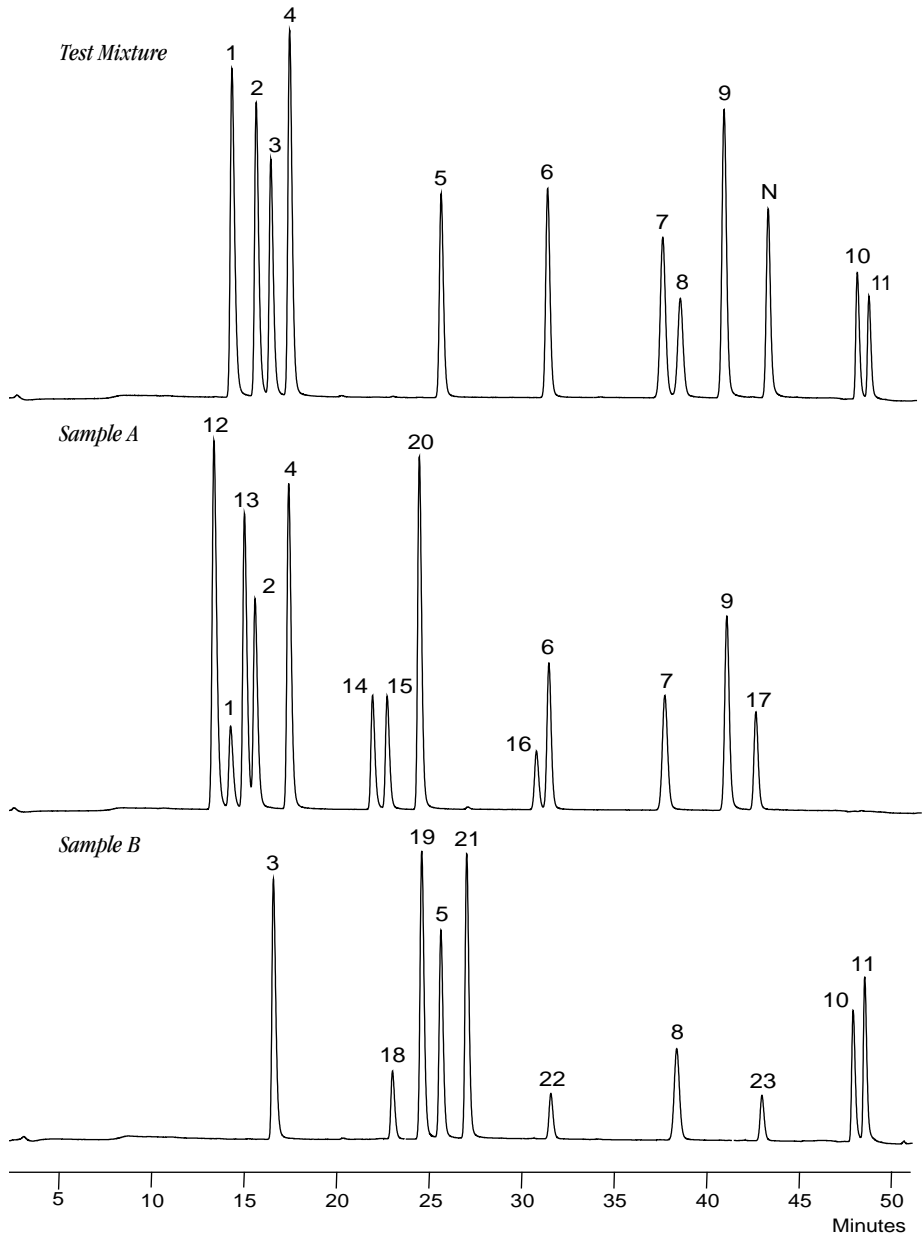
MICRO CARBAMATE COLUMN 0821150 (2.1 x 150 mm), C₈, 5 μm

CONDITIONS FOR METHANOLIC SAMPLES

TIME	WATER	MeOH %
0	100	0
0.1	90	10
23	56	44
30	56.5	44.5
40	25	75
41	0	100
45	0	100
45.1	100	0
58	100	0

Flow rate: 0.17 mL/min, column temperature 42 °C,
injection volume: 3 μL

- | | |
|---------------------------|---------------------------|
| 1 Aldicarb sulfoxide | 13 Butocarboxim sulfone |
| 2 Aldicarb sulfone | 14 Ethiofencarb sulfoxide |
| 3 Oxamyl | 15 Ethiofencarb sulfone |
| 4 Methomyl | 16 Butocarboxim |
| 5 3-Hydroxy carbofuran | 17 Ethiofencarb |
| 6 Aldicarb | 18 Thiofanox sulfoxide |
| 7 Propoxur | 19 Thiofanox sulfone |
| 8 Carbofuran | 20 Methiocarb sulfoxide |
| 9 Carbaryl | 21 Methiocarb sulfone |
| 10 Methiocarb | 22 3-Ketocarbofuran |
| 11 BDMC internal standard | 23 Thiofanox |
| 12 Butocarboxim sulfoxide | N 1-Naphthol |



CARBAMATE PESTICIDE MICRO COLUMNS CATALOG INFORMATION

NEW
NEW

CATALOG NO.	DESCRIPTION
0821150	Micro Analytical Column, C ₈ , 2.1 × 150 mm & 1700-0063 Carbamate Test Mixture, 2.5 μg/mL, 1.5 mL
1821100	Micro Analytical Column, C ₁₈ , 2.1 × 100 mm & 1700-0063 Carbamate Test Mixture, 2.5 μg/mL, 1.5 mL
1700-0204	Guard Cartridge Holder with 3 guard cartridges, for use with Micro columns
1700-0205	Guard Cartridges, 2/pk, for use with Micro columns

3

Chromatograms, Columns & Guards

■ GLYPHOSATE HERBICIDE ANALYSIS COLUMN

Pickering Laboratories cation-exchange Glyphosate column is designed and tested for analysis of Glyphosate and its primary metabolite Aminomethylphosphonic acid (AMPA). This short, isocratic method provides separation of the peaks of interest. Reproducible performance is guaranteed run to run and column to column.

Post-column conditions for Glyphosate analysis:

Reagent 1: Oxidizing reagent— 100 μ L of 5% Sodium Hypochlorite in 950 mL of GA116

Reagent 2: 100 mg of OPA, 2 g Thiofluor™ in 950 mL of GA104

Reactor 1: 36 °C, 0.5 mL

Reactor 2: ambient. 0.1 mL

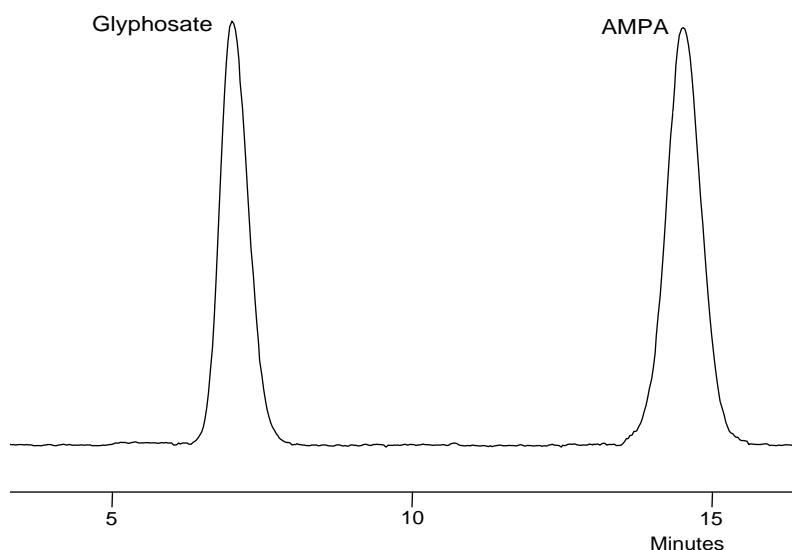
Reagents flow rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm

λ_{em} 465 nm

GLYPHOSATE COLUMN 1954150 (4.0 x 150 mm) K+ CATION-EXCHANGE, GUARD COLUMN (3.0 x 20 mm), K+ CATION EXCHANGE



CONDITIONS

TIME	K200 %	RG019 %
0	100	0
15	100	0
15.1	0	100
17	0	100
17.1	100	0
27	100	0

Flow rate: 0.4 mL/min, column temperature 55 °C, injection volume: 10 μ L

GLYPHOSATE COLUMN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1954150	Cation-exchange Column for Glyphosate analysis, 4 x 150 mm & 1700-0080 Glyphosate test mixture, 2.5 μ g/mL, 1.5 mL
1953020	Cation-exchange Guard Column, 3.0 x 20 mm
1952150	Micro Cation-exchange Column, K ⁺ form, 2.1 x 150 mm

NEW

■ ALKION™ COLUMN

The stationary phase in the ALKION™ column is a rigid, non-porous polymeric phase that is surface sulfonated. The two modes of separation are ion-exchange and moderate partitioning. The low capacity of the ion-exchange resin makes it an ideal phase for the separation of

strongly basic and positively charged compounds. The reversed-phase character allows for discrimination between closely related species.

The unique properties of this column allow using it for a wide range of applications.

ALKION™ COLUMN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
9410917	ALKION™ Cation-exchange column, K form, 4.0 × 150 mm
9493020	ALKION™ Guard column, K form, 3.0 × 20 mm

ALKION™ COLUMN ANALYSIS OF BIOGENIC AMINES

Post-column conditions:

Reagent 1: 300 mg of OPA, 2g Thiofluor™, 3 mL of 30% Brij® 35 in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent flow rate: 0.3 mL/min

Detection:

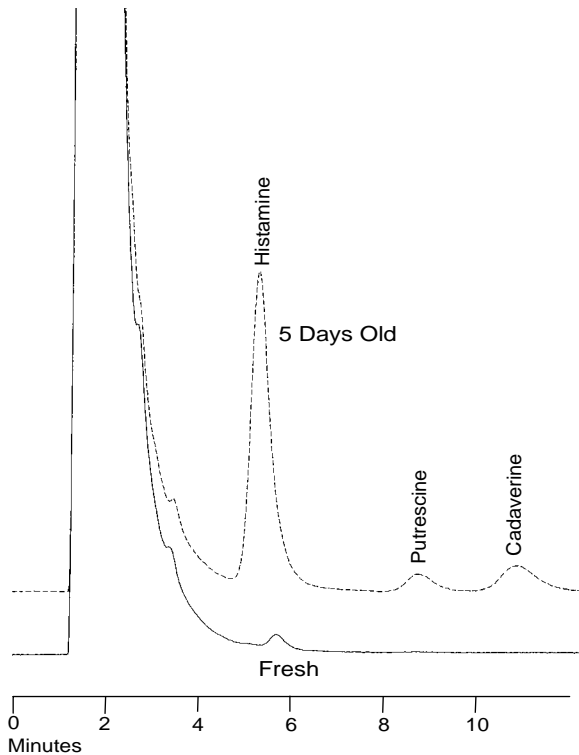
Fluorometer: λ_{ex} 330 nm

λ_{em} 465 nm

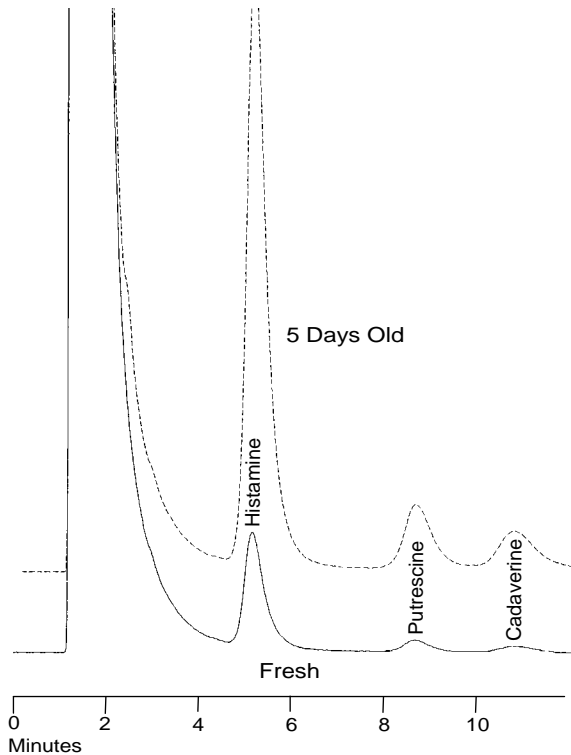
CONDITIONS

TIME	K600 %	K130 %
0	100	0
12	100	0
12.1	0	100
15	0	100
15.1	100	0
20	100	0

Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 μ L



Abi Tuna Fillet extracted per FDA Method



Mabi-Mabi extracted per FDA Method

3

Chromatograms, Columns & Guards

ALKION™ COLUMN ANALYSIS OF BIOGENIC AMINES

Post-column conditions:

Reagent 1: 300 mg of OPA, 2g Thiofluor™, 3 mL of 30% Brij® 35 in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent flow rate: 0.3 mL/min

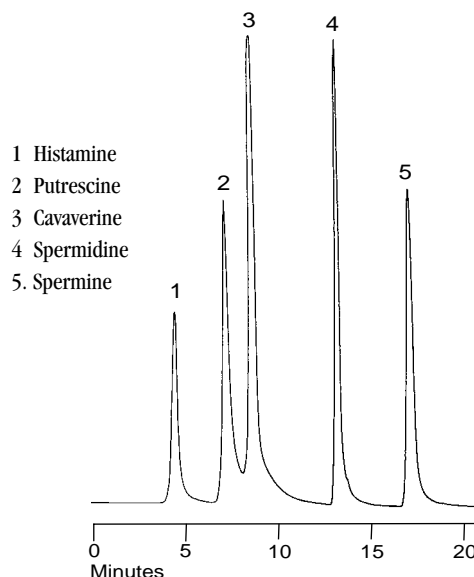
Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

CONDITIONS

TIME	K600 %	K563 %	K130 %
0	100	0	0
6	100	0	0
15	0	100	0
21	0	100	0
21.1	0	0	100
23	0	0	100
23.1	100	0	0
29	100	0	0

Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 μ L



ALKION™ COLUMN ANALYSIS OF PARAQUAT AND DIQUAT IN WATER

Post-column conditions:

Reagent 1: 300 mg/L of Sodium Dithionite in 0.3 M Sodium Hydroxide

Reactor: 35 °C, 0.15 mL

Reagent flow rate: 0.3 mL/min

Detection:

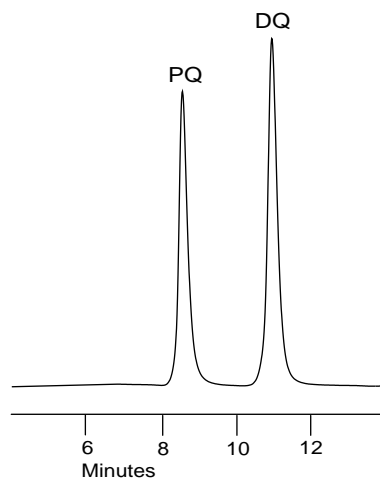
UV-Vis detector: $\lambda = 395$ nm for PQ, $\lambda = 378$ nm for DQ

CONDITIONS

TIME	1700-1101 %	1700-1102 %	1700-1103 %	i-PROPANOL %
0	31.5	53.5	0	15
10	28	47	10	15
15	28	47	10	15
15.1	0	85	10	5
17	0	85	10	5
17.1	31.5	53.5	0	15
23	31.5	53.5	0	15

Flow rate: 0.8 mL/min, column temperature 50 °C, injection volume: up to several μ L

PQ = Paraquat
DQ = Diquat



Note: Above chromatogram is approximately 1 ppm in 200 μ L.

ALKION™ COLUMN ANALYSIS OF AMINOGLYCOSIDE ANTIBIOTICS IN FEEDS

Post-column conditions:

Reagent 1: 300 mg of OPA, 2g Thiofluor™, 3 mL 30 % Brij® 35 in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent flow rate: 0.3 mL/min

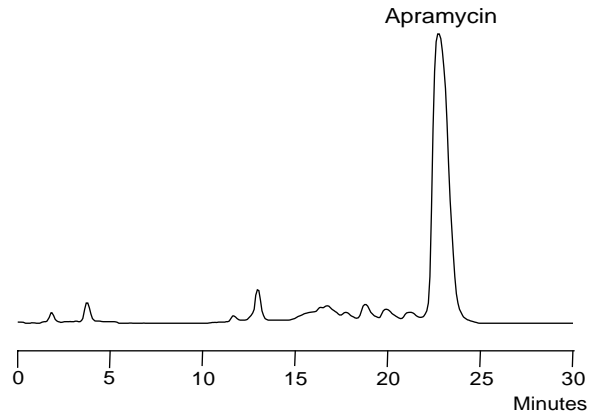
Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

CONDITIONS FOR APRAMYCIN ANALYSIS

TIME	1700-1101 %	1700-1102 %	1700-1103 %
0	67	33	0
5	67	33	0
15	14.7	7.3	78
20	14.7	7.3	78
20.1	0	22	78
21	0	22	78
21.1	67	33	0
28	67	33	0

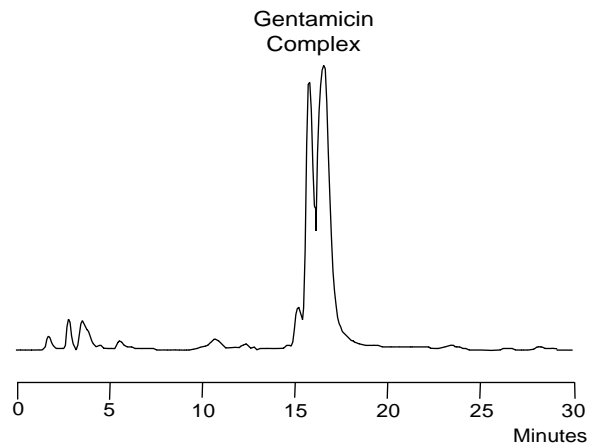
Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 μ L



CONDITIONS FOR GENTAMICIN ANALYSIS

TIME	1700-1101 %	1700-1102 %	1700-1103 %
0	43	31	26
20	9	13	78
30	9	13	78
30.1	0	22	78
31	0	22	78
31.1	43	31	26
38	43	31	26

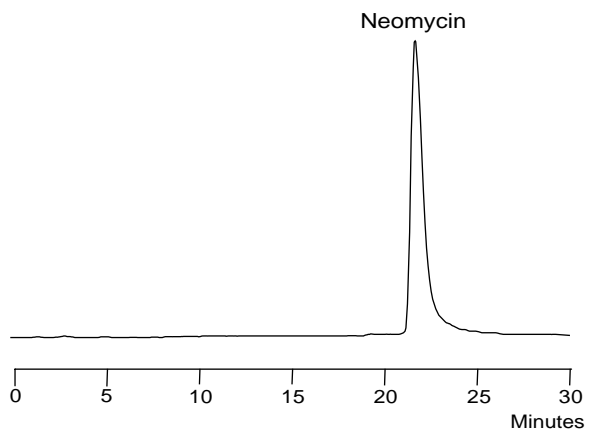
Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 μ L



CONDITIONS FOR NEOMYCIN ANALYSIS

TIME	1700-1101 %	1700-1102 %	1700-1103 %
0	60	40	0
15	13.2	8.8	78
25	11	11	78
25.1	0	22	78
26	0	22	78
26.1	60	40	0
32	60	40	0

Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 μ L



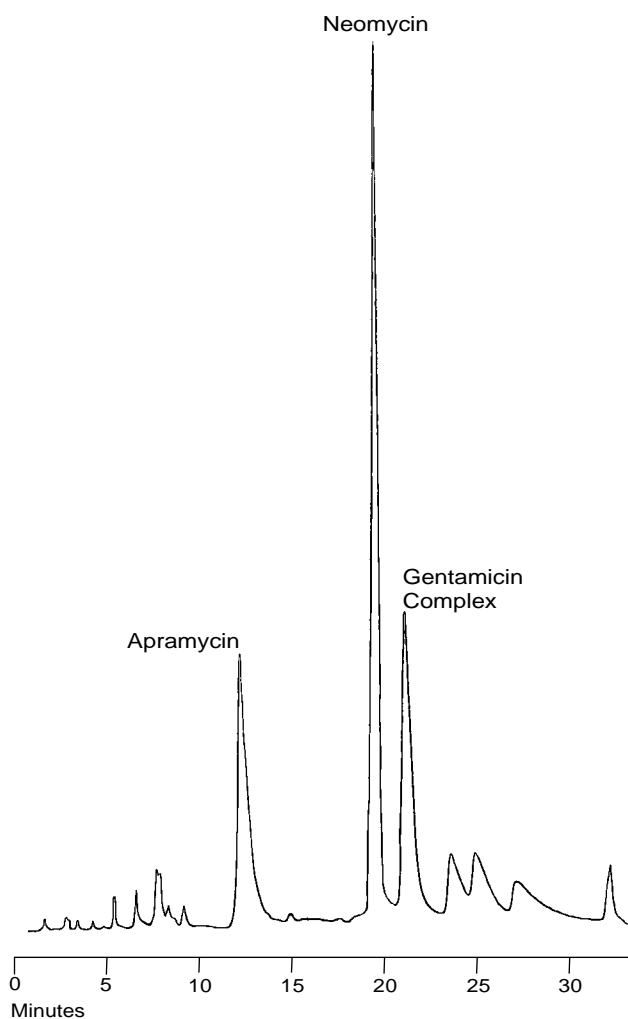
3

Chromatograms, Columns & Guards

CONDITIONS FOR SEPARATION OF APRAMYCIN GENTAMICIN AND NEOMYCIN

TIME	1700-1101 %	1700-1102 %	1700-1103 %
0	60	40	0
15	13.2	8.8	0
15.1	12	10	78
30	12	10	78
30.1	0	22	78
31	0	22	78
31.1	60	40	0
37	60	40	0

Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: 10 µL



ALKION™ COLUMN ANALYSIS OF STREPTOMYCIN

Post-column conditions:

Reagent 1: 0.75 N Sodium Hydroxide

Reactor 1: ambient, 0.1 mL

Reagent 2: 0.6 % Ninhydrin

Reactor 2: 60 °C, 0.5 mL

Reagents flow rate: 0.3 mL/min

or

Reagent 1: Oxidizing Reagent: 100 µL of 5% Sodium Hypochlorite in GA116

Reactor 1: 50 °C, 0.5 mL

Reagent 2: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30% Brij® 35 solution in 950 mL of OD104

Reactor 2: ambient, 0.1 mL

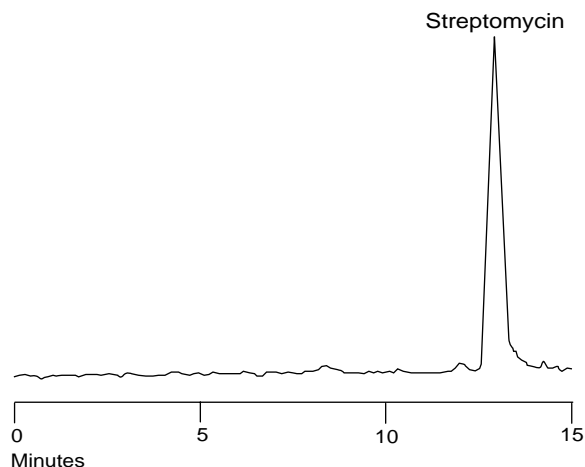
Detection:

Fluorometer: λ_{ex} 395 nm, λ_{em} 500 nm

CONDITIONS

TIME	1700-1101 %	1700-1102 %	1700-1103 %
0	60	40	0
10	60	40	0
10.1	48	48	4
15	48	48	4
15.1	60	40	0
21	60	40	0

Flow rate: 0.8 mL/min, column temperature 40 °C, injection volume: up to several µL



■ PARALYTIC SHELLFISH TOXINS ANALYSIS COLUMN

LC Condition:

Flow rate: 0.8 mL/min, column temperature 40 °C

Post-column conditions:

Reagent 1: Periodic acid (7 mM) in 50 mM Potassium Phosphate buffer, pH 9.0

Reactor 1: 75 °C, 2.0 mL

Reagent 2: 0.5 M Acetic Acid

Reactor 2: ambient, 0.1 mL

Reagents flow rate: 0.4 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 390 nm

Mobile Phases:

A. For C1–C4 toxins:

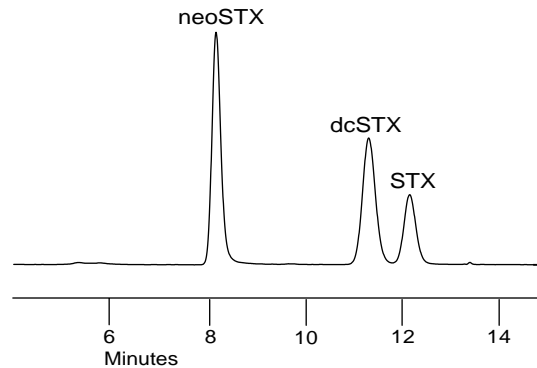
Tetrabutylammonium phosphate (1 mM) adjusted to pH 5.8 with acetic acid

B. For GTX-1 to GTX-6, dcGTX2, and dcGTX3:

Sodium 1-heptanesulfonate (2 mM) in 10 mM Ammonium phosphate, pH 7.1

C. For STX, neoSTX, and dcSTX:

Sodium 1-heptanesulfonate (2 mM) in 10 mM Ammonium phosphate, pH 7.1-Acetonitrile (100 + 5)



PARALYTIC SHELLFISH TOXINS CATALOG INFORMATION

NEW

CATALOG NO.	DESCRIPTION
0846150	Reversed-phase column for analysis of paralytic shellfish toxins, C ₈ , 4.6 × 150 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

■ MULTI-RESIDUE MYCOTOXIN ANALYSIS COLUMN

Although *Aspergillus* (Aflatoxins, Ochratoxin A) are generally associated with peanuts and *Fusarium* (Deoxynivalenol, Zearalenone) with wheat, these fungi and those that produce other toxins are not host selective and so can cross plant species. This situation is complicated by the fact that the microscopic mold may not be visible to the naked eye. Also, when infected grains are processed, any visible mold is lost but the toxic metabolites carry over into the finished products. Thus, multi-residue analytical screens for toxins in grain and finished goods are a wiser choice than single-family protocols. We present here two such screens that cover five families of toxins.

Method One: Analysis of Deoxynivalenol, Aflatoxins, Ochratoxin A and Zearalenone in single run

Method Two: Analysis of Deoxynivalenol, Aflatoxins and Fumonisin in single run

Analytical Conditions (One & Two)

Column: MYCOTOX™ Analytical column, C18, high resolution/capacity, 4.6 × 250 mm, Catalog No. 1846250

Temperature: 40 °C

Flow Rate: 1.0 mL/min, injection volume 30 µL

Mobile Phase:

- D.I. Water
- Acetonitrile
- Methanol
- Phosphate buffer (pH 3.3): MeOH (90:10)

Post-column Conditions (Method One)

Post-column System: PCX5200 with 2.0 mL reactor

Temperature: 90 °C

Reagent: I2, 100 mg/Lt.

Detection:

- DON DAD 218 nm
- Aflatoxins Fluorescence: λ_{ex} 365 nm, λ_{em} 455 nm
- Ochratoxin A Fluorescence: λ_{ex} 335 nm, λ_{em} 455 nm
- Zearalenone Fluorescence: λ_{ex} 275 nm, λ_{em} 455 nm

Post-column Conditions (Method Two)

Post-column Systems: PCX5200 with 2.0mL reactor

Temperature: 60 °C

Reagent: OPA, Thiofluor in GA 104

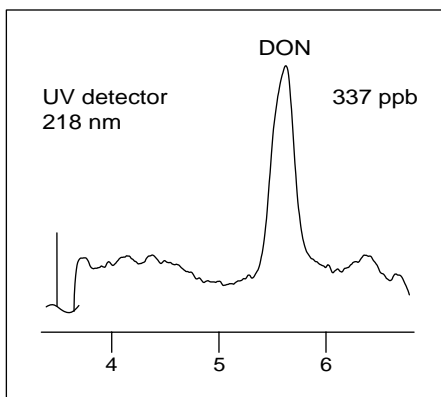
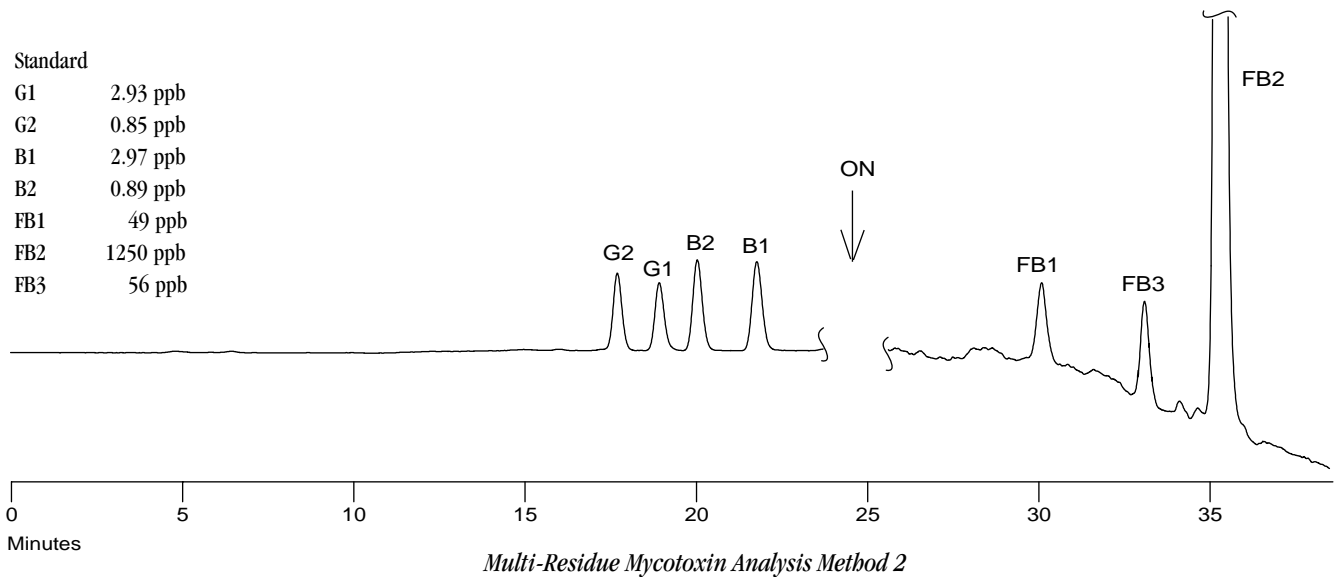
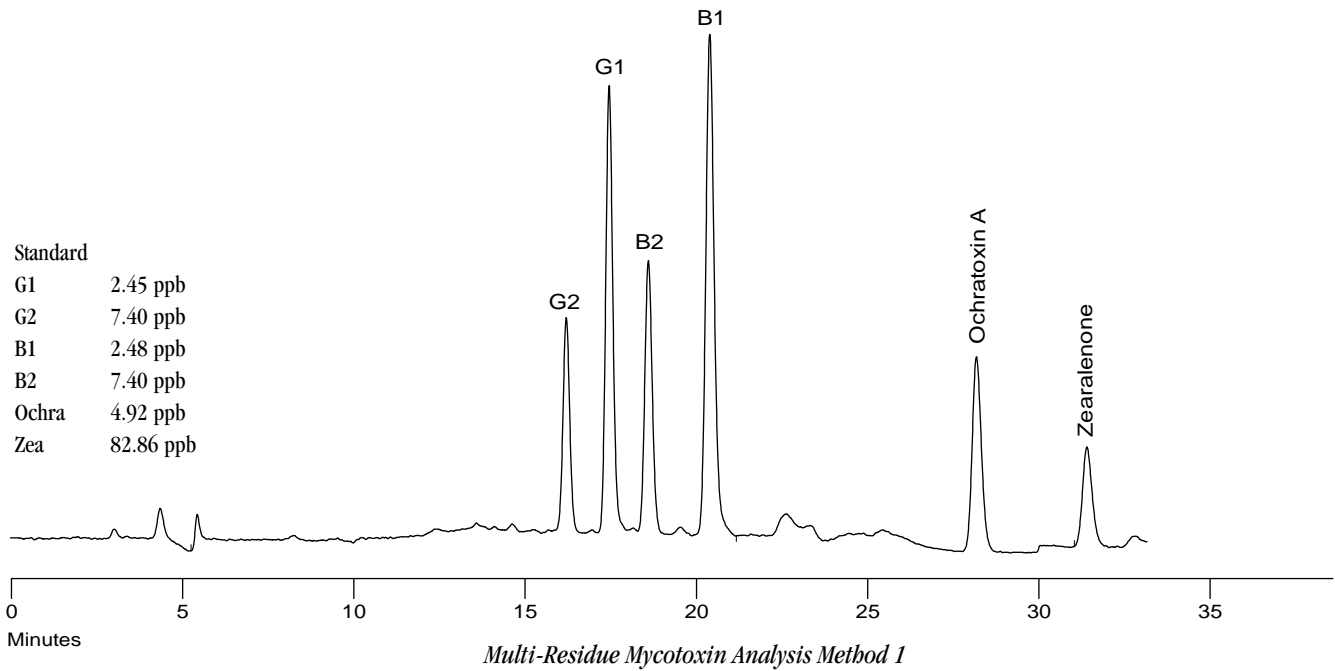
Detection:

- DON DAD 218 nm
- Aflatoxins Fluorescence: λ_{ex} 365 nm, λ_{em} 455 nm
- Fumonisin Fluorescence: λ_{ex} 330 nm, λ_{em} 465 nm

MULTI-RESIDUE MYCOTOXIN ANALYSIS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1612124	MYCOTOX™ Reversed-phase column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

Chromatograms, Columns & Guards



■ AFLATOXINS ANALYSIS COLUMN

Aflatoxins are naturally occurring toxins belonging to the class Mycotoxins. They are produced by fungi and occur in peanuts, peanut meal, cotton-seed meal, wheat, milk and many other foods and feeds.

The most important feature of the post-column method described below is that all six Aflatoxins are detectable at the same fluorescence emission wavelength in a single isocratic HPLC analysis.

LC Conditions:

Flow rate: 1.0 mL/min, column temperature 42 °C,
injection volume 10 µL

Mobile Phase: Methanol/acetonitrile/water: (22:22:56), isocratic

Injection: 10 µL in Methanol
5 ng B₁ & G
1.5 ng B₂ & G₂
1.25 ng M₁ & M₂

Post-column conditions:

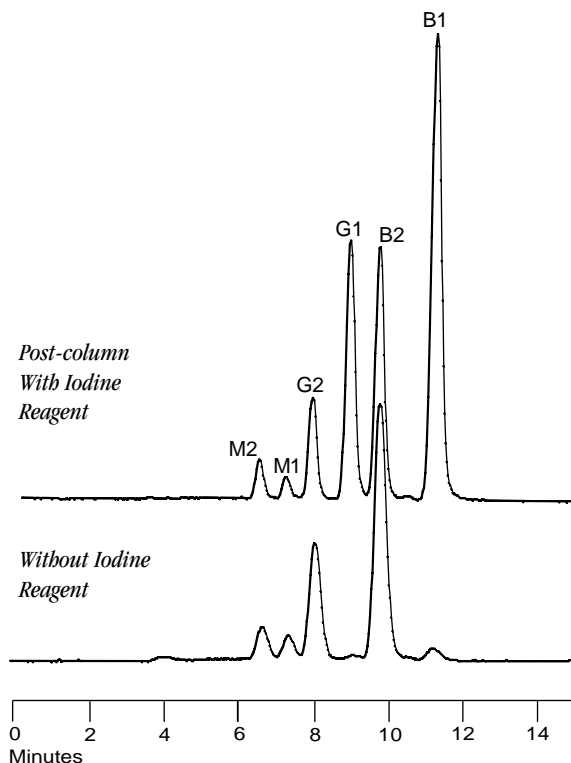
Reagent: I₂ 100 mg/L in water

Reactor: 70 °C, 1.4 mL

Reagent flow rate: 0.4 mL/min

Detection:

Fluorometer: λ_{ex} 365 nm, λ_{em} 430 nm



AFLATOXIN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1612124	MYCOTOX™ Reversed-phase column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

■ POLYETHER ANTIBIOTICS ANALYSIS COLUMN

Polyether antibiotics, such as Monensin, Narasin and Salinomycin, in raw material, premix, liquid supplements and final feeds are best quantified using HPLC with post-column derivatization. Because of selectivity of post-column reaction almost no sample cleanup is needed.

LC Conditions:

Flow rate: 0.7 mL/min, column temperature 40 °C,
injection volume 10 µL

Mobile Phase: Methanol/5% Acetic Acid in Water (90:10), isocratic

Post-column conditions

(non-metallic post-column derivatization system is required):

Reagent 1: Concentrated Sulfuric acid / Methanol (4:96 v/v)

Reactor 1: Ambient, 0.1 mL

Reagent 2: 60 g of Vanillin (or p-dimethylaminobenzaldehyde)
in 950 mL of Methanol

Reactor 2: 90 °C, 1.4 mL

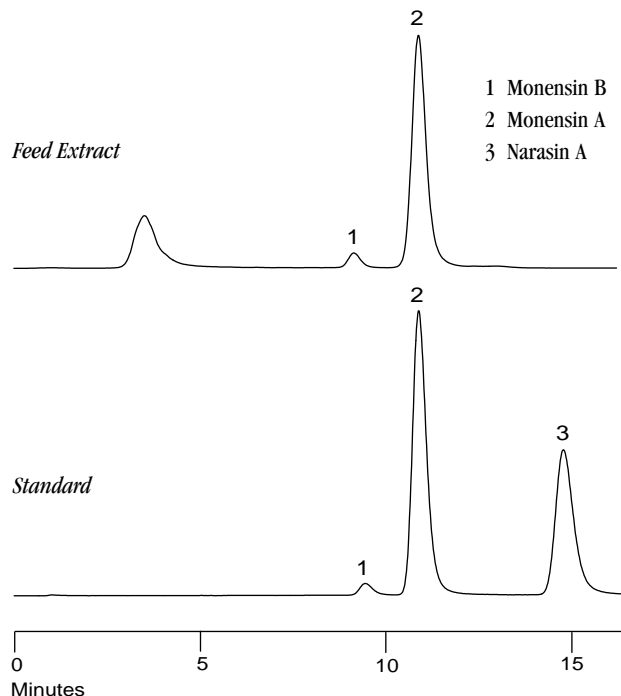
Reagents flow rate: 0.3 mL/min

Note: Using 2-reagent system for this application greatly extends reagents life.

One-reagent method and post-column derivatization system are also available.

Detection:

UV-Vis detector: Vanillin $\lambda=520$ nm, DMAB $\lambda=450$ nm



POLYETHER ANTIBIOTICS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
2381750	Polyether reversed-phase column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

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Eluants

■ CHROMATOGRAPHIC GRADE™

Pickering Laboratories eluants are manufactured under strictly controlled conditions to guarantee purity, stability and consistency for a reproducible high quality chromatogram. This quality standard guarantees the resulting chromatogram will be free of any noise and interference.

The Lithium and Sodium eluants are not sensitive to oxidation and do not need refrigeration, either in storage or use. Degassing is not required. However, they should be protected from air to prevent contamination. Ambient air actually contains amines and amino acids that will dissolve in the low-pH eluants and will appear in the chromatograms.

All buffers are packaged in cases of four 950 mL polyethylene bottles. The regenerants are packaged in single 950 mL

bottles because of the small volumes used during each analysis. Sample diluents are packaged in cases of four 250 mL borosilicate glass bottles.



ELUANTS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
	<i>Amino Acid Analysis, Sodium-Based Solutions:</i>	
Na270	Sodium Eluant, pH 2.70	case of 4 (950 mL/bottle)
Na315	Sodium Eluant, pH 3.15	case of 4 (950 mL/bottle)
Na328	Sodium Eluant, pH 3.28	case of 4 (950 mL/bottle)
Na425	Sodium Eluant, pH 4.25	case of 4 (950 mL/bottle)
Na640	Sodium Eluant, pH 6.40	case of 4 (950 mL/bottle)
Na740	Sodium Eluant, pH 7.40	case of 4 (950 mL/bottle)
1700-0112*	Sodium Eluant, pH 3.15, with 5 % Sulfolane,	case of 4 (950 mL/bottle)
1700-0114*	Sodium Eluant, pH 3.33, with 2.5 % Sulfolane,	case of 4 (950 mL/bottle)
RG011	Sodium Column Regenerant	each (950 mL/bottle)
Na220	Sodium Diluent, pH 2.20, for calibration standards/hydrolyzed samples	case of 4 (250 mL/bottle)

* For use with 1154150 column with serial numbers above 1314

ELUANTS CATALOG INFORMATION CONTINUED

CATALOG NO.	DESCRIPTION	QUANTITY
	<i>Amino Acid Analysis, Lithium-Based Solutions:</i>	
Li275	Lithium Eluant, pH 2.75	case of 4 (950 mL/bottle)
Li280	Lithium Eluant, pH 2.80	case of 4 (950 mL/bottle)
Li292	Lithium Eluant, pH 2.92	case of 4 (950 mL/bottle)
Li357	Lithium Eluant, pH 3.57	case of 4 (950 mL/bottle)
Li365	Lithium Eluant, pH 3.65	case of 4 (950 mL/bottle)
Li750	Lithium Eluant, pH 7.50	case of 4 (950 mL/bottle)
RG003	Lithium Column Regenerant	each (950 mL/bottle)
Li220	Lithium Diluent, pH 2.36, for calibration standards/prepared samples	case of 4 (250 mL/bottle)
	<i>Glyphosate Herbicide Analysis:</i>	
K200	Glyphosate Potassium Phosphate Eluant	case of 4 (950 mL/bottle)
RG019	Glyphosate Column Regenerant	each (950 mL/bottle)
	<i>Potassium-Based Solutions for ALKION™ Column for Aminoglycoside Antibiotics, Paraquat/Diquat in Water Analysis & Streptomycin:</i>	
1700-1101	Potassium Phosphate Eluant, K01	case of 4 (950 mL/bottle)
1700-1102	Potassium Hydroxide Eluant, K02	case of 4 (950 mL/bottle)
1700-1103	Potassium Chloride Eluant, K03	case of 4 (950 mL/bottle)
	<i>Biogenic Amines/Polyamines Analysis:</i>	
K563	Potassium Phosphate Eluant, pH 5.63	case of 4 (950 mL/bottle)
K600	Potassium Phosphate Eluant, pH 6.00	case of 4 (950 mL/bottle)
K130	Potassium Column Regenerant	each (950 mL/bottle)

■ CUSTOM ELUANTS

We develop and manufacture custom lots of Eluants for customers who require our “Guaranteed Chemistry” commitment of purity and certified use. Let us make some for you! Call for details.



ANALYTICAL COLUMNS & GUARDS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
0354100	Lithium Cation-exchange column, 4.0 × 100 mm
1154150B	Sodium Cation-exchange column, 4.0 × 150 mm
0352020	Lithium guard column, 2.0 × 20 mm
1193020	Sodium guard column, 3.0 × 20 mm

ELUANTS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
	<i>Physiological Fluids and Native Samples, 3-buffer method:</i>	
Li292	1st Lithium Eluant, pH 2.92	case of 4 (950 mL/bottle)
Li365	2nd Lithium Eluant, pH 3.65	case of 4 (950 mL/bottle)
Li375	3rd Lithium Eluant, pH 3.75	case of 4 (950 mL/bottle)
RG003	Lithium Column Regenerant	each (950 mL/bottle)
	<i>Protein Hydrolysate Samples, classic 3-buffer method:</i>	
Na328*	1st Sodium Eluant, pH 3.28	case of 4 (950 mL/bottle)
1700-0114**	1st Sodium Eluant, pH 3.33	case of 4 (950 mL/bottle)
Na425	2nd Sodium Eluant, pH 4.25	case of 4 (950 mL/bottle)
Na640	3rd Sodium Eluant, pH 6.40	case of 4 (950 mL/bottle)
RG011	Sodium Column Regenerant	each (950 mL/bottle)

* For columns with serial number 1313 and below

** For columns with serial number 1314 and above

Note: Please contact Pickering to obtain information on 3-buffer method for Collagen Hydrolysate Oxidized Feed samples, 5-buffer method for Physiological Fluids and Native Samples and for Beckman System Gold

POST-COLUMN REAGENTS & CHEMICALS CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
T100	TRIONE® Ninhydrin Reagent (3-month* shelf life)	each (950 mL/bottle)
T100C	TRIONE® Ninhydrin Reagent (3-month* shelf life)	case of 4 (950 mL/bottle)
T200	TRIONE® Two-part Ninhydrin Reagent (12-month* shelf life before mixing)	to prepare case of 4 (900 mL/bottle)
Li220	Lithium Diluent, pH 2.36	case of 4 (250 mL/bottle)
Na220	Sodium Diluent, pH 2.20	case of 4 (250 mL/bottle)
SP100	SERAPREP™	each (250 mL/bottle)
UP100	URIPREP™	each (250 mL/bottle)
012006P	Native Sample standard, in 0.2 N Lithium citrate buffer pH 2.36 ¹	each (5 mL/bottle)
011006P	Native Sample standard, in 0.2 N Lithium citrate buffer pH 2.36 ²	each (5 mL/bottle)
012506H	Protein Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ³	each (5 mL/bottle)
012506C	Collagen Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ⁴	each (5 mL/bottle)
1700-0155	Oxidized Feed Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ⁵	each (5 mL/bottle)
1700-0070	Amino Acid Test Mixture, in 0.01 N HCl ⁶	each (1.5 mL/bottle)
1700-0170	Native Sample Standard in 0.2 N Lithium citrate buffer, pH 2.36 ⁷	each (5 mL/bottle)

* From date of manufacture

¹ Without Norleucine, 0.25 µmole/mL

² With Norleucine, 0.25 µmole/mL

³ 0.25 µmole/mL

⁴ 0.25 µmole/mL, Proline & Hydroxyproline, 1.25 µmole/mL

⁵ 0.25 µmole/mL

⁶ 0.25 µmole/mL

⁷ Without Norleucine & α-Amino-β-guanidinopropionic acid, 0.25 µmole/mL

ACCESSORIES CATALOG INFORMATION

CATALOG NO.	DESCRIPTION
1100-6310	Pre-column Filter Kit
2103-0463	Tubing, SARAN®, 1/8 OD × 0.063 ID, per 90 cm
3107-0200	Reservoir Adapter, to connect Pickering reservoir bottle to Beckman 6300 cap
RB050	Reservoir Assembly, TRIONE® Ninhydrin Reagent, includes safety-coated reservoir bottle, cap with SARAN® tubing and fittings

■ TRIONE® NINYDRIN REAGENT



Chromatographic Grade™

A prepared Reagent for Automated Post-column Derivatization of Primary and Secondary Amines

TRIONE® Ninhydrin reagent is specially formulated for amino acid analysis. It contains Ninhydrin, Hydrindantin (reduced Ninhydrin), a Lithium Acetate buffer, and Sulfolane, a water-miscible organic solvent. The solvent is necessary to maintain the solubility of both the Hydrindantin and the primary amine product, Ruhemann's Purple. The buffer is required because the reaction is pH dependent. The active ingredients—Ninhydrin and Hydrindantin are required for proper development of secondary and primary amines, respectively.

TRIONE® is so stable that it does not require refrigeration, either in shipment, storage, or in the reservoir. Quantitation is consistent from the first to the last mL, so there is no waste. The high signal-to-noise ratio of TRIONE®, when compared to DMSO-containing reagents, permits detection sensitivity to be increased with minimum increase in background noise—a feature particularly appreciated at sample concentrations of <50 pico moles.

Two Preparations are available to suit your usage and storage requirements:

T100/T100C

- Pour into your reservoir and use; the ultimate in convenience with a minimum of handling
- 3-month* shelf life

T200

- Combine two solutions, swirl, and use
- 12-month* shelf life before mixing preparation; one month in the reservoir

TRIONE® NINYDRIN REAGENT CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
T100	TRIONE® Ninhydrin Reagent (3-month* shelf life)	each (950 mL/bottle)
T100C	TRIONE® Ninhydrin Reagent (3-month* shelf life)	case of 4 (950 mL/bottle)
T200	TRIONE® Two-part Ninhydrin Reagent (12-month* shelf life before mixing)	to prepare case of 4 (900 mL/bottle)

* From date of manufacture

■ *o*-PHTHALALDEHYDE (OPA)



Chromatographic Grade™

For Automated Post-column Derivatization of Primary Amines

Primary amines form highly fluorescent adducts when reacted with *o*-Phthalaldehyde (OPA) and a mercaptan under basic conditions.

The products of this reaction, 1-alkyl-2-alkylthio-substituted isoindoles, exhibit optimal excitation at 330 nm and maximal emission at 465 nm.

Pickering's OPA is specially prepared to meet the demanding requirements of high-sensitivity pre- and post-column HPLC derivatization methods. Our repurification process actually begins with commercially available 99 % material.

The entire process is controlled to eliminate trace interfering contamination. Lot quality is verified by post-column HPLC using a high-sensitivity fluorescence detector.

o-PHTHALALDEHYDE (OPA) CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
0120	<i>o</i> -Phthalaldehyde (OPA)	each (5 g/bottle)

■ NAPHTHALENE-2,3-DICARBOXALDEHYDE

Chromatographic Grade™

For derivatization of primary amino groups

Naphthalene-2,3-dicarboxaldehyde reacts with primary amines in presence of a nucleophile (e.g., mercaptan) and forms highly fluorescent 1-Alkylbenz-2-thioalkyl[f]isoindole derivatives.

This reagent is especially effective for post-column or precolumn derivatization of proteins, peptides and other large amines since the derivative is stable and doesn't internally quench.

Naphthalenedialdehyde can also be used as a reagent for chemiluminescence analysis.

NAPHTHALENE-2,3-DICARBOXALDEHYDE CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
3700-0100	Naphthalene-2,3-dicarboxaldehyde	each (500 mg/bottle)

■ VANILLIN

4-Hydroxy-3-methoxybenzaldehyde

Chromatographic Grade™

For Post-column Analysis of Polyether Antibiotics

Reagent formulation with Vanillin, Methanol and Sulfuric acid allows specific post-column analysis of polyether antibiotics, such as Monensin, Narasin and Salinomycin. This reagent can also be used for the post-column derivatization of Sulfa Drugs. Polyether antibiotics are monitored at 520 nm and Sulfa Drugs at 400 nm.

Chromatographic Grade™ Vanillin meets the exacting purity requirements for a post-column chemical, ensuring that detection at 520 nm will be free of reagent artifacts. Because it is sensitive to oxygen, Pickering Laboratories Vanillin is sealed under CO₂ in convenient 30-gram bottles.



VANILLIN CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
3700-2200	Vanillin	each (30 g/bottle)

■ *o*-PHTHALALDEHYDE (OPA) DILUENT



Chromatographic Grade™

For preparation of *o*-Phthalaldehyde Reagents

The derivatization of primary amines with *o*-Phthalaldehyde and a mercaptan requires basic conditions. To ensure the optimum pH of the reaction it is important to use the correct diluent.

Three application specific diluents are available : CB910 and GA104 for carbamate and glyphosate analyses, and OD104 for analysis of amino acids and other amines.

These borate buffers are produced from starting materials which are free of heavy metals and amines. As with most other products of Pickering Laboratories, the quality of the OPA Diluents is verified by actual post-column HPLC analysis.

o-PHTHALALDEHYDE (OPA) DILUENT CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
CB910	<i>o</i> -Phthalaldehyde (OPA) Diluent for Carbamate analysis	case of 4 (950 mL/bottle)
GA104	<i>o</i> -Phthalaldehyde (OPA) Diluent for Glyphosate analysis	case of 4 (950 mL/bottle)
OD104	<i>o</i> -Phthalaldehyde (OPA) Diluent for amino acids and amines analysis	case of 4 (950 mL/bottle)

■ SERAPREP™ & URIPREP™

Chromatographic Grade™

Reagents for the preparation of Native Samples for amino acid analysis

Preparation of samples such as serum, urine and other physiological fluids, plant extracts, foods and beverages requires control of pH and normality, and removal of soluble protein.

The samples must be held to a narrow pH range between 2.1 and 2.5, and the proper Lithium ion concentration to ensure reproducibility in the early part of the chromatogram.

SERAPREP™ and URIPREP™ replace commonly used protein precipitation reagents such as Acetonitrile, Perchloric acid, and Picric acid, and eliminate the need for dialysis, ultrafiltration, and the repeated centrifugation steps, followed by pH adjustment.

SERAPREP™ is used for preparing serum and other samples with high buffering capacity, e.g. sardine oil. URIPREP™ is used for urine and other samples with low buffering capacity, such as fruit juices, beer and wines. The efficiency of protein precipitation and need for post-centrifugation pH adjustment of the sample determine which reagent is best for your particular sample.

SERAPREP™ & URIPREP™ CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
SP100	SERAPREP™	each (250 mL/bottle)
UP100	URIPREP™	each (250 mL/bottle)

■ *p*-DIMETHYLAMINOBENZALDEHYDE (DMAB)



Chromatographic Grade™

For Post-column Analysis of Sulfa Drugs in feed and animal tissues

p-Dimethylaminobenzaldehyde (DMAB; Ehrlich's Reagent) reacts rapidly with many primary amines to form a complex with maximum absorbance at 450 nm.

Reversed-phase LC followed by post-column derivatization is used to determine the levels of Sulfamethazine, Sulfathiazole and related compounds in feeds, premixes and animal tissues. Although these compounds have a UV chromophore, so do most of the other constituents in the complex sample matrix. Forming a colored derivative post-column allows shifting of the detection wavelength into the visible range thus greatly enhancing selectivity.

p-DIMETHYLAMINOBENZALDEHYDE (DMAB) CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
3700-0400	<i>p</i> -Dimethylaminobenzaldehyde (DMAB)	each (5 g/bottle)

■ HYDROLYSIS REAGENT

Chromatographic Grade™

This 0.05 M NaOH/C47™ reagent is applied in the first stage of post-column carbamate derivatization. At 100 °C the separated carbamates are converted from urethanes to Methylamine. The Methylamine can then react with OPA and Thiofluor™ to form the characteristically fluorescent isoindole.

Hydrolysis Reagent contains C47 which prevents the precipitation of insoluble minerals (e.g. Ca²⁺, Mg²⁺) from samples of hard drinking water and ground water. The C47 additive complexes these minerals and keeps them in solution.



HYDROLYSIS REAGENT CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
CB130	Hydrolysis Reagent for carbamate analysis	case of 4 (950 mL/bottle)

■ HYPOCHLORITE DILUENT

Chromatographic Grade™

For the preparation of the oxidizing reagent for post-column Glyphosate Herbicide Analysis

This diluent is used to prepare the oxidizing reagent required to convert glyphosate to a primary amine prior to reacting it with OPA. The reagent is prepared by adding 100 µL of 5% solution of Sodium hypochlorite to one 950 mL bottle of Diluent. The pH 11.6 Diluent is formulated to ensure pH stability of the mixed stream of column effluent and oxidizing reagent. This diluent could also be used in fluorescence detection of other secondary amines.



HYPOCHLORITE DILUENT CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
GA116	Hypochlorite Diluent for Glyphosate analysis	case of 4 (950 mL/bottle)

■ ChlorAC™ BUFFER



Chromatographic Grade™

For Preservation of Aqueous Carbamate Samples

Trace analysis of carbamate insecticide residues in drinking water is a mandated requirement in the U.S. Since several of the common carbamates—Carbaryl, Oxamyl, Hydroxycarbofuran—are labile in water due to oxidation or hydrolysis, the samples and standards must be preserved in order to obtain valid results.

ChlorAC™ Buffer from Pickering Laboratories is a highly purified Chromatographic Grade™ preservative. It is prepared from Monochloroacetic acid and Potassium acetate to EPA specifications. ChlorAC™ is guaranteed to be free of co-eluting interferences for the analytes in EPA 531.1.

ChlorAC™ BUFFER CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
1700-0132	ChlorAC Buffer	each (250 mL/bottle)

■ RESTORE™

Chromatographic Grade™

For Removal of Metal Ion Contamination and Restoration of Proper Ion Balance in Glyphosate Analytical Columns and Guards

Glyphosate herbicide analysis by post-column HPLC according to US EPA Method 547 employs a cation-exchange column. Many polyvalent metal ions which may be present in the sample, especially Iron, will accumulate in the guard or analytical column. As little as 100 nmole of Ferric ion, for example, will cause serious degradation of column performance; larger amounts can actually cause the glyphosate peak to vanish completely.

Glyphosate RESTORE™ rapidly removes Iron and all other polyvalent metals from the column and guard. In addition, it preserves the balance of K^+/H^+ in the resin, thus avoiding a lengthy re-equilibration.

RESTORE™ CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
1700-0140	RESTORE™, removes metal ions from Glyphosate column and guard	each (250 mL/bottle)

■ THIOFLUOR™

N,N-Dimethyl-2-mercaptoethylamine hydrochloride

Chromatographic Grade™

For Automated Post-column Derivatization of Primary Amines

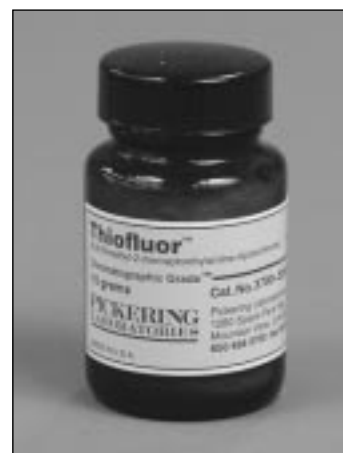
Primary amines form highly fluorescent adducts when reacted with *o*-Phthalaldehyde (OPA) and a mercaptan under basic conditions.

The products of this reaction, 1-alkyl-2-thioalkyl-substituted isoindoles, exhibit optimal excitation at 330 nm and maximal emission at 465 nm.

Pickering's Thiofluor™, a solid, nearly odorless nucleophile, is a superior substitute for 2-Mercaptoethanol in the preparation of OPA reagents. It forms a more stable reagent and a longer-lasting fluorophore with OPA than does 2-Mercaptoethanol, yet it has the same fluorescence properties.

Unlike the volatile 2-Mercaptoethanol, Thiofluor™ will not migrate through the gas manifold and regulator of the OPA reagent pressurization system.

Two grams of Thiofluor™ is equivalent to 1 mL of 2-Mercaptoethanol.



THIOFLUOR™ CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
3700-2000	Thiofluor™	each (10 g/bottle)

■ Li220 & Na220

Chromatographic Grade™

Samples and Standards diluents for amino acid analysis

Use of these diluents is essential to ensuring reproducibility from injection to injection. They establish a uniform pH and ion concentration at the outset, regardless of the source and pre-treatment of the sample. The sample is maintained buffered and at optimum pH for sample storage and analysis.

Use Na220 for hydrolysate samples and to dilute amino acid calibration standards for use with Sodium columns and buffers. Use Li220 for native amino acid samples and calibration standards for use with Lithium columns and buffers.

LI220 & Na220 CATALOG INFORMATION

CATALOG NO.	DESCRIPTION	QUANTITY
Li220	Lithium Diluent, pH 2.36	case of 4 (250 mL/bottle)
Na220	Sodium Diluent, pH 2.20	case of 4 (250 mL/bottle)

■ CALIBRATION STANDARDS & TEST MIXTURES

- Quantitative and guaranteed
- Each lot tested chromatographically
- Chromatographically-pure starting components

Pickering's Amino Acid standards have a reputation worldwide for quality and reliability in all post-column systems and methods. Six Amino Acid Standard mixtures are available for a variety of applications. Except for the three-component test mixture (1700-0070) the standards are in 5 mL vials, in an appropriate citrate buffer.

Although they are stored frozen at the factory, Pickering's calibration standards remain stable when shipped at ambient temperatures. Upon receipt, however, it is important to place them into a freezer immediately, and store until ready for use.

Test Mixtures are the qualitative standards and intended to be used to establish an elution profile and for troubleshooting.



TEST MIXTURES

CATALOG NO.	DESCRIPTION	CONSTITUENTS
1700-0070	Amino Acid Test Mixture Concentration 0.25 µmole/mL	L-Cysteic Acid L-Threonine L-Serine
1700-0063	Carbamate Test Mixture Concentration 2.5 µg/mL	Aldicarb Aldicarb Sulfone Aldicarb Sulfoxide BDMC (4-Bromo-3,5-dimethylphenyl-N-methylcarbamate) Carbaryl Carbofuran 3-Hydroxycarbofuran Methiocarb Methomyl 1-Naphthol Oxamyl Propoxur
1700-0080	Glyphosate Test Mixture Concentration 2.5 µg/mL	Glyphosate AMPA (Aminomethyl-phosphonic acid)

■ CALIBRATION STANDARDS & TEST MIXTURES

CATALOG NO.	DESCRIPTION	QUANTITY
012006P	Native Sample standard, in 0.2 N Lithium citrate buffer pH 2.36 ¹	each (5 mL/bottle)
011006P	Native Sample standard, in 0.2 N Lithium citrate buffer pH 2.36 ²	each (5 mL/bottle)
012506H	Protein Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ³	each (5 mL/bottle)
012506C	Collagen Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ⁴	each (5 mL/bottle)
1700-0150	Native Sample Standard for rapid-screen for PKU and MSUD, in 0.2 N Lithium citrate buffer pH 2.36 ⁵	each (5 mL/bottle)
1700-0155	Oxidized Feed Hydrolysate standard, in 0.27 N Sodium citrate buffer pH 2.20 ⁶	each (5 mL/bottle)
1700-0170	Native Sample Standard in 0.2 N Lithium citrate buffer, pH 2.36 ⁷	each (5 mL/bottle)
1700-0070	Amino Acid Test Mixture, in 0.01 N HCl ⁸	each (1.5 mL/bottle)
1700-0063	Carbamate Test Mixture, in Methanol ⁹	each (1.5 mL/bottle)
1700-0080	Glyphosate Test Mixture, in water ¹⁰	each (1.5 mL/bottle)

¹ Without Norleucine, 0.25 µmole/mL, ² With Norleucine, 0.25 µmole/mL, ³ 0.25 µmole/mL, ⁴ 0.25 µmole/mL, Proline & Hydroxyproline, 1.25 µmole/mL

⁵ 0.25 µmole/mL, ⁶ 0.25 µmole/mL, ⁷ Without Norleucine & α-Amino-β-guanidinopropionic acid, 0.25 µmole/mL, ⁸ 0.25 µmole/mL, ⁹ 2.5 µg/mL, ¹⁰ 2.5 µg/mL

CALIBRATION STANDARDS FOR AMINO ACID ANALYSIS

CONSTITUENTS	011006P	012006P	1700-0150	012506C	012506H	1700-0155	1700-0170
β-Alanine	•	•					•
Alanine	•	•		•	•	•	•
D,L-a-Amino-adipic acid	•	•					•
γ-Amino butyric acid	•	•					•
α-Amino-n-butyric acid	•	•					•
D,L,b-Amino-i-butyric acid	•	•					•
α-Amino-β-guanidinopropionic acid	•	•					
Ammonia	•	•		•	•	•	•
Anserine	•	•					•
Arginine	•	•		•	•	•	•
Asparagine	•	•					•
Aspartic acid	•	•		•	•	•	•
Carnosine	•	•					•
Citrulline	•	•					•
Creatinine	•	•					•
Cystathionine	•	•					•
Cystine	•	•		•	•		•
Cysteic acid						•	
Ethanolamine	•	•					•
Glutamic acid	•	•		•	•	•	•
Glycine	•	•		•	•	•	•
Histidine	•	•		•	•	•	•
D,L-Homocystine	•	•					•
D,L & allo-Hydroxylysine	•	•		•			•
4-trans-L-Hydroxyproline	•	•		•(1.25)			•
Isoleucine	•	•	•	•	•	•	•
Leucine	•	•	•	•	•	•	•
Lysine	•	•		•	•	•	•
Methionine	•	•	•	•	•		•
Methionine-D,L-sulfoxide				•			
Methionine-D,L-sulfone						•	
1-Methyl-histidine	•	•					•
3-Methyl-histidine	•	•					•
Norleucine	•						
Ornithine	•	•					•
Phenylalanine	•	•	•	•	•	•	•
Phosphoethanolamine	•	•					•
Phosphoserine	•	•					•
Proline	•	•		•(1.25)	•	•	•
Sarcosine	•	•					•
Serine	•	•		•	•	•	•
Taurine	•	•					•
Threonine	•	•		•	•	•	•
Tryptophan	•	•			•		•
Tyrosine	•	•	•	•	•	•	•
Urea	•	•					•
Valine	•	•		•	•	•	•

Note: Concentration of all the constituents in the Amino Acid standards is 0.25 μmole/mL unless otherwise specified.



Application Kits

■ AMINO ACID ANALYSIS KITS

CATALOG NO.	DESCRIPTION
AT30SH	STANDARD 60-MIN PROTEIN HYDROLYSATE KIT:
1193250	Sodium Ion-exchange Column, 3.0 × 250 mm (with test mixture 1700-0070)
1192020	Sodium Guard Column, 2.0 × 20 mm
Na328	Sodium Eluant, pH 3.28, 4 × 950 mL
Na740	Sodium Eluant, pH 7.40, 4 × 50 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG011	Sodium Column Regenerant, 950 mL
Na220	Sodium Diluent, pH 2.20, 4 × 250 mL
012506H	Sodium Calibration Standard, for protein hydrolysate, 0.25 µmole/mL, 5 mL
0101-0004	Amino Acid Analysis Application Manual
0352-0030	KIT IDENTICAL TO AT30SH WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
A030SH	KIT IDENTICAL TO AT30SH WITH ITEMS BELOW REPLACING T100C:
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
AT31FH	HIGH-EFFICIENCY 55-MIN PROTEIN HYDROLYSATE KIT:
1154150	Sodium Ion-exchange Column, 4.0 × 150 mm (with test mixture 1700-0070)
1193020	Sodium Guard Column, 3.0 × 20 mm
1700-0112	Sodium Eluant, pH 3.15, with 5% Sulfolane, 4 × 950 mL
Na740	Sodium Eluant, pH 7.40, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG011	Sodium Column Regenerant, 950 mL
Na220	Sodium Diluent, pH 2.20, 4 × 250 mL
012506H	Sodium Calibration Standard, for protein hydrolysate, 0.25 µmole/mL, 5 mL
0101-0004	Amino Acid Analysis Application Manual
0352-0031	KIT IDENTICAL TO AT31FH WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
A031FH	KIT IDENTICAL TO AT31FH WITH ITEMS BELOW REPLACING T100C:
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g

* From date of manufacture

■ AMINO ACID ANALYSIS CONTINUED

CATALOG NO.	DESCRIPTION
AT32FC	HIGH-EFFICIENCY 55-MIN COLLAGEN HYDROLYSATE KIT:
1154150	Sodium Ion-exchange Column, 4.0 × 150 mm (with test mixture 1700-0070)
1193020	Sodium Guard Column, 3.0 × 20 mm
1700-0112	Sodium Eluant, pH 3.15, with 5% Sulfolane, 4 × 950 mL
Na740	Sodium Eluant, pH 7.40, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG011	Sodium Column Regenerant, 950 mL
Na220	Sodium Diluent, pH 2.20, 4 × 250 mL
012506C	Sodium Calibration Standard, for collagen hydrolysate, 0.25 μmole/mL, Proline and Hydroxyproline, 1.25 μmole/mL, 5 mL
0101-0004	Amino Acid Analysis Application Manual
0352-0032	KIT IDENTICAL TO AT32FC WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
A032FC	KIT IDENTICAL TO AT32FC WITH ITEMS BELOW REPLACING T100C:
OD104	OPA Diluent, 4 × 950 mL
O120	o-Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
AT360H	60-MIN OXIDIZED FEED HYDROLYSATE KIT:
1193250	Sodium Ion-exchange Column, 3.0 × 250 mm (with test mixture 1700-0070)
1192020	Sodium Guard Column, 2.0 × 20 mm
Na270	Sodium Eluant, pH 2.70, 4 × 950 mL
Na740	Sodium Eluant, pH 7.40, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG011	Sodium Column Regenerant, 950 mL
Na220	Sodium Diluent, pH 2.20, 4 × 250 mL
1700-0155	Sodium Calibration Standard, for oxidized feed hydrolysate, 0.25 μmole/mL, 5 mL
0101-0004	Amino Acid Analysis Application Manual
0352-0036	KIT IDENTICAL TO AT360H WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
AT33SP	STANDARD 185-MIN PHYSIOLOGIC FLUID/NATIVE SAMPLE KIT:
0393250	Lithium Ion-exchange Column, 3.0 × 250 mm (with test mixture 1700-0070)
0392020	Lithium Guard Column, 2.0 × 20 mm
Li275	Lithium Eluant, pH 2.75, 4 × 950 mL
Li750	Lithium Eluant, pH 7.50, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG003	Lithium Column Regenerant, 950 mL
Li220	Lithium Diluent, pH 2.36, 4 × 250 mL
011006P	Lithium Calibration Standard, with norleucine, 0.25 μmole/mL, 5 mL
SP100	SERAPREP™, 250 mL
UP100	URIPREP™, 250 mL
0101-0004	Amino Acid Analysis Application Manual
0352-0033	KIT IDENTICAL TO AT33SP WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
A033SP	KIT IDENTICAL TO AT33SP WITH ITEMS BELOW REPLACING T100C:
OD104	OPA Diluent, 4 × 950 mL
O120	o-Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g

* From date of manufacture



Application Kits

■ AMINO ACID ANALYSIS CONTINUED

CATALOG NO.	DESCRIPTION
AT34FP	HIGH-EFFICIENCY 120-MIN PHYSIOLOGIC FLUID/NATIVE SAMPLE KIT:
0353150	Lithium Ion-exchange Column, 3.0 × 150 mm (with test mixture 1700-0070)
0352020	Lithium Guard Column, 2.0 × 20 mm
Li280	Lithium Eluant, pH 2.80, 4 × 950 mL
Li750	Lithium Eluant, pH 7.50, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG003	Lithium Column Regenerant, 950 mL
Li220	Lithium Diluent, pH 2.36, 4 × 250 mL
011006P	Lithium Calibration Standard, with norleucine, 0.25 µmole/mL, 5 mL
SP100	SERAPREP™, 250 mL
UP100	URIPREP™, 250 mL
0101-0004	Amino Acid Analysis manual
0352-0034	KIT IDENTICAL TO AT34FP WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)
A034FP	KIT IDENTICAL TO AT34FP WITH ITEMS BELOW REPLACING T100C:
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
AT35PK	HIGH-EFFICIENCY 7-MIN PKU DETECTION/PHYSIOLOGIC FLUID KIT:
0354050	Lithium Ion-exchange Column, 4.0 × 50 mm
0352020	Lithium Guard Column, 2.0 × 20 mm
Li357	Lithium Eluant, pH 3.57, 4 × 950 mL
T100C	TRIONE® Ninhydrin Reagent, 4 × 950 mL (3-month* shelf life)
RG003	Lithium Column Regenerant, 950 mL
Li220	Lithium Diluent, pH 2.20, 4 × 250 mL
1700-0150	Calibration Standard, contains Ile, Leu, Met, Tyr, & Phe, 0.25 µmole/mL, 5 mL
0101-0004	Amino Acid Analysis manual
0352-0035	KIT IDENTICAL TO AT35PK WITH T200 REPLACING T100C:
T200	TRIONE® Two-part Ninhydrin Reagent, prepares 4 × 900 mL (12-month* shelf life)

* From date of manufacture

■ PESTICIDE & HERBICIDE ANALYSIS KITS

CATALOG NO.	DESCRIPTION
0352-0002	CARBAMATE PESTICIDES ANALYSIS KIT, 23+ COMPOUNDS:
0840250	Analytical Column, C ₈ , expanded resolution, 4.0 × 250 mm (with Carbamate Test Mixture 1700-0063)
18ECG001	Guard Cartridge Holder with 3 guard cartridges
CB130	Carbamate Hydrolysis Reagent, 4 × 950 mL
CB910	Carbamate OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
1700-0132	ChlorAC™ Buffer, 250 mL
0101-0002	Carbamate Pesticide Analysis Application Manual
0352-0003	CARBAMATE PESTICIDES ANALYSIS KIT, FOR EPA METHOD 531.1:
1846250	Analytical Column, C ₁₈ , high resolution/capacity, 4.6 × 250 mm (with Carbamate Test Mixture 1700-0063)
18ECG001	Guard Cartridge Holder with 3 cartridges
CB130	Carbamate Hydrolysis Reagent, 4 × 950 mL
CB910	Carbamate OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
1700-0132	ChlorAC™ Buffer, 250 mL
0101-0002	Carbamate Pesticide Analysis Application Manual
0352-0004	CARBAMATE PESTICIDES ANALYSIS KIT, FOR AOAC METHOD 985.23:
1846150	Analytical Column, C ₁₈ , rapid analysis/QC, 4.6 × 150 mm (with Carbamate Test Mixture 1700-0063)
18ECG001	Guard Cartridge Holder with 3 cartridges
CB130	Carbamate Hydrolysis Reagent, 4 × 950 mL
CB910	Carbamate OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
1700-0132	ChlorAC™ Buffer, 250 mL
0101-0002	Carbamate Pesticide Analysis Application Manual
0352-0010	GLYPHOSATE HERBICIDE ANALYSIS KIT, FOR EPA METHOD 547, AOAC METHOD 991.08:
1954150	Cation-exchange Column, K form, 4.0 × 150 mm (with Glyphosate Test Mixture 1700-0080)
1953020	Cation-exchange Guard column, K form, 3.0 × 20 mm
K200	Glyphosate Potassium Phosphate Eluant, 4 × 950 mL
RG019	Glyphosate Column Regenerant, 950 mL
GA104	Glyphosate OPA Diluent, 4 × 950 mL
GA116	Glyphosate Hypochlorite Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
1700-0140	RESTORE™, 250 mL
0101-0003	Glyphosate Herbicide Analysis Application Manual

■ OTHER POST-COLUMN ANALYSIS KITS

CATALOG NO.	DESCRIPTION
	COMPATIBLE KITS FOR CONNECTION TO PCX5200
1100-0450	Tubing Kit to connect PCX5200 to Agilent Series 1090, 1050 & 1100 pumps
1100-0415	Tubing Kit to connect PCX5200 to Waters Alliance System
1100-0460	Dead-head Plumbing Kit for Agilent Series 1050 & 1100 pumps, AAA
1100-0410	Dead-head Plumbing Kit for Perkin-Elmer Series 4, 400 & 410 pumps, AAA
1100-0420	Dead-head Plumbing Kit for Varian 240 pump, AAA

Note: Dead-head circuits reduce the possibility of corrosion and minimize unswept volume, resulting in more precise gradient control.
Dead-head kits include tee, plug, tubes, fittings and flow schematic.



Application Kits

■ OTHER POST-COLUMN ANALYSIS KITS CONTINUED

CATALOG NO.	DESCRIPTION
0352-0040	BIOGENIC AMINES/POLYAMINES ANALYSIS KIT:
9410917	ALKION™ Cation-exchange Column, K form, 4.0 × 150 mm
9493020	ALKION™ Guard Column, K form, 3.0 × 20 mm
1100-0200	Flow Restrictor, 300 psi, 10 cm
K563	Potassium Phosphate Eluant, pH 5.63, 4 × 950 mL
K600	Potassium Phosphate Eluant, pH 6.00, 4 × 950 mL
K130	Potassium Column Regenerant, 950 mL
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
0352-0041	AMINOGLYCOSIDE ANTIBIOTICS ANALYSIS KIT:
9410917	ALKION™ Cation-exchange Column, K form, 4.0 × 150 mm
9493020	ALKION™ Guard Column, K form, 3.0 × 20 mm
1100-0200	Flow Restrictor, 300 psi, 10 cm
1700-1101	Potassium Phosphate Eluant, KO1, 4 × 950 mL
1700-1102	Potassium Hydroxide Eluant, KO2, 4 × 950 mL
1700-1103	Potassium Chloride Eluant, KO3, 4 × 950 mL
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
0352-0042	PARAQUAT/DIQUAT IN WATER ANALYSIS KIT:
9410917	ALKION™ Cation-exchange Column, K form, 4.0 × 150 mm
9493020	ALKION™ Guard Column, K form, 3.0 × 20 mm
1100-0200	Flow Restrictor, 300 psi, 10 cm
1700-1101	Potassium Phosphate Eluant, KO1, 4 × 950 mL
1700-1102	Potassium Hydroxide Eluant, KO2, 4 × 950 mL
1700-1103	Potassium Chloride Eluant, KO3, 4 × 950 mL
0352-0053	MULTI-RESIDUE MYCOTOXIN KIT:
1612124	MYCOTOX™ Reversed-phase Column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
0103-1001	PCX Control Software Kit—Software, Adaptor, Manual, Cable (compatible with Agilent Chem Station)
OD104	OPA Diluent, 4 × 950 mL
O120	<i>o</i> -Phthalaldehyde, 5 g
3700-2000 × 2	Thiofluor™, 10 g
0352-0050	AFLATOXINS ANALYSIS KIT:
1612124	MYCOTOX™ Reversed-phase Column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
0352-0051	POLYETHER ANTIBIOTICS KIT:
2381750	Polyether Column, C ₁₈ , 4.6 × 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
3700-2200	Vanillin, 30 g
0352-0052	PARALYTIC SHELLFISH TOXINS KIT:
0846150	P.S.P. column, C ₈ , 4.0 × 150 mm
18ECG001	Guard Cartridge Holder with 3 cartridges

■ PANELS FOR PCX5200

CATALOG NO.	DESCRIPTION
1452-0023	Single-reagent Post-column Gauge Panel
1452-0020	Dual-reagent Post-column Gauge Panel
1452-0027	Inert PEEK, Single-reagent Post-column Gauge Panel
1452-0028	Inert PEEK, Dual-reagent Post-column Gauge Panel
1452-0021	Reagent 1 Panel, for OPA, Hypochlorite & Hydrolysis Reagent
1452-0022	Reagent 2 Panel, for OPA Reagent
1452-0024	Reagent Panel, TRIONE® Ninhydrin Reagent
1452-0025	Reagent 1 Panel, Inert PEEK flowpath
1452-0026	Reagent 2 Panel, Inert PEEK flowpath

■ PCX5200 REAGENT PUMPS WITH PISTON WASH

CATALOG NO.	DESCRIPTION
1452-0012	Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0013	Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0010	Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0011	Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0016	Inert PEEK, Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0017	Inert PEEK, Simplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V
1452-0014	Inert PEEK, Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 120 V
1452-0015	Inert PEEK, Duplex Reagent Pump & Motor Assembly, 50/60 Hz, 240 V

Note: 240 V pumps CE certified

Please contact Pickering for pumps without Piston Wash



Replacement Components, Fittings & Tubing

■ REAGENTS PUMP COMPONENTS

CATALOG NO.	DESCRIPTION
3106-1330	Seal & Backup Ring
3106-1310	Seal Kit, includes 2 seals, back-up rings, installation tool & hex wrench
3106-1314	Inlet Check Valve Assembly
3106-1316	Outlet Check Valve Assembly
3106-1318	Check Valve Cartridge, inlet or outlet
3106-1332	Sapphire Piston, for piston-wash
3106-1333	O-ring, for piston-wash
3106-5174	Compression Ring
3106-1322	Piston Guide/Retainer
3106-1324	Liquid End Assembly
3106-1326	Preventive Maintenance Kit, includes 2 check-valve cartridge repair kits & 3106-1310 items
3106-1335	Seal Kit for PEEK pump heads, includes 2 seals
1100-4001	Piston-Wash Upgrade Kit

Note: Please contact Pickering for pumps without Piston Wash.

■ FUSES & MISC. ACCESSORIES

CATALOG NO.	DESCRIPTION
3543-0045	Fuse, for 120 V instruments
3543-0044	Fuse, for 240 V instruments
3543-0010	Fuse, for power supply (PCB)
3107-0020	Syringe, 20 cc
3102-9161	Tubing Cutter, for 1/8–1/16 in. tubing

■ REAGENT RESERVOIRS & CAP ASSEMBLIES

CATALOG NO.	DESCRIPTION
3107-0137	Reservoir Bottle, safety-coated, 1L
3107-0145	Reservoir Bottle, safety-coated, 2L
3107-0146	Reservoir Bottle, safety-coated, 5L
3107-0300	Reservoir Assembly, includes 1L bottle, and cap with integrated valve
3107-0147	Cap Assembly for 1L bottle, includes cap with integrated valve
3107-0148	Cap Assembly for 2L bottle, includes cap with integrated valve
3107-0138	Reservoir Cap

Note: Tubing, nuts and ferrules sold separately

■ PCX5200 PRESSURE REGULATORS, VALVES & GAUGES

CATALOG NO.	DESCRIPTION
1152-0010	Gas Manifold & 5 psi Regulator Assembly
1552-0002	Pressure Transducer Assembly, 500 psi
3102-9025	Pressure Regulator, 100 psi, 1/4-28 connection, for detector waste
3102-9013	Pressure Relief Valve, 525 psi
3102-9016	Reagent Anti-siphon Valve, 60 psi
3104-0050	Two-way Valve, for 1/8" tubing
3104-0080	Prime/Purge Valve Assembly
3104-0081	Seal Kit for prime/purge valve
3112-0020	Gauge Manifold, SST
1452-0032	Pressure Gauge Assembly, 0–1000 psi
1452-0033	Pressure Gauge Assembly, 0–3000 psi
1452-0034	Pressure Gauge Assembly, 0–1000 psi, for PEEK

Note: Please contact Pickering for PCX3100 & PCX5100 components.

■ FLOW RESTRICTORS

CATALOG NO.	DESCRIPTION
1100-0200	Flow Restrictor, for OPA, Hypochlorite & Hydrolysis reagent, 300 psi @ 0.3 mL/min, 10 cm
1100-0141	Flow Restrictor, TRIONE® Ninhydrin reagent, 65 psi @ 0.3 mL/min, 6 cm
1100-0143	Inert PEEK Flow Restrictor, 550 psi @ 0.3mL/min, 10 cm
1100-0142	Flow Restrictor, 100 psi @ 0.3 mL/min, 10 cm
1100-0205	Flow Restrictor, 200 psi @ 0.3 mL/min, 6 cm
1100-0263	Flow Restrictor, 550 psi @ 0.3 mL/min, 17 cm
1100-0262	Flow Restrictor, 1150 psi @ 0.3 mL/min, 20 cm
1100-0300	Static Mixer, internal volume 800 µL

Note: Listed pressures are for a flow rate of 0.3mL/min at ambient temperature with 100% water and pulse-dampened flow.



Replacement Components, Fittings & Tubing

■ FILTERS & FRITS

CATALOG NO.	DESCRIPTION
3102-9032 3102-9042	Pre-column Filter, 0.5 µm PEEK Assembly Replacement Frit for 3102-9032
3102-9036 3102-9040	Reagent Filter, 2 µm filter Assembly Replacement Frit for 3102-9036

■ SUBSTITUTE REACTOR VOLUMES OR REPLACEMENT REACTORS

CATALOG NO.	DESCRIPTION
1100-3403 1100-3404	Reactor Heater & Coil Assembly, 0.1 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 0.1 mL, 150 °C max, 240 V
1100-3401 1100-3402	Reactor Heater & Coil Assembly, 0.15 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 0.15 mL, 150 °C max, 240 V
1100-2654 1100-2653	Reactor Heater & Coil Assembly, 0.2 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 0.2 mL, 150 °C max, 240 V
1100-2660 1100-2661	Reactor Heater & Coil Assembly, 0.5 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 0.5 mL, 150 °C max, 240 V
1100-3411 1100-3412	Reactor Heater & Coil Assembly, 1.0 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 1.0 mL, 150 °C max, 240 V
1100-2659 1100-2658	Reactor Heater & Coil Assembly, 1.4 mL, 150 °C max, 120 V Reactor Heater & Coil Assembly, 1.4 mL, 150 °C max, 240 V
1100-3511 1100-3512	Reactor Heater & Knitted Coil Assembly, 2.0 mL, 150 °C max, 120 V Reactor Heater & Knitted Coil Assembly, 2.0 mL, 150 °C max, 240 V
1100-2683 1100-2684	Reactor Heater & Knitted Coil Assembly, 2.8 mL, 80 °C max, 120 V Reactor Heater & Knitted Coil Assembly, 2.8 mL, 80 °C max, 240 V
1100-2681 1100-2682	Reactor Heater & Knitted Coil Assembly, 3.0 mL, 80 °C max, 120 V Reactor Heater & Knitted Coil Assembly, 3.0 mL, 80 °C max, 240 V
1100-3514 1100-3513	Reactor Heater & Dual-knitted Coil Assembly, 1.2 and 1.6 mL, 150 °C max, 120 V Reactor Heater & Dual-knitted Coil Assembly, 1.2 & 1.6 mL, 150 °C max, 240 V
1100-2927	OPA Ambient Reactor, 0.011 in. ID TFE Tubing
1100-0282	Coil Assembly, 0.15 mL
1100-0281	Coil Assembly, 0.5 mL
1100-0283	Coil Assembly, 1.0 mL

■ TEES & UNIONS

CATALOG NO.	DESCRIPTION
3102-3031	Tee, Valco type, 0.010 holes, 1/16"
3102-4020	Pressure Gauge Tee Adapter, 1/4 FPT, 1/16"
1352-0004	Tee Mount
3102-4040	Adapter, 1/4 FPT, 1/16"
3102-3050	Union, 0.020 holes, 1/16"
3102-3051	Union, 0.050 holes, 1/16"
3102-3053	Union, Bulkhead 1/4" x 28
3102-3054	Union, Bulkhead 1/16" x 0.010

■ TUBING, PLASTIC

CATALOG NO.	DESCRIPTION
2101-0212	TFE (Teflon) Tubing, 1/16" OD × 0.010" ID, 90 cm
2101-0225	TFE (Teflon) Tubing, 1/16" OD × 0.025" ID, 90 cm
2102-0463	FEP (Teflon clear) Tubing, 1/8" OD × 0.063" ID, 90 cm
2103-0463	SARAN® Tubing, 1/8" OD × 0.063" ID, 90 cm
2104-0210	Inert PEEK Tubing, 1/16" OD × 0.010" ID, 90 cm
2104-0220	Inert PEEK Tubing, 1/16" OD × 0.020" ID, 90 cm
2101-0230	C-flex Tubing, 1/8" OD × 1/16" ID, 90 cm
1452-0035	PEEK Tubing Assembly, 0.007" ID × 1/32" (includes nut & ferrules)

■ TUBING, TYPE 316 STAINLESS STEEL

CATALOG NO.	DESCRIPTION
3103-1005	SST Tubing, 1/16" OD × 0.010" ID, 5 cm
3103-1010	SST Tubing, 1/16" OD × 0.010" ID, 10 cm
3103-1020	SST Tubing, 1/16" OD × 0.010" ID, 20 cm
3103-1030	SST Tubing, 1/16" OD × 0.010" ID, 30 cm
3103-3005	SST Tubing, 1/16" OD × 0.030" ID, 5 cm
3103-3010	SST Tubing, 1/16" OD × 0.030" ID, 10 cm
3103-3020	SST Tubing, 1/16" OD × 0.030" ID, 20 cm
3103-3030	SST Tubing, 1/16" OD × 0.030" ID, 30 cm



Replacement Components, Fittings & Tubing

■ FITTINGS, PLASTIC

CATALOG NO.	DESCRIPTION
3101-0005	Nut, 1/4-28, 1/8" (Polypropylene)
3101-0006	Ferrule, 1/4-28, 1/8" (Tefzel)
3101-0007	Nut, 1/4-28, 1/16" (Kel-F)
3101-0008	Ferrule, 1/4-28, 1/16" (Tefzel)
3102-1110	Nut, 1/4 -28, 1/16" (Tefzel)
3102-2110	Ferrule, 1/4-28, 1/16" (Tefzel)
3101-0020	Plug (Male), 1/4-28 (Delrin)
3101-0030	Plug (Male), 10-32, 1/16" (Delrin)
3101-0060	Fingertight Nut, 1/16" (Kel-F)
3102-1518	Lite-Touch Nut, 1/16" (PEEK)
3102-2507	Lite-Touch Ferrule, 1/16" (PEEK)
3102-9160	Removal Tool, for Lite-Touch Ferrule

■ FITTINGS, TYPE 316 STAINLESS STEEL

CATALOG NO.	DESCRIPTION
3102-1202	Nut (Male), Parker type, 10-32, 1/16"
3102-2102	Ferrule, Parker type, 1/16"
3102-1402	Nut (Male), Valco type, 10-32, 1/16"
3102-2402	Ferrule, Valco type, 1 /16"
3102-1404	Nut, Valco type, 1/32"
3102-2404	Ferrule, Valco type, 1/32"

The following trademarks are the property of the companies listed:

ALKION	Pickering Laboratories, Inc.
Brij-35	ICI Americas, Inc.
ChlorAC	Pickering Laboratories, Inc.
Chromatographic Grade	Pickering Laboratories, Inc.
Hydrolysis Reagent C47	Pickering Laboratories, Inc.
RESTORE	Pickering Laboratories, Inc.
Saran	Dow Chemical Corporation
SERAPREP	Pickering Laboratories, Inc.
Tefzel	E. I. DuPont Corporation
Thiofluor	Pickering Laboratories, Inc.
TRIONE	Pickering Laboratories, Inc.
URIPREP	Pickering Laboratories, Inc.
Vespel	E. I. DuPont Corporation
Windows	Microsoft Corporation



METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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Aflatoxins

Aflatoxins occur naturally in peanuts, peanut meal, cottonseed meal, corn, dried chili pepper, etc. However the growth of mold does not always indicate the presence of toxin since the yield of Aflatoxins is dependent on growth conditions such as moisture, temperature, and aeration. The Aflatoxins are characterized as B for blue fluorescence and G for green fluorescence. The numerical subscripts indicate relative chromatographic mobility. Besides the toxins commonly found in vegetable matter (B1, B2, G1, and G2), Aflatoxins M (for milk) are found in milk of cows fed toxic meals. The highly toxic M metabolites are 4-hydroxylated Bs.

The most important feature of the post-column method described here is that all four Aflatoxins are detectable at the same fluorescence emission wavelength in a single run. The Pickering PCX5200 with a 1.4 mL reactor is recommended for this method.

METHOD

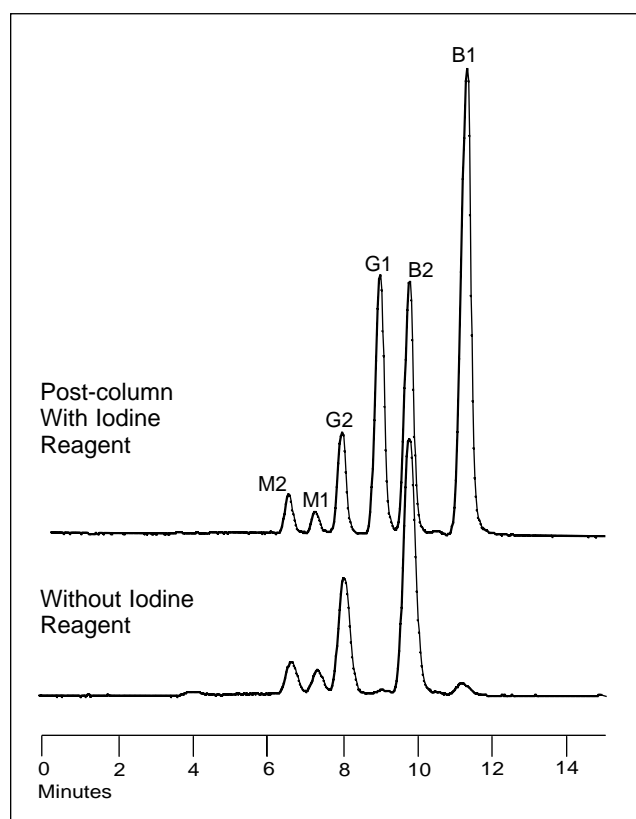
Analytical Conditions

COLUMN: MYCOTOX™ column, Catalog No. 1612124
TEMPERATURE: 42 °C
FLOW RATE: 1.0 mL/min
MOBILE PHASE: MeOH, CH₃CN, H₂O; 22:22:56, Isocratic

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200 with 1.4 mL reactor
TEMPERATURE: 70 °C
REAGENT: I₂ 100 mg/L in water
FLOW RATE: 0.4 mL/min
DETECTION: Fluorometer, Xenon lamp
 λ_{ex} : 365 nm
 λ_{em} : 430 nm

Toxins in Peanuts, Vegetable Matter, and Milk



REFERENCES

- 1) R. Buchi in "Aflatoxins," L. Goldblat, Ed., Academic Press, New York, NY (1969)
- 2) C.W. Thorp, G.M. Ware, and A.E. Pohland, "Proceedings of the 5th International IUPAC Symposium on Mycotoxins and Phycotoxins," W. Pfannhauser and P.B. Czedic-Eysenberg (Eds.), Technical University, Vienna (1982) 52-55
- 3) J.W. Dorner & R.J. Cole, *J.A.O.A.C.*, **71** (1988) 43-47
- 4) M.J. Shepherd and J. Gilbert, *Food Additives Contaminants*, **1** (1984) 325-335



Amino Acid Column for Accelerated Analysis of Physiologic Fluids

Analysis of 44 Amino Acids in 75 Minutes

The new column can resolve 44 amino acids in 75 minutes isothermally with a two-eluant gradient and a regenerant. The column exhibits the characteristic reproducibility and ruggedness of our standard columns.

METHOD

Analytical Conditions

COLUMN: Accelerated Lithium cation-exchange column, 5 μ m, 5.5 x 80 mm, Catalog No. 0355080
 TEMPERATURE: 38 °C
 FLOW RATE: 0.36 mL/min
 MOBILE PHASE: Li280, Li750, RG003

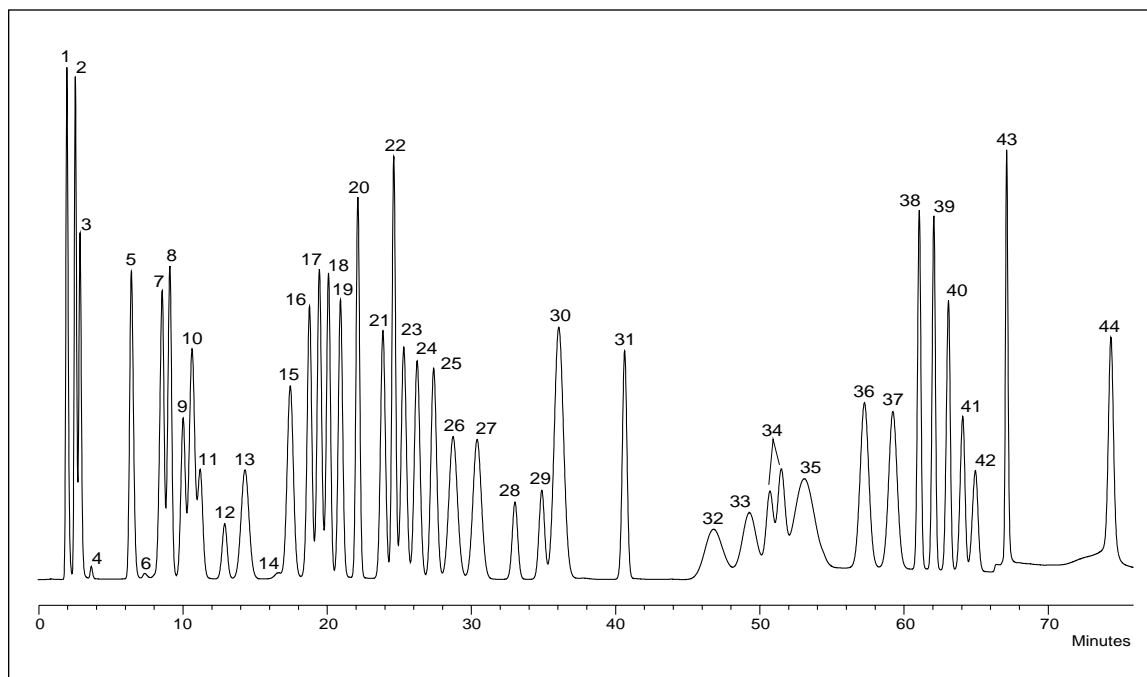
Post-column Conditions

POST-COLUMN SYSTEM: PCX5200
 REACTOR VOLUME: 0.5 mL
 TEMPERATURE: 130 °C
 REAGENT: TRIONE®
 FLOW RATE: 0.3 mL/min
 DETECTION: UV-Vis
 λ : 570 nm for 1° amines
 λ : 440 nm for 2° amines

Time [min]	Li280 [%]	Li750 [%]	RG003 [%]
0	100	0	0
8	100	0	0
22	77	23	0
32	65	35	0
38	40	60	0
55	0	100	0
59	0	100	0
68	0	94	6
75	0	94	6
75.1	100	0	0

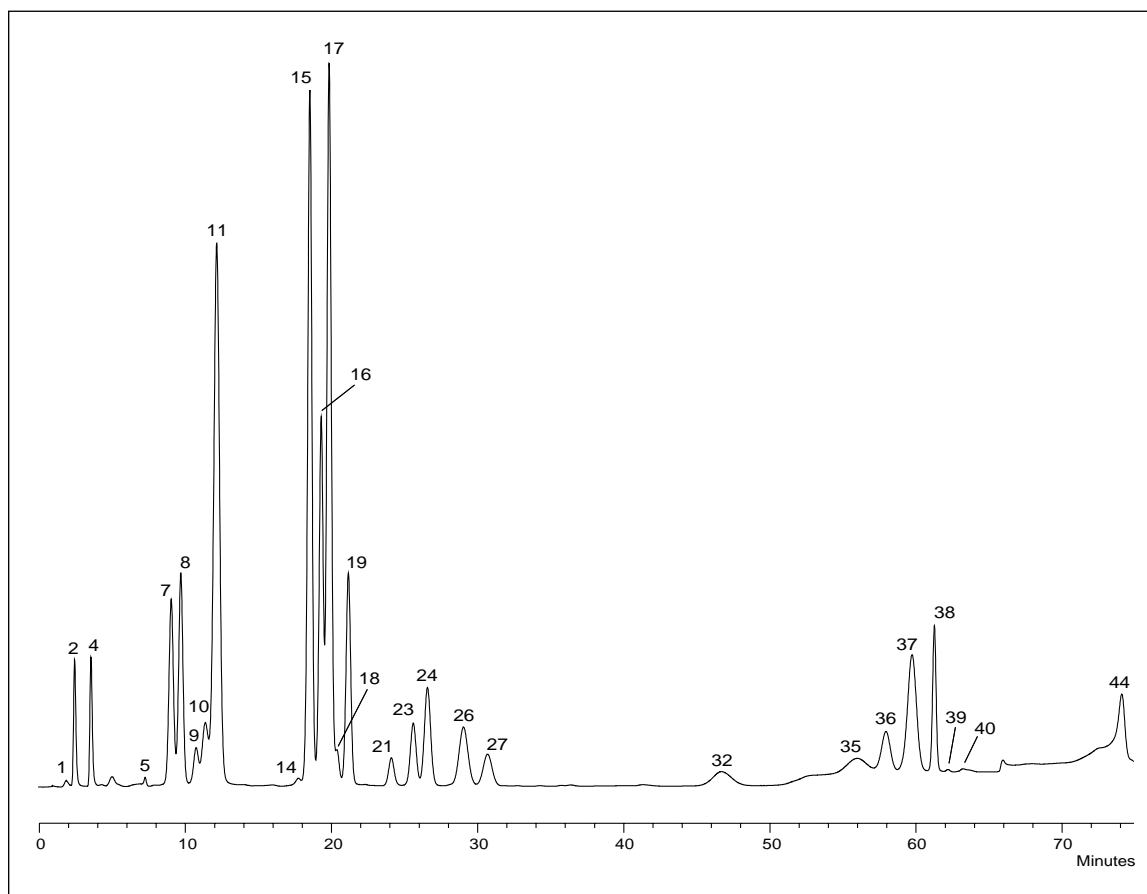


continued on the next page



Amino Acids Calibration Standard

- 1 Phosphoserine
- 2 Taurine
- 3 Phosphoethanolamine
- 4 Urea
- 5 Aspartic acid
- 6 Hydroxyproline
- 7 Threonine
- 8 Serine
- 9 Asparagine
- 10 Glutamic acid
- 11 Glutamine
- 12 Sarcosine
- 13 α -Amino adipic acid
- 14 Proline
- 15 Glycine
- 16 Alanine
- 17 Citrulline
- 18 α -Amino-*n*-butyric acid
- 19 Valine
- 20 Cystine
- 21 Methionine
- 22 Cystathionine
- 23 Isoleucine
- 24 Leucine
- 25 Norleucine
- 26 Tyrosine
- 27 Phenylalanine
- 28 β -Alanine
- 29 β -Amino-*i*-butyric acid
- 30 Homocystine
- 31 γ -Aminobutyric acid
- 32 Tryptophan
- 33 Ethanolamine
- 34 Hydroxylysines
- 35 Ammonia
- 36 Ornithine
- 37 Lysine
- 38 Histidine
- 39 3-Methyl-histidine
- 40 1-Methyl histidine
- 41 Carnosine
- 42 Anserine
- 43 α -Amino- β -guanidino-propionic acid
- 44 Arginine



Amino Acid Analysis of Human Serum



Aminoglycoside Antibiotics in Feed

Aminoglycoside antibiotics are among those commonly used in animal feeds to manage intestinal microorganisms. The beneficial effects include improved growth and generally healthier animal populations. Use of antibiotics creates a demand for analytical procedures to verify concentrations in pre-mixes and feeds and in some instances for residue analysis in animal products.

This note describes a simple, robust analytical method for the family of Aminoglycoside antibiotics in feeds and animal products. The sample is homogenized with a generic extraction solution and the crude soluble portion is directly injected into an HPLC ion-exchange column. The column effluent is then mixed with an OPA/Thiofluor™ reagent which forms highly fluorescent derivatives with the primary amine moieties of the antibiotics.

Call if you need to analyze other Aminoglycosides.

EXTRACTION PROCEDURE:

Take one part feed:10 parts Extraction solution (w/v) Catalog No. 1700-1118 and homogenize for five minutes. Centrifuge for 10 minutes. Three layers will form: the pellet, a supernatant emulsion and a soft layer of floating fat. Carefully lift the floating fatty layer with a spatula and discard. Transfer the emulsion to a sealable vial. Coagulate the emulsion by placing the vial in a boiling water bath for 15 minutes. Centrifuge for 10 minutes. The clear supernate is filtered (0.45µm Nylon) and placed in an autosampler vial.

METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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Apramycin, Gentamicin, Neomycin

METHOD

Analytical Conditions

COLUMN: ALKION™ cation-exchange, K⁺ form,
4 x 150 mm, Catalog No. 9410917
ALKION™ Guard column, 3 x 20 mm,
Catalog No. 9493020

TEMPERATURE: 40 °C

FLOW RATE: 0.8 mL/min

MOBILE PHASE: K01, Potassium buffer
K02, Potassium titrant
K03, Potassium ionic strength adjuster

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200

REACTOR VOLUME: 0.15 mL

TEMPERATURE: 45 °C

REAGENT: *o*-Phthalaldehyde/Thiofluor + Brij 35®

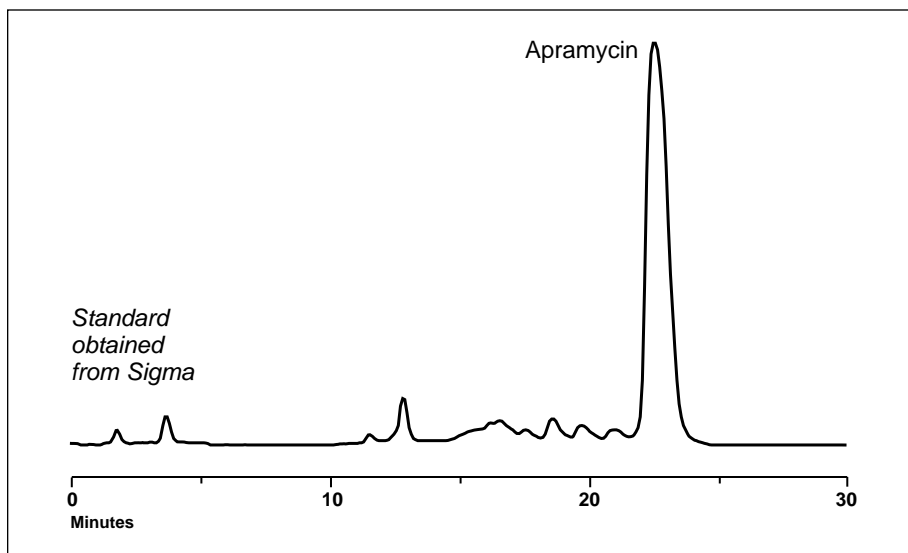
FLOW RATE: 0.3 mL/min

DETECTION: Fluorometer

λ_{ex} : 330 nm

λ_{em} : 465 nm

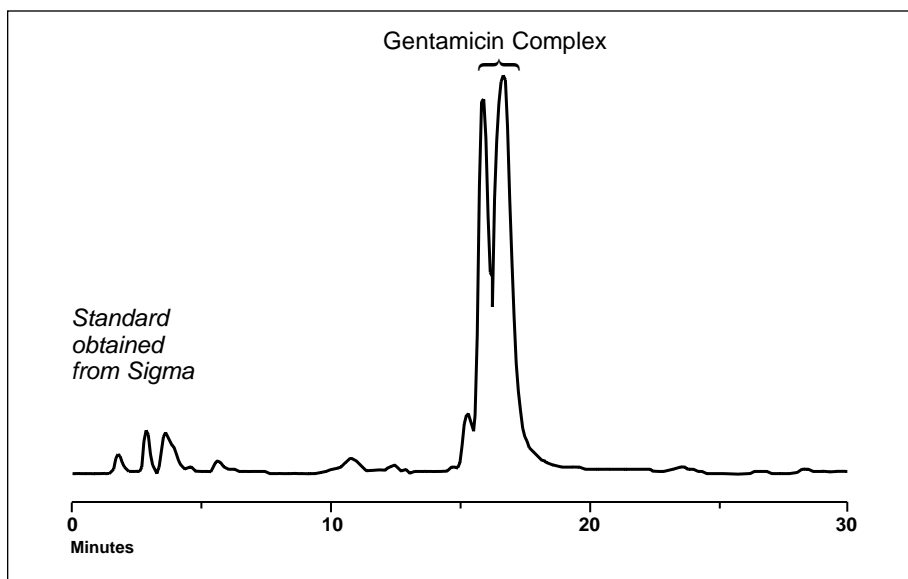
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Apramycin Analysis

Sample: 11.1 nmole Apramycin on column

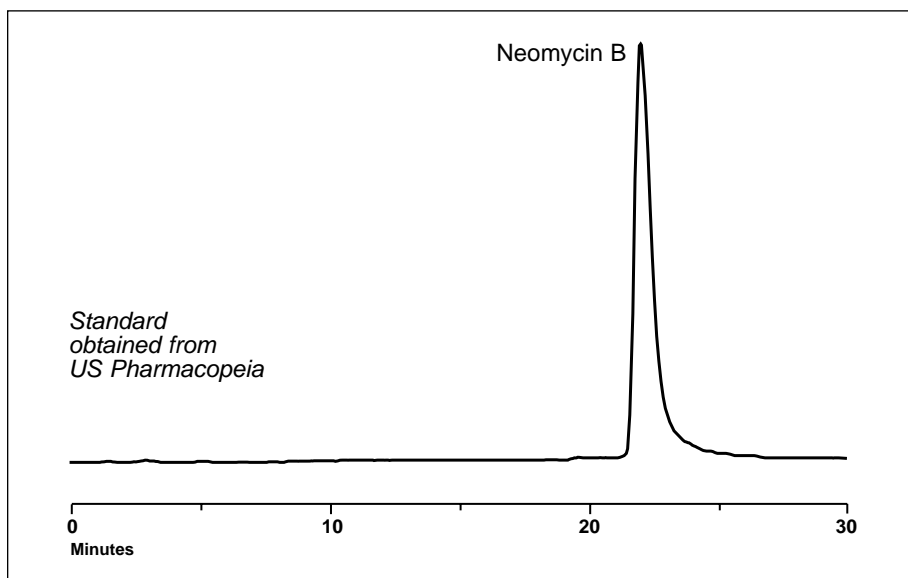
Time [min]	K01 [%]	K02 [%]	K03 [%]
0	67	33	0
5	67	33	0
15	14.7	7.3	78
20	0	7.3	78
20.1	0	22	78
21	0	22	78
21.1	67	33	0



Gentamicin Analysis

Sample: 5 x 10⁻⁶ g Gentamicin complex on column

Time [min]	K01 [%]	K02 [%]	K03 [%]
0	43	31	26
20	9	13	78
30	9	13	78
30.1	0	22	78
31	0	22	78
31.1	43	31	26



Neomycin Analysis

Sample: 2.75 nmole Neomycin on column

Time [min]	K01 [%]	K02 [%]	K03 [%]
0	60	40	0
15	13.2	8.8	78
25	11	11	78
25.1	0	22	78
26	0	22	78
26.1	60	40	0

“ALKION” and Thiofluor are trademarks of Pickering Laboratories, Inc.

“Brij 35” is a registered trademark of ICI Americas, Inc.



Analysis of Biogenic Amines

Histamine and other polyamines such as Putrescine, Cadaverine, Spermidine and Spermine are products of decomposition. The level of histamine, in particular, has been used as a regulatory guideline for degree of decomposition in fish. Also, Histamine and Tyramine levels are of interest to producers of wine and cheese.

The polyamines, Spermidine, Spermine and Putrescine are elevated in neoplastic and damaged, e.g., burned, tissue. In fact, the level of circulating and urinary polyamines is an indicator of total body damage. The levels can be monitored for the effect of diet and other modalities on recovery.

This method employs ion-exchange chromatography so, after extraction, centrifugation/filtration are the only sample preparations necessary.

EXTRACTION PROCEDURE

Weigh 10 g of sample into a small glass blender cup (any fortifications should be added at this time). Add 50 mL of extraction solution, Catalog No. 1700-1119, and homogenize for two minutes. Centrifuge for five minutes. Mix equal portions of the supernatant with the mobile phase (K600). Allow to coagulate at -4 °C for 15 minutes, then centrifuge for five minutes. The clear supernatant is filtered (0.45 µm Nylon) and placed in an autosampler vial.

METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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Food and Physiological Samples

METHOD

Analytical Conditions

COLUMN: ALKION™ cation-exchange, K⁺ form, 4 x 150 mm, Catalog No. 9410917
ALKION™ Guard column, 3 x 20 mm, Catalog No. 9493020

TEMPERATURE: 40 °C

FLOW RATE: 0.8 mL/min

MOBILE PHASE: K600, K563, K130

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200

REACTOR VOLUME: 0.15 mL

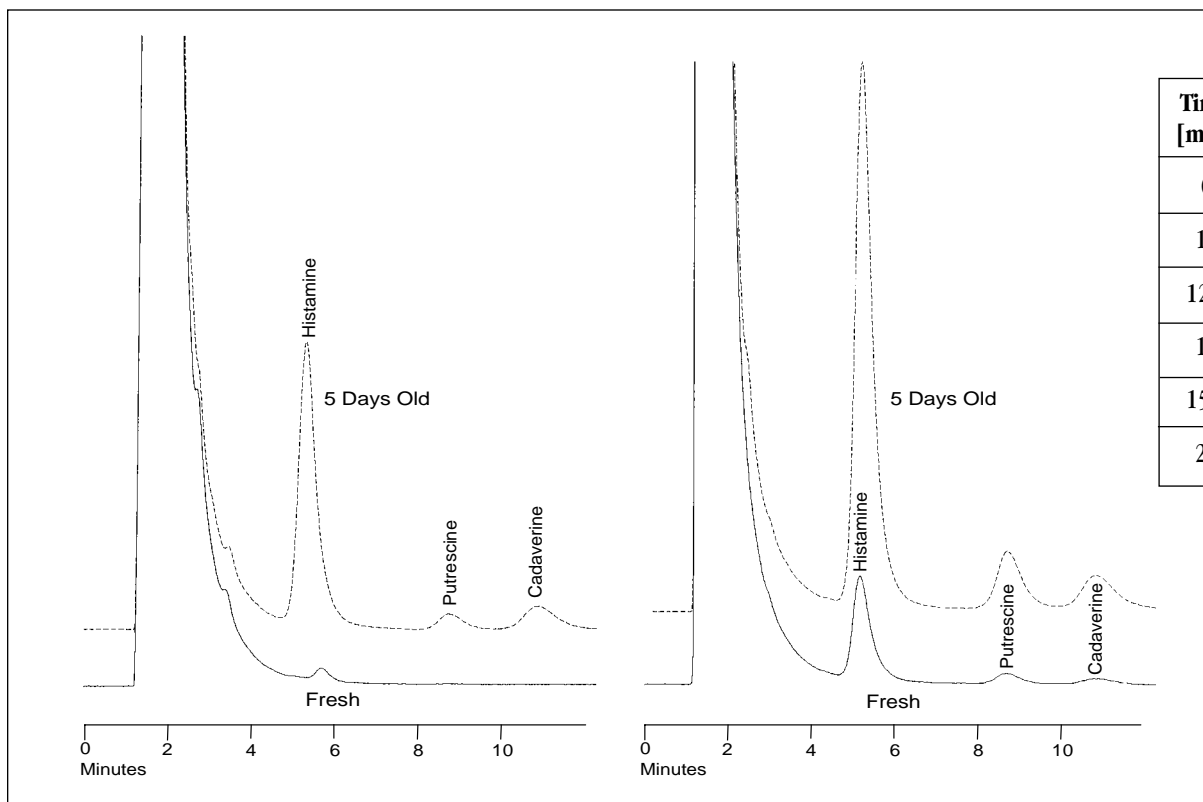
TEMPERATURE: 45 °C

REAGENT: 300 mg of OPA, 2 g of Thiofluor™, 3 mL of 30% Brij® 35 in 950 mL of OD104

FLOW RATE: 0.3 mL/min

DETECTION: Fluorometer
λ_{ex}: 330 nm
λ_{em}: 465 nm

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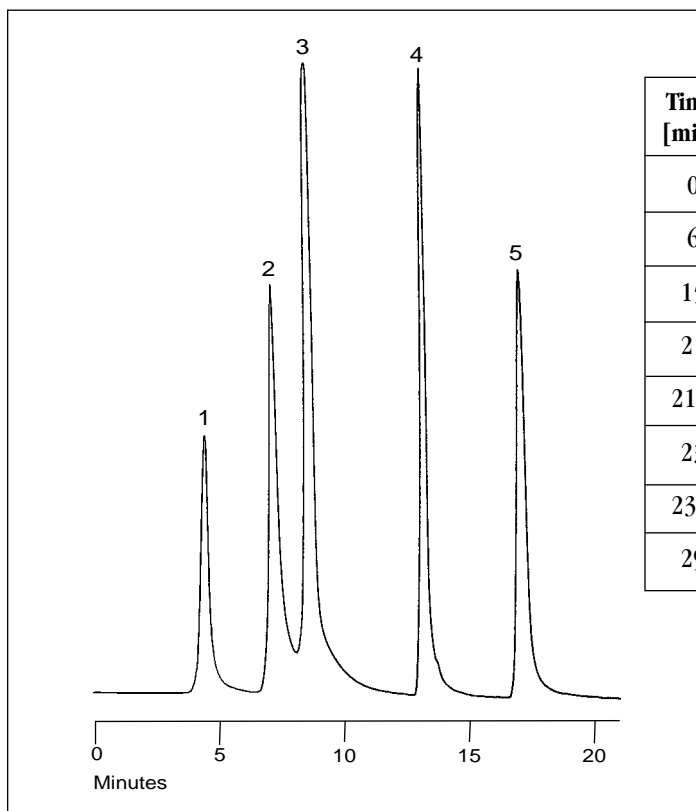


Time [min]	K600 [%]	K130 [%]
0	100	0
12	100	0
12.1	0	100
15	0	100
15.1	100	0
20	100	0

- 1 Histamine
- 2 Putrescine
- 3 Cadaverine

Mahi-Mahi

Ahi Tuna Fillet



Time [min]	K600 [%]	K563 [%]	K130 [%]
0	100	0	0
6	100	0	0
15	0	100	0
21	0	100	0
21.1	0	0	100
23	0	0	100
23.1	100	0	0
29	100	0	0

- 1 Histamine
- 2 Putrescine
- 3 Cadaverine
- 4 Spermidine
- 5 Spermine

Gradient Separation of Polyamine Mixture

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METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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Glyphosate and AMPA Analysis in Crops

The recently practiced method¹ for analysis of Glyphosate and AMPA in crops suffers from an expensive, time consuming clean-up procedure that has less than ideal recoveries. Although the analysis (after clean up) by ion-exchange chromatography with post-column derivatization is rugged and sensitive, a new method was sought to improve the sample preparation. This resulted in AOAC Method 2000.52² which has a streamlined cleanup followed by pre-column derivatization and GC/MS analysis. We show how this simplified sample preparation is suitable for the classic ion-exchange/post-column analytical protocol.

METHOD

EQUIPMENT

- LC with a binary pump
- Fluorescence detector
- Pickering Laboratories PCX 5200 Post-column Derivatization instrument
- Pickering Laboratories Potassium cation exchange column, 4.0 x 150 mm (Cat. No. 1954150)
- Pickering Laboratories Potassium cation exchange guard column, 3.0 x 20 mm (Cat. No 1953020)
- Cation exchange cleanup column

REAGENTS

- Potassium eluant (Cat. No.K200)
- Potassium regenerant (Cat. No. RG019)
- Hypochlorite diluent (Cat. No. GA116)
- o-Phthalaldehyde diluent (Cat. No. GA104)
- Thiofluor (Cat. No. 3700-2000)
- o-Phthalaldehyde (Cat. No. O120)
- 5% Sodium hypochlorite solution
- Methylene chloride
- Acidic modifier solution
- Cleanup column eluant

A Simple and Reproducible Extraction and Clean-up² For HPLC Post-column Derivatization

SAMPLE PREPARATION

Extraction

To 25 g of a homogenous sample add enough water (after estimation of moisture content) to make the total volume of water 125 mL. Blend at high speed for 3–5 min. and centrifuge for 10 min. Transfer 20 mL of the aqueous extract into a centrifuge tube and add 15 mL of methylene chloride (to remove nonpolar co-extractives). Shake for 2–3 min. and centrifuge for 10 min. Transfer 4.5 mL of the aqueous layer into a vial and add 0.50 mL acidic modifier solution (16g KH₂PO₄, 160 mL H₂O, 40 mL Methanol, 13.4 mL HCl). Shake and centrifuge for 10 min.

Matrix specific modification

Plants with high: 1) Water 2) Protein 3) Fat Content

- 1) For crops that absorb large amounts of water, reduce test portion to 12.5 g keeping water volume the same.
- 2) For crops that have high protein content add 100 µL HCl to 20 mL aliquot of crude extract. Cap, shake and centrifuge for 10 min.
- 3) For crops that have high oil content, do the methylene chloride partition twice.

Cation-exchange cleanup

Transfer 1 mL of extract (representing 0.18g normal crop or 0.09g dry crop) to the column reservoir and elute to the top of the resin bed. Add 0.70 mL of the elution solution (160 mL H₂O, 2.7 mL HCl, 40 mL Methanol) and discard the effluent. Repeat with a second 0.70 mL portion and discard effluent. Elute with 12 mL of the elution solution and collect in a round-bottomed flask. Evaporate to dryness in a water bath set at 40 °C using a rotary evaporator. Or collect in a centrifuge tube and evaporate using a vacuum vortex evaporator. Dissolve residue in 2.0 mL of the elution solution (use 1.5 mL for dry crops). Extracts before evaporation can be stored refrigerated for up to 7 days.

continued on the next page

CONDITIONS

LC COLUMN TEMPERATURE: 55 °C
 SAMPLE INJECTION VOLUME: 100 µL
 LC FLOW RATE: 0.40 mL/min
 MOBILE PHASES: K200, Potassium Eluant
 RG019, Regenerant

POST COLUMN CONDITIONS

POST COLUMN SYSTEM: PCX5200
 REACTOR VOLUME: 0.5 mL
 REACTOR TEMPERATURE: 36 °C
 REAGENT 1: 100µL of 5% NaOCl (Bleach) in GA116
 Diluent
 REAGENT 2: 100 mg o-Phthalaldehyde and
 2g Thiofluor in 950 mL GA104 Diluent
 FLOW RATE: 0.3 mL/min
 DETECTION: Fluorescence detector
 λ_{ex} : 330nm
 λ_{em} : 465nm

Step	Time [min]	Interval [min]	K200 [%]	RG019 [%]	
0	0	0	100	0	Injection
1	0 - 15	15	100	0	Isocratic
2	15.1-17	1.9	0	100	Step Change
3	17.1-25	7.9	100	0	Re-Equilibration

NOTE:

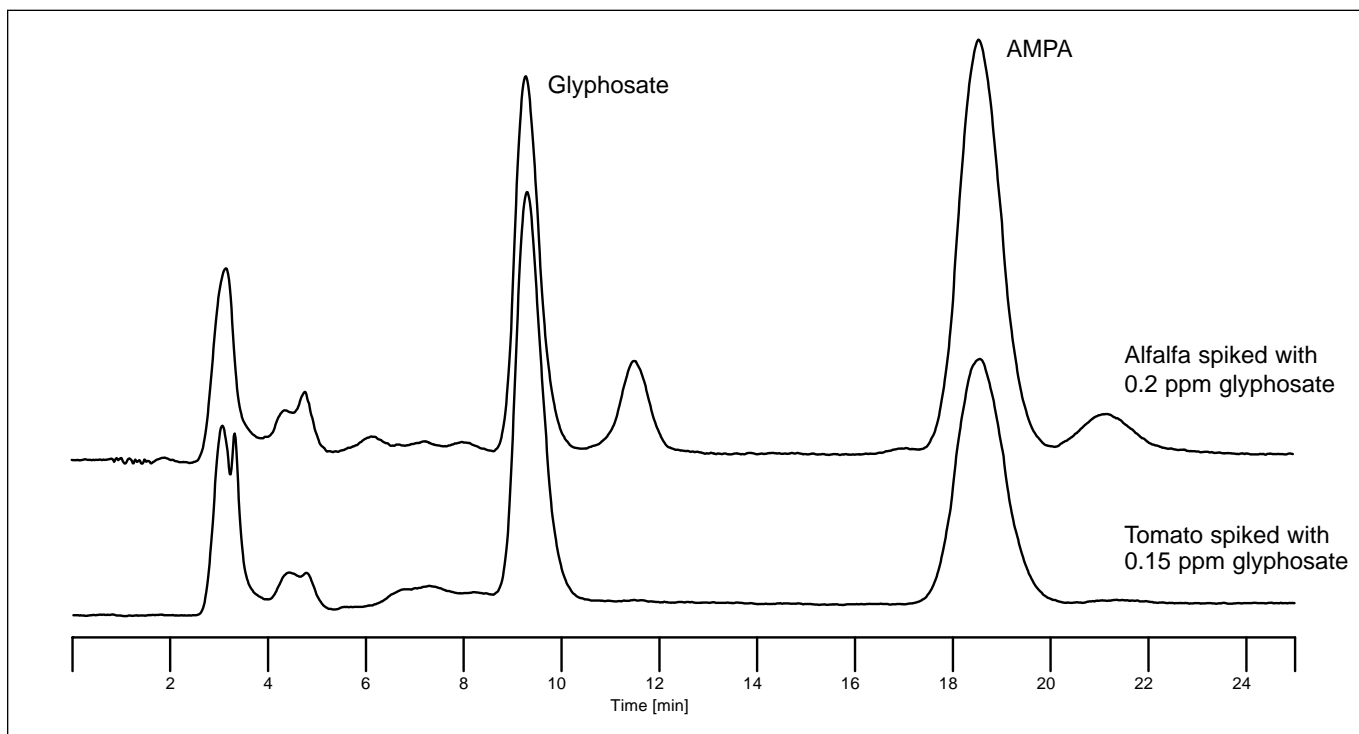
Ensure that the auto sampler injection valve is fitted with a Tefzel or PEEK rotor seal for compatibility with the high-pH column regenerant. Heavy-metal ions, especially iron can cause loss of sensitivity. Contamination of the guard and column can be removed by using RESTORE (Cat. No. 1700-0140) reagent.

ACKNOWLEDGEMENT:

We thank The Montana Department of Agriculture, Laboratory Bureau for extracting alfalfa, tomato and other samples.

REFERENCES:

- 1) "Validation of an Analytical Residue Method for Analysis of Glyphosate and Metabolite: An Interlaboratory Study." *J. Agric. Food Chem.* **34**, (1986) 955-960.
- 2) P.L. Alferness and L.A. Wiebe, "Determination of Glyphosate and Aminomethylphosphonic Acid in Crops by Capillary Gas Chromatography with Mass-Selective Detection: Collaborative Study." *Journal of AOAC International*, 2001 **84**, 823-846.



Chromatograms of Alfalfa and Tomato matrix spiked with glyphosate and AMPA

For complete method details request the
 Glyphosate Application Manual, Cat. No. 0101-0003.

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Multi-Residue Mycotoxin Analysis

MARIA OFITSEROVA, PhD
DARSA SIANTAR, PhD*
SAREETA NERKAR, PhD
MICHAEL PICKERING, PhD

Although *Aspergillus* (Aflatoxins, Ochratoxin A) are generally associated with peanuts and *Fusarium* (Deoxynivalenol, Zearalenone) with wheat, these fungi and those that produce other toxins are not host selective and so can cross plant species. This situation is complicated by the fact that the microscopic mold may not be visible to the naked eye. Also, when infected grains are processed, any visible mold is lost but the toxic metabolites carry over into the finished products. Thus, multi-residue analytical screens for toxins in grain and finished goods are a wiser choice than single-family protocols. We present here two such screens that cover five families of toxins.

Method One: Analysis of Deoxynivalenol, Aflatoxins, Ochratoxin A and Zearalenone in single run

Method Two: Analysis of Deoxynivalenol, Aflatoxins and Fumonisin in single run

METHOD (ONE & TWO)

Sample Preparation (Method One)

A 5 mL portion of the beverage or extract is loaded into an antibody-based cartridge. The cartridges used were "Afla/DON/Ochra/Zear" in the first method and "Afla/DON/Fumo" in the second method. The cartridge is washed with 1 mL of water. The mixed toxins are eluted with 3 mL of Methanol. The Methanol solution is evaporated to dryness and is reconstituted in 250 mL of Methanol.

ACKNOWLEDGEMENT:

* Darsa Siantar, Ph. D. – Bureau of Alcohol, Tobacco & Firearms,
Department of the Treasury.

We wish to thank VICAM in Watertown, MA and PROMEC of MRC in South Africa for materials and assistance.

PRODUCT ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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One Run Analysis of Deoxynivalenol, Aflatoxins, Ochratoxin A, Zearalenone and Fumonisin by HPLC and Post-column Derivatization

Sample Preparation (Method Two)

Repeat above method with Afla/DON/Fumo antibody cartridge.

Analytical Conditions (One & Two)

COLUMN: MYCOTOX™ Analytical column, C₁₈,
high resolution/capacity, 4.6 x 250 mm
Catalog No. 1846250

TEMPERATURE: 40 °C

FLOW RATE: 1.0 mL/min

MOBILE PHASE: • D.I. Water
• Acetonitrile
• Methanol
• Phosphate buffer (pH 3.3):
MeOH (90:10)

Post-column Conditions (Method One)

POST-COLUMN SYSTEM: PCX5200 with 2.0 mL reactor

TEMPERATURE: 90 °C

REAGENT: I₂, 100 mg/Lt.

DETECTION: • DON
DAD 218 nm

• Aflatoxins
Fluorescence
 λ_{ex} : 365 nm λ_{em} : 455 nm

• Ochratoxin A
Fluorescence
 λ_{ex} : 335 nm λ_{em} : 455 nm

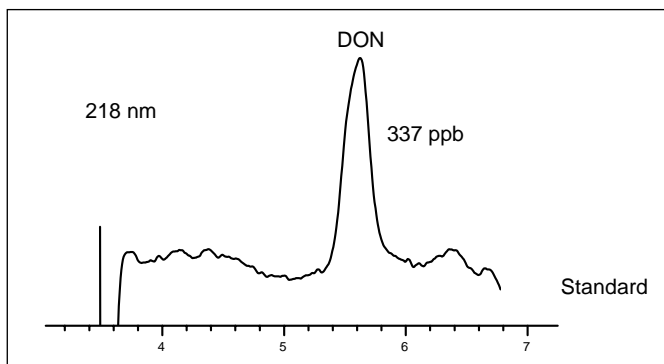
• Zearalenone
Fluorescence
 λ_{ex} : 275 nm λ_{em} : 455 nm

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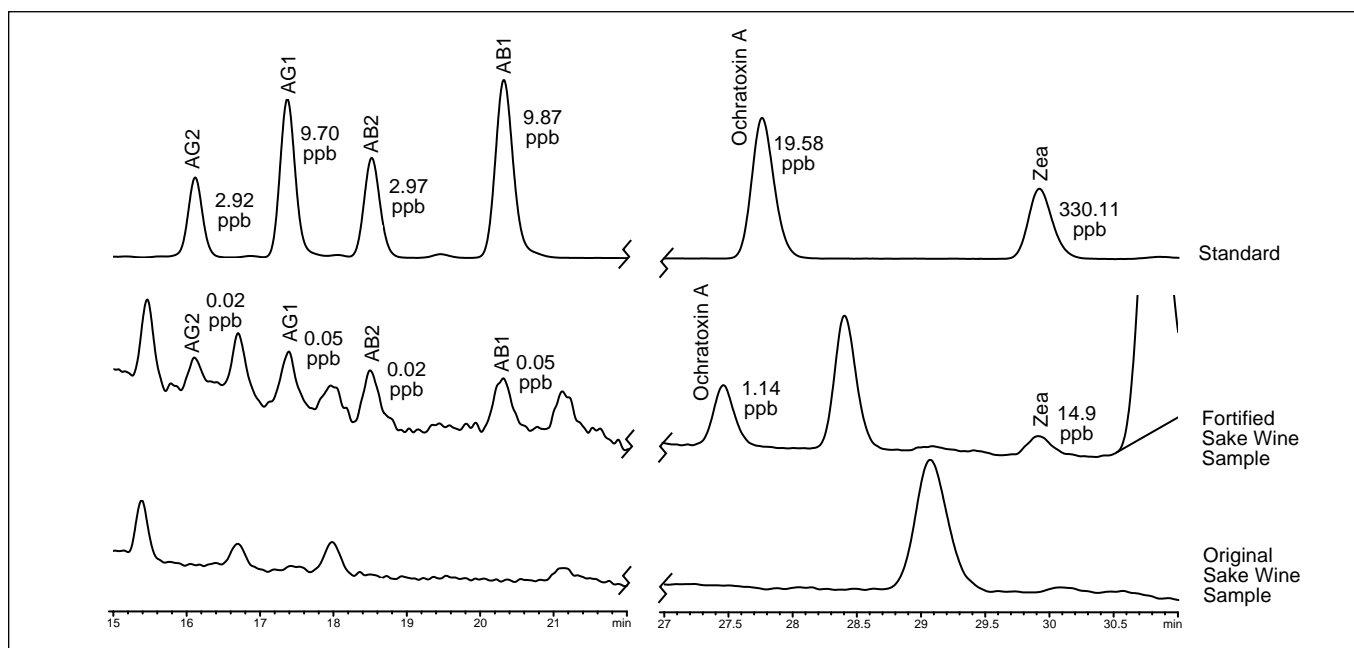
Post-column Conditions (Method Two)

POST-COLUMN SYSTEMS: PCX5200 with 2.0mL reactor
 TEMPERATURE: 60° C
 REAGENT: OPA, Thiofluor in GA 104
 DETECTION: • DON
 DAD 218 nm
 • Aflatoxins
 Fluorescence
 λ_{ex} : 365 nm λ_{em} : 455 nm
 • Fumonisin
 Fluorescence
 λ_{ex} : 330 nm λ_{em} : 465 nm

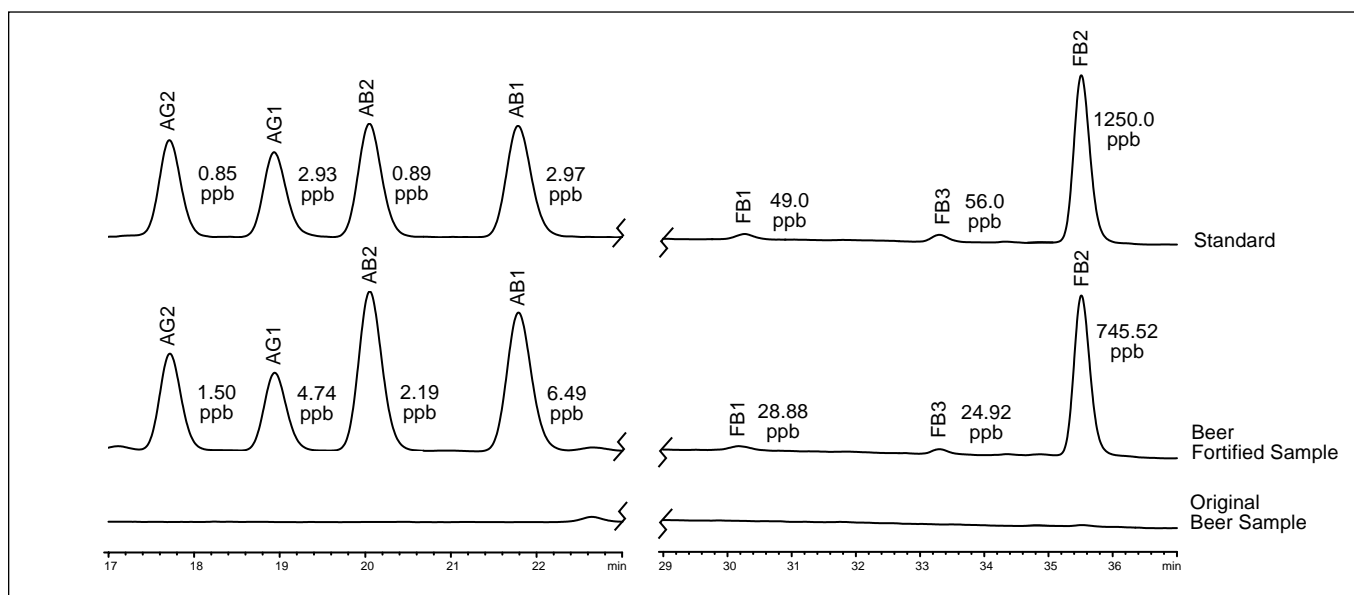
DON (Method One & Two)



Method I Aflatoxins Derivatized by IODINE



Method II Fumonisin Derivatized by OPA

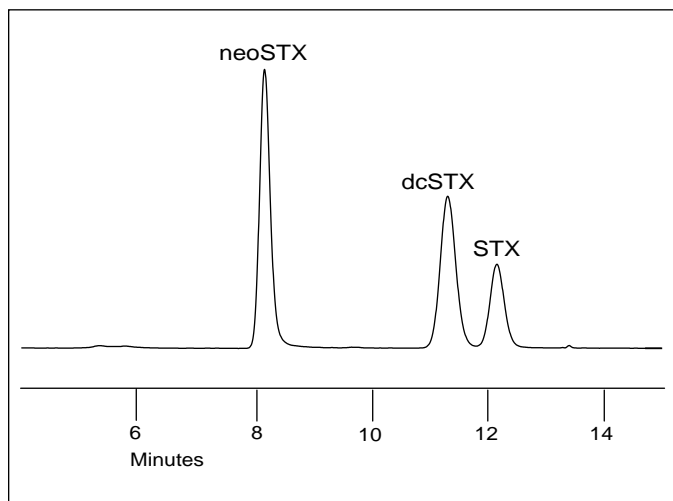


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Paralytic Shellfish Toxins

The paralytic shellfish toxins are a group of 18 secondary metabolites deposited in bivalve mollusks by dinoflagelates. Dinoflagelates blooms are seasonal, occurring during warm months. Since it is unpredictable whether an infestation will occur, the shellfish population should be regularly monitored for toxins. Ingestion of contaminated shellfish can lead to paralytic shellfish poisoning; a life-threatening illness.



METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

105.1

Dinoflagellate-derived Neurotoxins in Bivalve Mollusks

METHOD

Analytical Conditions

- COLUMN: Reversed-phase column for PST analysis, C₈, 4.6 x 150 mm, Catalog No. 0846150
- TEMPERATURE: 40 °C
- FLOW RATE: 0.8 mL/min
- MOBILE PHASE: A. For C1–C4 toxins:
Tetrabutylammonium phosphate (1 mM) adjusted to pH 5.8 with acetic acid
- B. For GTX-1 to GTX-6, dcGTX2, and dcGTX3:
Sodium 1-heptanesulfonate (2 mM) in 10 mM Ammonium phosphate, pH 7.1
- C. For STX, neoSTX, and dcSTX:
Sodium 1-heptanesulfonate (2 mM) in 10 mM Ammonium phosphate, pH 7.1 : Acetonitrile (2 : 1)

Post-column Conditions

- POST-COLUMN SYSTEM: PCX5200
- REAGENT 1: Periodic acid (7 mM) in 50 mM Potassium Phosphate buffer, pH 9.0
- REACTOR 1: 75 °C, 2.0 mL
- REAGENT 2: 0.5 M Acetic Acid
- REACTOR 2: ambient, 0.1 mL
- FLOW RATE: 0.4 mL/min each
- DETECTION: Fluorometer
 λ_{ex} : 330 nm
 λ_{em} : 390 nm

REFERENCES:

- 1) Y. Oshima, K Sugino, T. Yasumoto
"Latest Advances in HPLC Analysis of Paralytic Shellfish Toxins in Bioactive Molecules" **10**, (1989) 319–326
- 2) J. J. Sullivan, M. M. Wekell, and L. L. Kentala,
J. Food Sci. **50** (1) (1985) 26–29.
- 3) Y. Oshima, *JOAC, INTL.* **78** (2) (1995).



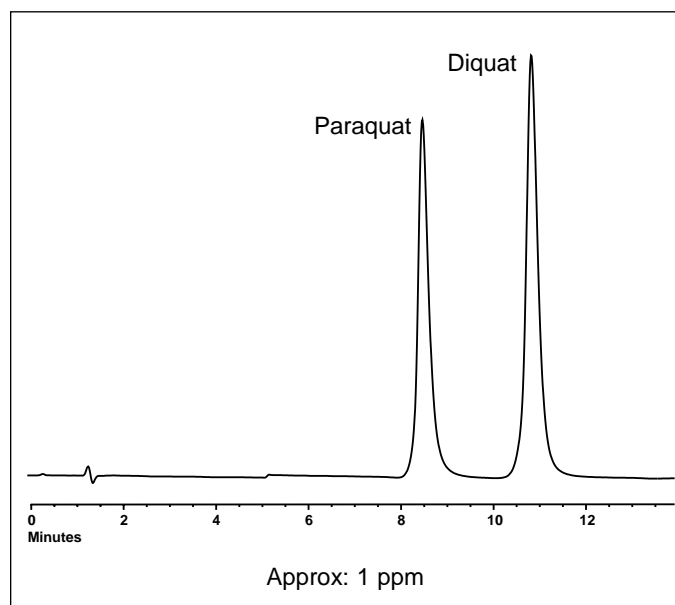
**METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY**

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Paraquat and Diquat in Water

Paraquat and Diquat are widely used in agriculture and industry. They are employed as contact herbicides, as harvest aids, for pasture renovation and for aquatic weed control. Their environmental persistence allows for contamination of water supplies; wells, lakes, rivers, etc. Since Paraquat is a Class I Toxin and Diquat is a Class II Toxin, water resources must be monitored for the presence of these herbicides.

This method employs ion exchange chromatography so filtration is the only sample preparation necessary. Also, since both Paraquat and Diquat have a fixed +2 charge, 2 mL can be injected without peak degradation. Post-column derivitization improves sensitivity and greatly improves selectivity by shifting the detection to longer wavelengths.



Direct Injection Method

METHOD

Analytical Conditions

COLUMN: ALKION™ column 4 x 150mm,
Catalog No. 9410917,
Guard column 3 x 20mm, Catalog No. 9493020
TEMPERATURE: 50 °C
FLOW RATE: 0.8 mL/min
MOBILE PHASE: K01, Potassium buffer
K02, Potassium titrant
K03, Potassium ionic strength adjuster

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200
REACTION DWELL: 0.15 mL
TEMPERATURE: 35 °C
REAGENT: 300 mg/L Sodium Dithionite in
0.3 M Sodium Hydroxide
FLOW RATE: 0.3 mL/min
DETECTION: 395 nm for Paraquat and 378 nm for Diquat
Without post-column derivitization:
257 nm for Paraquat and 308 nm for Diquat

Time [min]	K01 [%]	K02 [%]	K03 [%]	IPA [%]
0	31.5	53.5	0	15
10	28	47	10	15
15	28	47	10	15
15.1	0	85	10	5
17	0	85	10	5
17.1	31.5	53.5	0	15



PCX Control

Our new PCX5200 software is designed to make you more productive by putting all the controls for the Pickering PCX5200 Post-Column Derivatization instrument on your Windows PC. With the click of a mouse you can quickly and easily adjust settings and monitor status from your computer. PCX5200 works side-by-side with existing HPLC software. What's more, the PCX5200 can be controlled from anywhere on the network and it allows for multiple systems to be run by a single PC workstation.

FEATURES

- Synchronization with the Agilent Chem Station HPLC software for the new multi-residue Mycotoxin method
- Unlimited number of stored methods
- Automatic temperature calculation for easy calibration
- Simple RS-232 connection
- Network configurable

Convenient and flexible, this easy-to-use software enhances the PCX5200 instrument by giving you control of:

- Column pressure
- Column temperature
- Reactor temperature
- Reagent pumps

Introducing PC Software for the Pickering Laboratories PCX5200 Post-Column Derivatization Instrument

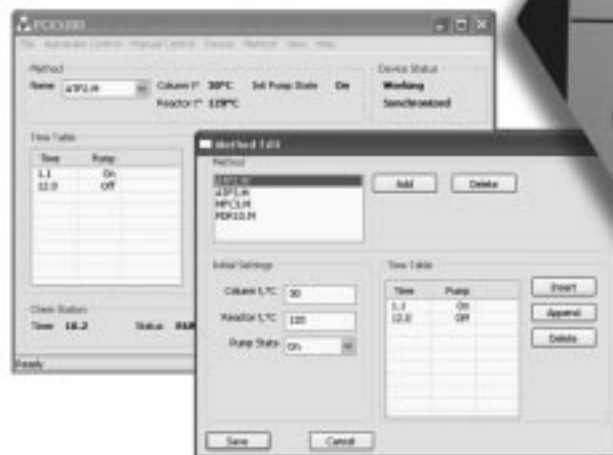
Preset Analysis Programs

SHIPS WITH 5 PRESET PROGRAMS

- Glyphosate
- Carbamate
- Sodium Amino Acids
- Lithium Amino Acids
- Aflatoxins

Software System Requirements

- Windows 95 or higher, 2 MB hard drive space, Pentium processor.
- Requires RS-232 cable
- Adapter





METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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PKU and MSUD

Phenylketonuria (PKU) and Maple syrup urine disease (MSUD, branched-chain ketoaciduria) are genetically transmitted metabolic diseases. PKU results in elevated Phenylalanine levels due to deficient activity of the enzyme Phenylalanine hydroxylase. In the MSUD state, elevated levels of leucine (Leu), isoleucine (Ile), valine (Val), and alloiso-leucine can be detected in blood. The increased concentration of the branched-chain amino acids is caused by an inherited deficient activity of the enzyme branched-chain keto-acid decarboxylase.

Failure to diagnose and treat these conditions in newborns can result in severe mental retardation (PKU) or even death (MSUD).

Dietary restriction of Val, Leu, and Ile for MSUD newborns must begin immediately once the diagnosis is made or suspected. MSUD patients must be monitored on a regular schedule in conjunction with the dietary therapy because even relatively small changes in the intake of the branched-chain amino acids may produce rather large fluctuations of their concentrations in the plasma. In this respect, MSUD is more difficult to control by dietary means than phenylketonuria (PKU), because each of the branched-chain amino acids has to be individually adjusted and monitored.

The Pickering Laboratories PKU/MSUD post-column system is a rapid, automated method for the quantitative analysis of Met, Leu + Ile, Tyr and Phe from whole blood samples. Between-injection time is 13 min while actual time is only 7 min. The Pickering lithium ion-exchange column has a matched set of eluant and regenerant to provide the best possible separation, sensitivity, and reproducibility. The post-column derivatizing reagent is TRIONE® Ninhydrin.

Screening for Phenylketonuria and Maple Syrup Urine Disease

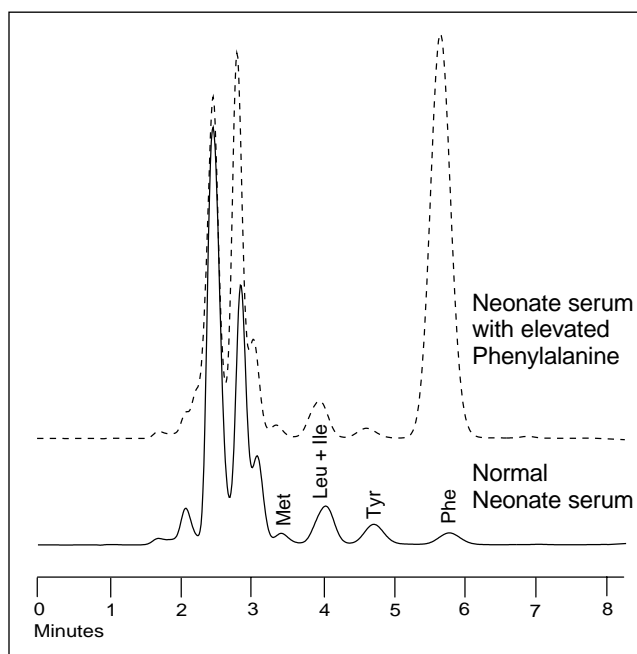
METHOD

Analytical Conditions

COLUMN: PKU/MSUD column, 4.0 x 50 mm
Catalog No. 0354050
TEMPERATURE: 65 °C
FLOW RATE: 0.4 mL/min
MOBILE PHASE: Eluant (A): Li357, Regenerant (B): RG003
GRADIENT: 0–8.0 min 100% A
8.1–10.0 min 100% B
10.1–13.0 min 100% A

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200
REACTION DWELL: 0.5 mL
TEMPERATURE: 130 °C
REAGENT: TRIONE® Ninhydrin
FLOW RATE: 0.3 mL/min
DETECTION: Visible @ 570 nm



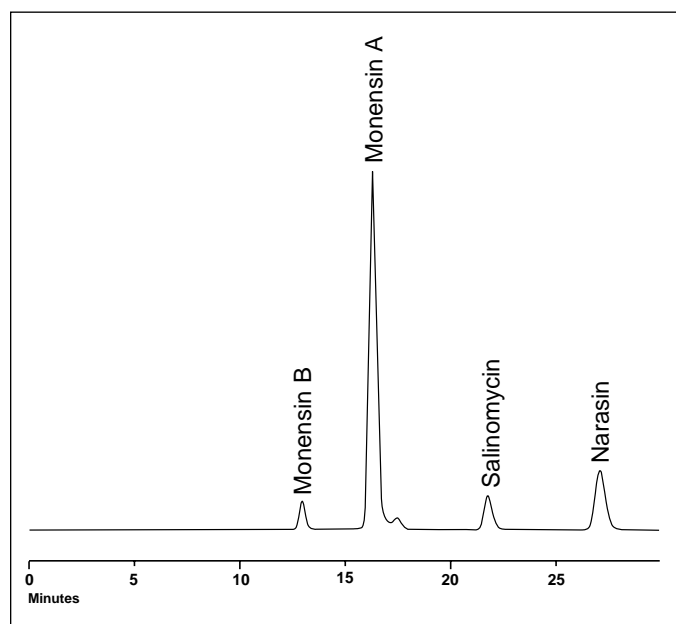
“TRIONE” (U.S. Patent No. 4,274,833) is a registered trademark of Pickering Laboratories, Inc.

This chromatogram is reproduced by courtesy of Quynh Vantu and Wanda Andrews, Virginia Newborn Screening Laboratory, Richmond, Virginia.



Polyether Antibiotics

Polyether antibiotics, such as Monensin, Narasin, and Salinomycin, in raw material, premix, liquid supplements, and final feeds, are best quantified using a high-performance liquid chromatograph equipped with a post-column reactor. The polyether antibiotics react, post-column, with Vanillin in the presence of Sulfuric acid, and the resulting products can be detected at 520 nm. However, this corrosive reagent can adversely degrade most instruments. Pickering's special PCX5200, comprised of mostly non-metallic parts and washing pump head, offers resistance to sulfuric acid. Special operating instructions will also be included with this instrument. Contact Pickering Laboratories for more information about the Inert PCX5200 Post-Column System for polyether antibiotics.



METHOD ABSTRACT FOR
POST-COLUMN
LIQUID CHROMATOGRAPHY

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Monensin, Narasin, & Salinomycin

METHOD

Analytical Conditions

COLUMN: Polyether reversed-phase column, C₁₈, 4.6 x 250 mm, Catalog No. 2381750
TEMPERATURE: 40 °C
FLOW RATE: 0.7 mL/min
MOBILE PHASE: Methanol/5% acetic acid in water (90/10), Isocratic

Post-column Conditions

POST-COLUMN SYSTEM: PCX5200 (Non-metallic post-column derivatization system is required)
REAGENT 1: Concentrated Sulfuric acid/Methanol (4:96 v/v)
REACTOR 1: ambient, 0.1 mL
REAGENT 2: 60 g of Vanillin (or *p*-dimethylaminobenzaldehyde) in 950 mL of Methanol
REACTOR 2: 90 °C, 1.4 mL
FLOW RATE: 0.3 mL/min
DETECTION: UV-Vis detector:
Vanillin $\lambda=520$ nm, DMAB $\lambda=450$ nm

REFERENCES

- 1) M.R. LaPointe and H. Cohen, *J.A.O.A.C.*, **71** (1988) 480–484.
- 2) J.M. Rodewald, J.N. Moran, A.L. Donoho, and M.R. Coleman, *J.A.O.A.C.*, **75** (1992) 272–279.



2.1 mm ID Micro Carbamates Column

Post-column derivatization of carbamates with hydroxide and OPA is the method of choice for the detection of carbamates because of its high selectivity and high sensitivity (US EPA 531.1 & AOAC 985.23).

To confirm the finding of carbamates in the tested samples, there are various possibilities:

- 1) Alternate columns to give different retention time or order of elution.
- 2) Fluorescence scan of the isoindole end-products.
- 3) Mass-spectrum of the carbamates.

Options 1 & 2 are already available to many Pickering customers. For option 3, the resolution of the carbamates has always been an issue with the necessary smaller ID column. The new 2.1 mm ID Pickering Carbamates Column provides the resolution. Because the new column contains the same durable phase as our regular Carbamates Column, it will have minimum leaching (critical for the mass spectrometer).

Ideal for LC-MS Confirmation

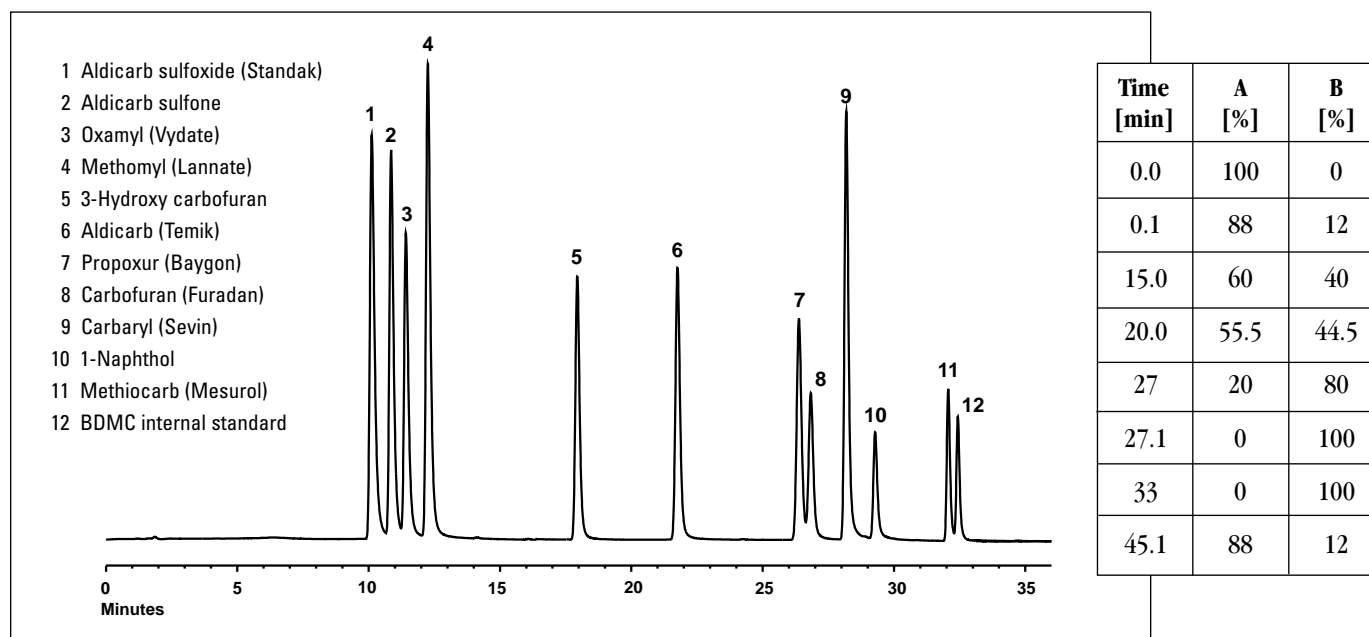
METHOD

Analytical Conditions

COLUMN: 2.1 x 100 mm Carbamates Column
Catalog No. 1821100
TEMPERATURE: 42 °C
FLOW RATE: 0.2 mL/min
MOBILE PHASE: A=H₂O; B=MeOH

Post-column Conditions

POST-COLUMN SYSTEM: micro-PCX5200
REAGENT 1: CB 130
REACTOR 1: 100 µL, 100 °C
REAGENT 2: OPA, Thiofluor in CB 910
REACTOR 2: 20 µL, Ambient
FLOW RATE: 60 µL/min
DETECTION: Fluorometer
 λ_{ex} : 330 nm
 λ_{em} : 464 nm



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GENERAL TERMS AND CONDITIONS OF SALE ("T&C")

- 1. CONTROLLING DOCUMENT.** These T & C's and only these T & C's apply to all goods sold and services provided by Seller to Buyer. By the placement of Buyer's purchase order, Buyer consents to these T & C's and no others.
- 2. TERMS OF PAYMENT.** All payments are due and payable thirty (30) days from the date of the invoice. A service charge of 1 1/2% per month shall apply to all invoices not paid within 30 days.
- 3. SECURITY AGREEMENT.**
 - (a) As security for Buyer's payment, Buyer grants Seller a purchase money security interest in the specific goods for which payment is due. Seller has the right to file a financing statement evidencing this security interest.
 - (b) This security interest shall terminate upon receipt by Seller of payment for the specific goods.
- 4. DELIVERY, TITLE AND RISK OF LOSS.** Title to goods and risk of loss of goods shall pass to Buyer when Seller delivers such goods to a common carrier or Buyer's agent. Delivery shall be EX Works Seller's Factory. Delivery dates agreed to by Seller are approximate only. Seller shall not be liable for, nor shall Seller be in breach of its obligations to the Buyer because of any delivery made within a reasonable time after the stated delivery date. Seller may, by written notice to Buyer, change any delivery date, and such date shall become the agreed upon delivery date unless Buyer objects to such date in writing delivered to Seller within ten (10) days of receipt of Seller's notice.
- 5. FORCE MAJEURE.** Seller shall not be liable for any failure to deliver, or delay in the delivery of, any goods or services due to any cause beyond its control, including but not limited to natural phenomena, government actions, fires, labor disputes, or inability to obtain components, energy, materials, manufacturing facilities, or transportation. In the event of such delay, the date of delivery or performance hereunder shall be extended by a period equal to the time lost by reason of such delay. In the event Seller's production is curtailed for any of the above reasons, Seller may allocate its production to its various Buyers.
- 6. SELLER'S LIABILITY.** If Buyer notifies Seller within 30 days under the terms hereof of a claimed defect, Buyer shall concurrently offer Seller an opportunity to investigate the claim and to inspect allegedly defective goods. If Seller determines that Buyer's claim is valid, Seller may repair the defective goods or replace the defective goods with conforming goods at the Seller's Factory. Failure to offer Seller such opportunity shall constitute acceptance by Buyer and waiver of all claims for defects. Seller's liability for damages on account of a claimed defect in any product delivered by Seller shall in no event exceed the purchase price of the product delivered by Seller on which the claim is based. Replacement of defective goods or repayment of the purchase price for any such product will be made only upon return of the defective product. Specifically and without limiting the generality of the foregoing, Seller shall not be responsible or liable to buyer or to any third party for any lost profits, or incidental, consequential, indirect, special or contingent damages for any breach of warranty or other breach of Seller's obligations under this contract. Seller shall not be liable for damages relating to any instrument, equipment, or apparatus with which the product sold under this agreement is used.
- 7. SELLER'S REMEDIES.** If Buyer fails, with or without cause, to furnish Seller with specifications and/or instructions for, or refuses to accept deliveries of, any of the products sold under this contract, or is otherwise in default under or repudiates this contract or any other contract with Seller or fails to pay when due any invoice under this contract, then in addition to any and all remedies allowed by law, Seller without notice (1) may deter shipment under this or any contract between Buyer and Seller until such default, breach or repudiation is removed and/or (2) may cancel any undelivered portion of this and/or any other contract in whole or in part, Buyer remaining liable for damages.
- 8. PATENT INDEMNITY.**
 - (a) Seller shall, at its own expense, defend any suit that is instituted against Buyer to the extent such suit alleges that any goods, other than prototypes, or any part thereof sold or leased hereunder infringes on any United States patent, trademark, or copyright (except goods covered by Section 8(b) below), provided that such alleged infringement does not arise from any modification or addition to the goods by anyone other than Seller, or the use of such goods as a part of or in combination with any other device or parts or from the use of such goods to practice any method or process. Provided further that the Buyer gives Seller immediate notice in writing of any such suit and permits Seller, through counsel of its choice, to answer the charge of infringement and defend such suit; and the Buyer gives Seller all the needed information, assistance, and authority, at Seller's expense, to enable Seller to defend or settle such suit. In the case of a final award of damages in any such suit, Seller shall pay such award but shall not be responsible for any settlement made without its prior written consent. In the event the use, lease, or sale of the goods is enjoined, Seller may at its own option and expense: (1) procure for Buyer the right to use, lease, or sell such goods, (2) replace such goods, (3) modify such goods, or (4) remove such goods and refund the purchase price paid by Buyer less a reasonable sum for use, damage, and obsolescence. THIS SECTION STATES SELLER'S TOTAL RESPONSIBILITY AND LIABILITY, AND THE BUYER'S SOLE REMEDY FOR ANY ACTUAL OR ALLEGED INFRINGEMENT OF ANY PATENT, TRADEMARK, OR COPYRIGHT BY ANY GOODS DELIVERED HEREUNDER OR ANY PART THEREOF. THIS SECTION 8 IS IN LIEU OF AND REPLACES ANY OTHER EXPRESS, IMPLIED OR STATUTORY WARRANTY AGAINST INFRINGEMENT.
 - (b) The Buyer shall, at its own expense, indemnify and hold Seller harmless from and against any expense or loss resulting from any infringement of any patent, trademark, or copyright arising as a result of Seller's compliance with any of the Buyer's designs, specifications, or instructions, and shall defend at its own expense including attorney fees, any suit brought against Seller alleging any such infringements provided that Seller (i) gives the Buyer immediate notice of any such suit and permits the Buyer through counsel of its choice, to defend such suit, and (ii) gives Buyer all needed information, assistance, and authority, at the Buyer's expense, necessary for the Buyer to defend any such suit.
- 9. ORDER CANCELLATION.** Buyer may, at any time, cancel its purchase of goods or services but only by paying 15% of the purchase price if such cancellation is received by Seller more than 90 days before the scheduled delivery date, 50% if received more than 45 days but less than 90 days, 75% if received more than 15 days but less than 45 days, and 100% if received less than 15 days.
- 10. WARRANTY AND LIMITATION OF LIABILITY.** IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM SELLER'S PERFORMANCE OR FAILURE TO PERFORM HEREUNDER OR THE FURNISHING, PERFORMANCE, OR USE OF ANY GOODS OR SERVICES SOLD PURSUANT HERETO. IN NO EVENT SHALL THE AMOUNT OF SELLER'S LIABILITY EXCEED THE AMOUNTS PAYABLE BY BUYER HEREUNDER. SELLER EXPRESSLY DISCLAIMS ANY LIABILITY FOR ANY WARRANTY, EXPRESS, IMPLIED OR STATUTORY, INCLUDED BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, EXCEPT SUCH WARRANTIES EXPRESSLY IDENTIFIED AS WARRANTIES AS ARE SET FORTH IN SELLER'S CURRENT OPERATING MANUAL, CATALOG OR OTHER WRITTEN GUARANTY COVERING THE PRODUCT.
- 11. GENERAL**
 - (a) The sale of goods shall be governed by Uniform Commercial Code and others laws of the State of California and Santa Clara County, California shall be the appropriate venue and jurisdiction for the resolution of disputes hereunder.
 - (b) The Buyer may not assign its rights or obligations under this acknowledgement without the prior written consent of Seller, and any purported assignment without such consent shall have no force or effect.
 - (c) Any waiver by Seller of any default by the Buyer hereunder shall not be deemed to be a continuing waiver of such default or a waiver of any other default or any of the terms and conditions of this acknowledgement.
 - (d) These T & C's may not be superseded, modified, or amended except in writing stating that there is such a modification and signed by an authorized representative of each party hereto, provided, however that Seller may modify the specifications of the goods sold hereunder if such modification does not change the form, fit, or function of such goods.
 - (e) This document constitutes the entire terms and conditions agreement between the Buyer and Seller with regard to the goods or services purchased or provided and expressly supersedes and replaces any prior or contemporaneous agreements, written or oral relating to such goods or services.
 - (f) In no event shall Buyer commence any action under this contract later than one year after the cause of action has accrued.