



# Highlighted LC Solutions Environmental & Consumer Goods

*Europe, Middle East and Africa edition*

## Applications and examples of possible separations for Environmental & Consumer Goods analysis.

(categorized by compound group)

### Acrylamide

- [EVAR3184](#) LC-MS/MS Analysis of **Acrylamide in Drinking Water** Using Large Volume Injection (Allure Acrylamide)  
*No preconcentration needed - 100 µL direct injection - meets sensitivity requirements - avoids matrix interferences*
- [LC\\_EV0566](#) Comparison of **100 ppt Acrylamide in Tap Water to Unfortified Tap Water** on Allure Acrylamide (LC-MS/MS)  
**Improve Acrylamide Analysis** with Allure Acrylamide LC Columns and Certified Reference Materials (LC-MS/MS)  
*- comprehensive overview of acrylamide analysis in food and water with our specific Allure Acrylamide columns: quick, reliable separation of acrylamide from matrix interferences - longer column lifetimes than porous graphitized carbon (PGC) columns*
- [GNSS3127](#) *- food testing: meet EN 16618:2015 and U.S. FDA requirements faster - environmental testing: easily reach ppt-level drinking water limits using large volume injection*

### Aldehydes and Ketones

- [EVSS2393](#) Improve Analysis of **Aldehydes and Ketones in Air Samples** with Faster, More Accurate Methodology (Raptor ARC-18, Raptor C18, LC-UV) - 15 commonly analyzed aldehydes and ketones (DNPH) baseline separated in few minutes - compatible with conventional 400 bar HPLC systems
- [LC\\_AR0508](#) **16-hr Laboratory Air Sample** with radiello 165 (Raptor C18, LC-UV) - C1-C6 aldehydes and ketones (DNPH) analyzed on Raptor C18 with 14 min cycle time - sampling with radiello passive air samplers.

For details about radiello Passive Air Samplers, see document [GNSS2960](#)

### Bisphenols

- [FFSS2935](#) Comprehensive LC-MS/MS Analysis of **15 Bisphenols** in 8 Minutes (Raptor Biphenyl 1.8 µm)  
*- Biphenyl selectivity perfectly suited for this analysis - excellent peak shape and chromatographic separation for Bisphenol A and common analogues*  
*- simple, no additives mobile phases and gradient program - maximum speed with Raptor Biphenyl 1.8µm 50x2.1mm*  
*- Alternative for less back pressure and speed, but the critical pair still fully resolved: Raptor Biphenyl 2.7µm 50x2.1mm*
- [EVSS2395](#) Fast Analysis of **Bisphenol A (BPA)** (Raptor Biphenyl 5 µm, LC-MS/MS) - 4 min cycle time - narrow, symmetrical peak - alternate selectivity to a C18 allows easier identification in difficult matrices - 5µm compatible with both HPLC and UHPLC systems, low pressure, less risk of blockage

### Explosives

- [LC\\_EV0531](#) **Explosives** on Raptor Biphenyl by EPA Method 8330B (LC-UV) - Raptor Biphenyl is the recommended primary column for a two-column analysis, see LC\_EV0530 for the confirmation column - isocratic 10 min run
- [LC\\_EV0530](#) **Explosives** on Raptor ARC-18 by EPA Method 8330B (LC-UV) - Raptor ARC-18 is the recommended confirmation column for a two-column analysis, see LC\_EV0531 for the primary column - isocratic 22 min run

### Disinfectants and Preservatives

- [LC\\_PH0531](#) **Parabens** on Raptor C18 by LC-UV
- [LC\\_FF0623](#) Benzalkonium Chloride (BAC), Didecyltrimethylammonium Chloride (DDAC), Chlorate, Perchlorate on Ultra IBD (LC-MS/MS) - good retention and separation of several **quaternary ammonium compounds (quats)**, chlorate and perchlorate

## Pharmaceuticals

- [LC\\_EV0539](#) **Pharmaceuticals and Personal Care Products (PPCPs)** on Raptor Biphenyl 1.8  $\mu$ m (LC-MS/MS) - *best selectivity on Raptor Biphenyl - UHPLC method suited for water testing*
- [FSSS2276](#) Multiclass **Veterinary Antibiotics** on Raptor C18 by LC-MS/MS - One Analysis, One Column, Less than 9 Minutes for Over 60 Multiclass Antibiotics - *highly efficient peak separation for over 60 antibiotics from different classes on one column in less than 9 minutes - in addition to that individual class panels optimized for quantitation - Macrolide, Lincosamide and Streptogramin - Amphenicol and Tetracycline - Quinolone - Penicillin, Cephalosporin and Tetracycline - Sulfonamide - Ionophore (on Raptor Biphenyl)*
- [BLOG](#) Fast Screening Method for the Determination and Quantification of **Pharmacologically Active Substances** (Raptor ARC-18, LC-MS/MS) - *66 pharmacologically active substances in waste water - robust method with acid-resistant Raptor ARC-18*

## PAH

- [LC\\_EV0537](#) **EPA 8310 PAH** on Pinnacle II PAH (LC-UV) - 4  $\mu$ m column - baseline separation of 18 PAH - 15 min cycle time
- [LC\\_EV0522](#) **EPA 8310 PAH Mix** on Pinnacle II PAH (LC-FLD) - 4  $\mu$ m column - baseline separation of 17 PAH - 15 min cycle time
- [LC\\_EV0521](#) **EPA 8310 PAH Mix** on Pinnacle DB PAH (LC-UV) - 1.9  $\mu$ m column - fast separation of 18 PAH - 5 min cycle time
- [LC\\_EV0469](#) **EPA Method 610 Polycyclic Aromatic Hydrocarbons** on Pinnacle DB PAH (LC-UV) - 1.9  $\mu$ m column - fast separation of 16 PAH - 5 min cycle time

## Pesticides

- [LC\\_EV0596](#) **Pesticides** on Raptor ARC-18 and Raptor **Inert** ARC-18 (LC-MS/MS) - 13 organophosphorous pesticides - *up to 2x increase in sensitivity with inert column hardware - direct comparison and further details on [restek.com/inert](https://restek.com/inert)*
- [LC\\_EV0595](#) **Pesticides** on Raptor ARC-18 and Raptor **Inert** ARC-18 (LC-MS/MS) - 13 organophosphorous pesticides - *up to 2x increase in sensitivity with inert column hardware - direct comparison and further details on [restek.com/inert](https://restek.com/inert)*
- [BLOG](#) **Optimization of a real pesticide method** for routine analysis - faster and more sensitive on HPLC, more robust on UHPLC (Raptor ARC-18, LC-MS/MS) - *The result is a very robust method with long column life time - 130 pesticides in various types of water samples (from drinking water to highly contaminated waste water) - direct injection of 50-100  $\mu$ L - on 400 bar HPLC-MS/MS and on 600 bar UHPLC-MS/MS - application from a customer*
- [LC Multiresidue Pesticide Kit](#)

**204 compounds** of global environmental and food safety concern, formulated and grouped to **ten separate mixes** to ensure **maximum long-term stability and reliability** - downloadable XLS file includes **transition tables** - see below runs for each mix - Raptor ARC-18 is perfect for multi component pesticide screenings with several 100 analytes

- [LC\\_FF0543](#) LC Multi-Residue Pesticide Standard #1 on Raptor ARC-18 by LC-MS/MS: **Organophosphorus** Compounds (13)
- [LC\\_FF0544](#) LC Multi-Residue Pesticide Standard #2 on Raptor ARC-18 by LC-MS/MS: **Carbamate/Uron** Compounds (16)
- [LC\\_FF0545](#) LC Multi-Residue Pesticide Standard #3 on Raptor ARC-18 by LC-MS/MS: **Carbamate/Uron** Compounds (38)
- [LC\\_FF0546](#) LC Multi-Residue Pesticide Standard #4 on Raptor ARC-18 by LC-MS/MS: **Organonitrogen** Compounds (63)
- [LC\\_FF0548](#) LC Multi-Residue Pesticide Standard #5 on Raptor ARC-18 by LC-MS/MS: **Organonitrogen** Compounds (30)
- [LC\\_FF0547](#) LC Multi-Residue Pesticide Standard #6 on Raptor ARC-18 by LC-MS/MS: **Organonitrogen** Compounds (28)
- [LC\\_FF0549](#) LC Multi-Residue Pesticide Standard #7 on Raptor ARC-18 by LC-MS/MS: **Organonitrogen** Compounds (7)
- [LC\\_FF0550](#) LC Multi-Residue Pesticide Standard #8 on Raptor ARC-18 by LC-MS/MS: **Organonitrogen** Compounds (1)
- [LC\\_FF0551](#) LC Multi-Residue Pesticide Standard #9 on Raptor ARC-18 by LC-MS/MS: **Carbamate/Uron** Compounds (7)
- [LC\\_FF0552](#) LC Multi-Residue Pesticide Standard #10 on Raptor ARC-18 by LC-MS/MS: **Carbamate/Uron** Compounds (1)
- [LC\\_FS0521](#) **LC Multiresidue Pesticide Mix** Extracted from Brown Rice Flour with QuEChERS Slim Pouch on Raptor ARC-18 by LC-MS/MS - *example in food matrix - all 10 mixes in the same run - please consider the notes regarding reference standard stability*
- [EVSS2394](#) Analyze **Carbamate Pesticides** in a Fraction of the Time and Boost Productivity (Ultra Carbamate, LC-MS/MS) - *10 carbamates separated in 5 min - total cycle time of 8 min - separation also suited for UV-detection*
- [LC\\_0308](#) Pesticides (**Carbamates**) on Ultra Carbamate (LC-UV-MS) - *10 carbamates baseline separated - detected by UV and MSD*
- [EVSS2791](#) LC-MS/MS Analysis of **Paraquat and Diquat** without Ion-Pairing Reagents (Raptor HILIC-Si) - *robust HILIC application - no ion pairing needed - 7 min cycle time - MS-friendly mobile phases*
- [LC\\_GN0696](#) **Chlormequat, Mepiquat, Paraquat, and Diquat** on Raptor HILIC-Si by LC-MS/MS - *robust HILIC application - no ion pairing needed - 10 min cycle time - MS-friendly mobile phases*
- [LC\\_EV0355](#) **Phenoxyacid Herbicides** on Ultra Aqueous C18 (LC-UV)
- [LC\\_EV0533](#) **Phenylurea Herbicides** on Raptor C18 (LC-UV)

Problems with the early eluting pesticides in your mixture? Try our polar modified [Ultra Aqueous C18!](#)

## Per- and Polyfluoroalkyl Substances (PFAS)

### Overviews

- [EVAR3069](#) **PFAS LC Column Anatomy: Which Phase, Dimensions, and Particle Type Are Best?** - examination of the properties that are important to consider when choosing an LC column for PFAS analysis - overview of different applications for environmental analysis on Raptor and Force C18 as well as Raptor Polar X - C3 to C14 (short chain: C4-C6, ultra-short chain: C3, long-chain: from C8)
- [EVAR3552](#) **Method Guide for PFAS Analysis** - A Survey of Existing PFAS Testing Methods and Guidelines from Around the World - summary of legislation for PFAS work and expectations around these - scope is listed for different EPA, ISO and ASTM Methods
- [EVAR3498](#) **Product Guide for PFAS Analysis** - A Methods-Based Reference to Lab Supplies for PFAS Testing - summary of columns, sample prep materials, reference standards and lab supplies recommended for a variety of EPA, ISO and ASTM methods in water

### Tips & Tricks for PFAS Analysis — General

- [BLOG](#) What are **GenX** and **PFBS**? Why are they important in PFAS analysis? - an explanation of how HFPO DA (aka GenX) is formed from PFOS, PFOA and PFBA via hydrolysis and how it can best be quantified
- [EVAV3956](#) Learn How to Analyze Extended List of PFAS Including **Ultrashort Chain (C2 C3) PFAS** (Video 55 min, recorded webinar) - discussing LC-MS/MS method development for C2 and C3 PFAS analysis and analytical methodologies for simultaneous chromatographic determination of alternative and legacy PFAS

### Tips & Tricks for PFAS Analysis — Reducing contamination to avoid mistakes in quantification

#### Reducing PFAS Background by taking care of the used materials

- [BLOG](#) Are **PFAS sticking in your system?** - Blog that describes the possible sources for PFAS contamination on the way from sampling to the chromatogram, and how to reduce it.
- [EVAN3497](#) Meet Requirements of **EPA Method 537.1 PFAS Analysis** with Contaminant-Free Workflow - demonstrates on the practical example of EPA 537.1 method how to perform a contaminant-free workflow - SPE sample prep - LC-MS/MS analysis
- [BLOG](#) **PFAS Interference or Contamination?** - Blog about what customers are seeing when they report a contamination of 6:2 fluorotelomer sulfonic acid (6:2 FTS) and its surrogate sodium 1H,1H,2H,2H perfluoro 1 --(1,2 13C2) octane sulfonate (M2 6:2 FTS) in a variety of products vials, SPE cartridges, and syringe filters
- [BLOG](#) **PFAS Contamination** - The NeverEnding Story - contamination and background of PFBA and where it may come from

#### Reducing PFAS Background by including a PFAS delay column in the instrument-setup

- [BLOG](#) Sorry for the delay. Here is your chromatogram **with and without the PFAS Delay Column.** - Blog that explains why it is useful to have the delay column installed before your injector
- [EVAR3001](#) Eliminate the Impact of **Instrument-Related PFAS Interferences** by Using a Delay Column - detailed background information of how the delay column works and why it is effective - it traps and "delays" system-related PFAS to prevent interference - allows accurate identification and quantitation of trace-level PFAS in samples - pressure stable up to 1000 bar - additional back pressure almost neglectable
- [EVAV3628](#) PFAS Analysis: Why a **Delay Column** is Important (Video 3.5 min, transcript available) - short video of what is a delay column, why is it important? where is it installed?

## Questions?

Interested in evaluating a column for your method? We are here to help at [LC-EMEA@restek.com](mailto:LC-EMEA@restek.com)

## Individual methods

### For PFAS > C3: Best on C18 columns - ideally in combination with a PFAS delay column

Methods on Raptor C18 (Core-Shell columns) - best for direct injection of drinking water and for extracts after SPE sample clean up - best separation and sharpest peaks

- [EVAN3073](#) Integrating the Analysis of **Ultrashort Chain PFAS** (Raptor C18 2.7 µm, PFAS Delay Column, LC-MS/MS) - *method development for a simultaneous analysis of 13 PFAS (C3-C8), including ultrashort chain, alternative, and legacy PFAS*
- [LC\\_EV0540](#) **Perfluorinated Compounds** on Raptor C18 **1.8 µm** (LC-MS/MS) - 34 PFAS (C4 - C18) - 8 min cycle time  
*note: no delay column was used in this example, but it is always recommended for quantitative analysis*
- [LC\\_EV0551](#) **Perfluorinated Compounds** on Raptor C18 **2.7 µm** (LC-MS/MS) - 34 PFAS (C4 - C18) - 8 min cycle time  
*note: no delay column was used in this example, but it is always recommended for quantitative analysis*
- [LC\\_EV0541](#) **Perfluorinated Compounds** on Raptor C18 **5 µm** (LC-MS/MS) - 34 PFAS (C4 - C18) - 8 min cycle time  
*note: no delay column was used in this example, but it is always recommended for quantitative analysis*

Methods on Force C18 (classical fully-porous columns) - best capacity for samples with high matrix load - suited for all environmental matrices - more retention for early eluters

- [EVFA3693](#) Fast, 8 Minute Method for Direct Injection of PFAS in **Non Potable Water** (Force C18 3µm, PFAS Delay Column, LC-MS/MS)  
*- direct injection of 34 PFAS (C4 - C14) and their internal standards in non potable water - extra retention and improved peak shape for PFBA*
- [LC\\_EV0552](#) **Perfluorinated Compounds (PFCs)** on Force C18 (**1.8 µm**) - 34 PFAS (C4 - C18) - 8 min cycle time  
*note: no delay column was used in this example, but it is always recommended for quantitative analysis*

### For PFAS including ultrashort chain (< C3): Raptor Polar X (Core-Shell columns) - PFAS delay column not needed

- [EVAN3220](#) A Novel Approach for **Ultrashort Chain PFAS Analysis in Water Samples** (Raptor Polar X, LC-MS/MS) - *direct, simultaneous determination of 14 PFAS (C2-C10), including ultrashort chain, alternative and legacy PFAS*
- [EVFA3197](#) Novel Stationary Phase for Comprehensive PFAS Analysis: **Ultrashort-Chain (C2, C3), Alternative, and Legacy Compounds** (Raptor Polar X, LC-MS/MS) - 14 PFAS (C2 - C9) *including ultrashort chain, alternative and legacy PFAS in water*
- [EVAN4055](#) Analysis of **Ultrashort-Chain and Short-Chain (C1 to C4) PFAS in Water Samples** (Raptor Polar X, LC-MS/MS)  
*- 7 (ultra-)short chain PFAS (C1 - C4) in water*

Visit [www.restek.com/pfas](http://www.restek.com/pfas) to learn more about our PFAS solutions  
and how we could help your analysis.

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