



Highlighted LC Solutions Biphenyl

Europe, Middle East and Africa edition

Applications and examples of possible separations using Restek Biphenyl LC Columns

(categorized by market and compound group)

Cannabis, Hemp and Hallucinogens

- [FFSS2946](#) High-Throughput Analysis of **Mycotoxins in Cannabis CBD Oil** Pairs Simplified Cleanup with LC-MS/MS Sensitivity - *fast, 3-min total cycle time - with excellent compound resolution provided by the Raptor Biphenyl column - matrix interferences removed in one simple step by Resprep SPE - excellent sensitivity down to 2 ng/g in matrix on legacy instrumentation*
- [LC_FF0587](#) **Flavonoids in CBG Hemp Flower** on Raptor Biphenyl by LC-MS/MS
- [LC_FF0586](#) **Flavonoids** on Raptor Biphenyl by LC-MS/MS
- [LC_GN0689](#) Analysis of 13 **Alkaloids** Found in **Psychedelic Mushrooms** Using Force Biphenyl by HPLC-UV
- [LC_GN0690](#) Analysis of 6 **Alkaloids** Common to **Psychedelic Mushrooms** Using Force Biphenyl by HPLC-UV

Clinical/Toxicology/Forensics/Pharma

Cannabinoids & Synthetic Cannabinoids

- [FFAN2614](#) Analysis of **Synthetic Cannabinoids and Metabolites**: Adding New Compounds to an Existing LC-MS/MS Method (Raptor Biphenyl)
- [LC_CF0612](#) **Synthetic Cannabinoids in Urine** on Raptor Biphenyl by LC-MS/MS
- [LC_CF0585](#) **Synthetic Cannabinoid Metabolites in Urine** on Raptor Biphenyl by LC-MS/MS
- [LC_CF0584](#) **Synthetic Cannabinoids in Urine** on Raptor Biphenyl by LC-MS/MS
- [PHFA4018](#) **Isomer separation of Synthetic Cathinones in Serum** on Raptor Biphenyl by LC-MS/MS - *application from a customer*
- [BLOG](#) Are you struggling to separate **synthetic cathinone isomers**? Click here! - *fast separation of α -PHP and α -PiHP isomers using Raptor Biphenyl*
- [LC_CF0583](#) **THC + Metabolites in Urine** on Raptor Biphenyl by LC-MS/MS

To learn more about these solutions, simply click the linked reference number above.

If you have the printed version and wish to receive the digital copy with links, or are interested in discussing any of the applications mentioned, please contact us at LC-EMEA@restek.com. We are always here to help with all other enquiries, assistance, or to discuss our try-before-you-buy evaluation column policy.

Drugs & Pharmaceuticals — Therapeutic & Drug Monitoring Assays

- [CFAN2666](#) High-Throughput Analysis of **Immunosuppressive Drugs from Whole Blood** by LC-MS/MS (Raptor Biphenyl) - *robust method with only simple protein precipitation sample preparation, no matrix interferences, 3 minutes cycle time*
- [CFSS3051](#) LC-MS/MS Analysis of **58 Antipsychotics and Antidepressants in Human Urine** (Raptor Biphenyl) - *simple sample preparation, fast 5.5 minutes cycle time, separation of isobars*
- [LC_CF0579](#) **Therapeutic Drugs in Urine** on Raptor Biphenyl by LC-MS/MS -29 compounds in 5 minutes
- [LC_CF0581](#) **Benzodiazepines in Urine** on Raptor Biphenyl by LC-MS/MS
- [LC_GN0550](#) **Beta Blockers** on Raptor Biphenyl (LC-MS/MS)
- [LC_CF0675](#) **Cardiac Drugs** on Force Biphenyl by LC-MS/MS
- [LC_PH0533](#) **Weight Loss Drugs** on Force Biphenyl (LC-MS/MS)
- [LC_CF0587](#) **Drugs of Abuse** on Raptor Biphenyl by LC-MS/MS - *10 commonly abused substances in positive ion mode - 3.5-minute method*
- [CFAN2216](#) Rapid and Accurate LC-MS/MS Analysis of **Nicotine and Related Compounds in Urine** Using Raptor Biphenyl LC Columns and MS-Friendly Mobile Phases
- [CFAN2820](#) Analysis of **Fentanyl and Its Analogues in Human Urine** by LC-MS/MS (Raptor Biphenyl)
- [CFAN2665](#) Direct Analysis of **Morphine, M3G and M6G Metabolites, and Related Compounds in Urine** by LC-MS/MS (Force Biphenyl)
- [LC_CF0588](#) **Naltrexone and 6-β-Naltrexol in Urine** on Raptor Biphenyl by LC-MS/MS
- [LC_CF0580](#) **Norbuprenorphine & Buprenorphine in Urine** on Raptor Biphenyl by LC-MS/MS
- [LC_CF0568](#) **Pain Panel in Urine** on Raptor Biphenyl by LC-MS/MS - *Fast and small panel of commonly prescribed pain medications in positive ion mode - 18 total compounds*
- [LC_CF0561](#) **Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)** on Raptor Biphenyl (LC-UV)

Drugs & Pharmaceuticals — Therapeutic & Drug Monitoring Assays : “Big Pain” Panel and Sub-Panels

- [CFAR2309](#) “The **Big Pain**”: Development of Pain-Free Methods for Analyzing **231 Multiclass Drugs and Metabolites** by LC-MS/MS (Raptor Biphenyl) - *10 minutes screening analysis of 231 compounds (40+ isobars, 10 drug classes, 22 ESI- compounds) - confirmation methods for the 10 drug classes*
- [LC_CF0607](#) **Hallucinogen Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0608](#) **Anti-Psychotic Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0609](#) **Anti-Depressant Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0610](#) **Opioid Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0615](#) **Anti-Anxiety Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0616](#) **Anti-Epileptic Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0617](#) **Stimulant Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0618](#) **Barbiturate Drug Panel** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain*
- [LC_CF0620](#) **Analgesics and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)** on Raptor Biphenyl by LC-MS/MS - *Sub-panel from Big Pain - both positive and negative ions in one simultaneous run - fast analysis time amenable to high throughput analysis*

Drugs & Pharmaceuticals — Optimization

- [GNSS3457](#) **Restek Biphenyl: Better Selectivity than a C18**—Separate a Wider Range of Analytes in Highly Complex Samples - *Biphenyl Landing page on restek.com - background information on Biphenyl phases invented by Restek in 2005*
- [CFAR4190](#) **The Advantage of 2.1 mm ID Columns** for LC-MS/MS Analysis of Drugs of Abuse - *Choosing the right column dimension is key for obtaining robust and accurate data. Each column dimension can be advantageous in different scenarios, but generally clinical labs are all working towards the same goals: high throughput, low sample volume, good sensitivity, and low cost. In this article, the advantages of narrow-bore columns will be discussed and demonstrated for drugs of abuse.*

Drugs & Pharmaceuticals — Various

- [LC_CF0679](#) **Analysis of Antiretroviral Drugs** on Raptor Biphenyl by LC-MS/MS
- [BLOG](#) **Antiviral Analysis: Remdesivir and its Metabolites** on Raptor Biphenyl by LC-MS/MS

Drugs & Pharmaceuticals — Nitrosamine-Impurities

- [PHAR3806](#) Chromatographic Methods for Comprehensive **Nitrosamine Impurity Analysis** by LC-MS/MS
- [BLOG](#) **A Nitrosamines CRM and Method Development** Utilizing Restek Pro EZLC

Drugs & Pharmaceuticals — Emerging Compounds and Novel Psychoactive Substances

- [BLOG](#) Everything You Ever Wanted to Know About **Kratom** - *analysis of mitragynine and metabolite by LC-UV and LC-MS/MS using Raptor Biphenyl*
- [BLOG](#) Why is Everyone Talking About **Xylazine**? - *adding xylazine to an existing multi-drug class LC-MS/MS method*
- [BLOG](#) Is **Xylazine** Just the Beginning? —Two More Veterinary Drugs Found in Illicit Drug Supply -*using Pro EZLC Chromatogram Modeler to develop LC-MS/MS methods for NPS compounds*
- [CFAR4168](#) Method Development Guide for **Novel Psychoactive Substances** - *In this article, considerations will be outlined, both practical and analytical, when working with NPS. The method development for a subclass of NPS opioids will also be discussed.*
- [CFAN3694](#) Fast, 3.5 Minute Analysis of **Psilocin and Psilocybin** in Urine by LC-MS/MS (Raptor Biphenyl)

Hormones

- [CFSS2824](#) LC-MS/MS Analysis of **Urinary Free Cortisol and Cortisone** without Matrix Interferences (Raptor Biphenyl)
- [LC_CF0658](#) Synthetic and **Naturally Occurring Glucocorticoids** on Raptor Biphenyl by LC-MS/MS - *improved separation power of the Biphenyl phase under MeOH conditions: 13 glucocorticoids eluting in less than 4 minutes*
- [LC_CF0659](#) **Glucocorticoid Isomers** on Raptor Biphenyl by LC-MS/MS
- [BAAN2112](#) A Rapid and Sensitive LC-MS/MS Method for the Analysis of Three Forms of **Thyroid Hormones** (Raptor Biphenyl)

Neurotransmitters

- [CFAN2465](#) A Fast Dilute-And-Shoot Method for Simultaneous **5-Hydroxyindoleacetic Acid (5-HIAA), Vanillylmandelic Acid (VMA), and Homovanillic Acid (HVA)** LC-MS/MS Analysis in Human Urine (Raptor Biphenyl) - *baseline resolution in less than 2.5 minutes*
- [CFAN2800](#) Simultaneous Analysis of **Catecholamines and Metanephrines in Urine** by LC-MS/MS (Raptor Biphenyl)
- [LC_CF0560](#) **Catecholamines, Serotonin, and Related Compounds** on Raptor Biphenyl (LC-UV)

Vitamins

- [CFAN2934](#) A Novel Solution for **Vitamin K₁ and K₂ Analysis in Human Plasma** by LC-MS/MS (Raptor Biphenyl) - *trace level analysis of K₁, K₂ MK4 and K₂ MK7 in less than 3.5 minutes*
- [LC_CF0611](#) **Coenzyme Q10 in Serum** on Raptor Biphenyl by LC-MS/MS

Environmental & Consumer Goods

Bisphenols

- [FFSS2935](#) Comprehensive LC-MS/MS Analysis of **15 Bisphenols** in 8 Minutes (Raptor Biphenyl) - Biphenyl selectivity perfectly suited for this analysis - excellent peak shape and separation - simple mobile phases - 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** on a Raptor Biphenyl LC Column (LC-MS/MS) - 4 min cycle time - narrow, symmetrical peak - alternate selectivity to a C18 allows easier identification in difficult matrices - compatible with both HPLC and UHPLC systems

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

Pharmaceuticals

- [LC_EV0539](#) **Pharmaceuticals and Personal Care Products (PPCPs)** on Raptor Biphenyl 1.8 µm (LC-MS/MS) - best selectivity on Raptor Biphenyl - UHPLC method suited for water testing

Food & Agriculture

Antibiotics

- [LC_FF0530](#) **Sulfur Antibiotics** on Raptor Biphenyl (LC-UV)
- [LC_FS0503](#) **Ionophore Antibiotics** on Raptor Biphenyl by LC-MS/MS

Mycotoxins

- [FSAN3903](#) **Comprehensive Mycotoxin Analysis: Simultaneous Determination of *Alternaria* Toxins, Ergot Alkaloid Epimers, and Other Major Mycotoxins in Various Food Matrices** by LC-MS/MS (Raptor Biphenyl) - *simultaneous determination of *Alternaria* toxins and ergot alkaloids (complete separation of all six ergot alkaloids and their epimers!) along with other major mycotoxins produced by *Aspergillus*, *Fusarium*, and *Penicillium* fungi - simple sample preparation - fast, 11-minute analysis under low pH condition - rugged method - extended column life time*
- [LC_FS0552](#) **Multi-Mycotoxin Analysis on Inert Raptor Biphenyl** - *same analysis as FSAN3903, but better peakshape and up to 2x higher sensitivity by using Raptor Biphenyl in inert hardware - more details about Restek's Inert Columns on restek.com/inert*
- [FSFA3905](#) **Analysis of Ergot Alkaloid Mycotoxins in Blended Flour** by LC-MS/MS Under Acidic Conditions (Raptor Biphenyl) - *baseline separation of six critical ergot alkaloids and their epimers - fast, 11-min total cycle time - acidic conditions, also suitable for the simultaneous analysis of ergot alkaloids, *Alternaria* toxins, and major regulated mycotoxins (see article FSAN3903)*
- [FFSS2971](#) **5.5 Minute LC-MS/MS Analysis of Mycotoxins in Peanut Powder** (Raptor Biphenyl) - *separation of 12 FDA-regulated mycotoxins in peanut powder - quick and easy sample preparation*
- [LC_FS0527](#) **Mycotoxins in Brown Rice Flour** on Raptor Biphenyl by LC-MS/MS - *separation of 12 FDA-regulated mycotoxins in brown rice flour - quick and easy sample preparation*
- [LC_FS0525](#) **Mycotoxins in Yellow Corn Meal** on Raptor Biphenyl by LC-MS/MS - *separation of 12 FDA-regulated mycotoxins in yellow corn meal - quick and easy sample preparation*
- [LC_FS0524](#) **Mycotoxins in Unbleached Wheat Flour** on Raptor Biphenyl by LC-MS/MS - *separation of 12 FDA-regulated mycotoxins in unbleached wheat flour - quick and easy sample preparation*

Pesticides

- [GNOT3944](#) Expanding Capabilities in **Multi-Residue Pesticide Analysis** Using the LCMS-8060 (Raptor Biphenyl) - *Third Party publication from Shimadzu and Phytocontrol (France) - they developed a single multi-residue LC-MS/MS method for 646 pesticides*

Various

- [LC_FF0572](#) Artificial **Sweeteners** on Raptor Biphenyl by LC-MS/MS - *good retention and chromatographic separation due to the special Biphenyl selectivity*
- [FFSS2935](#) Comprehensive LC-MS/MS Analysis of **15 Bisphenols** in 8 Minutes (Raptor Biphenyl) - *Biphenyl selectivity perfectly suited for this analysis - excellent peak shape and separation - simple mobile phases*
- *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** on a Raptor Biphenyl LC Column (LC-MS/MS) - *4 min cycle time - narrow, symmetrical peak - alternate selectivity to a C18 allows easier identification in difficult matrices - compatible with both HPLC and UHPLC systems*

Questions?

Interested in evaluating a column for your method? We are here to help at LC-EMEA@restek.com



Restek Biphennyl LC Columns

Better Selectivity than a C18: Separate a Wider Range of Analytes in Highly Complex Samples

Whether you are analyzing foods, drug testing samples, or other complex matrices, Restek Biphennyl columns retain and separate a broader range of compound chemistries than is possible on popular C18 phases. Heightened selectivity separates difficult analytes—even isobars—and stronger retention protects early eluting compounds from matrix-related ionization suppression.

- Ideal for food, urine, blood, oral fluid, and other difficult matrices.
- Superior selectivity separates a broader range of analytes than a C18 column.
- Increased retention of early eluting compounds minimizes matrix effects.
- Improved sensitivity with simple, MS-friendly mobile phases.

The Right LC Phase in Any Format.

- **Raptor SPP columns**

Superficially porous particle columns that deliver UHPLC speed for high-throughput LC-MS/MS.

- **Force FPP columns**

Fully porous particle columns that scale easily and completely between HPLC and UHPLC.

Learn How to Achieve Better Separations with Restek Biphennyl LC Columns

www.restek.com/biphennyl