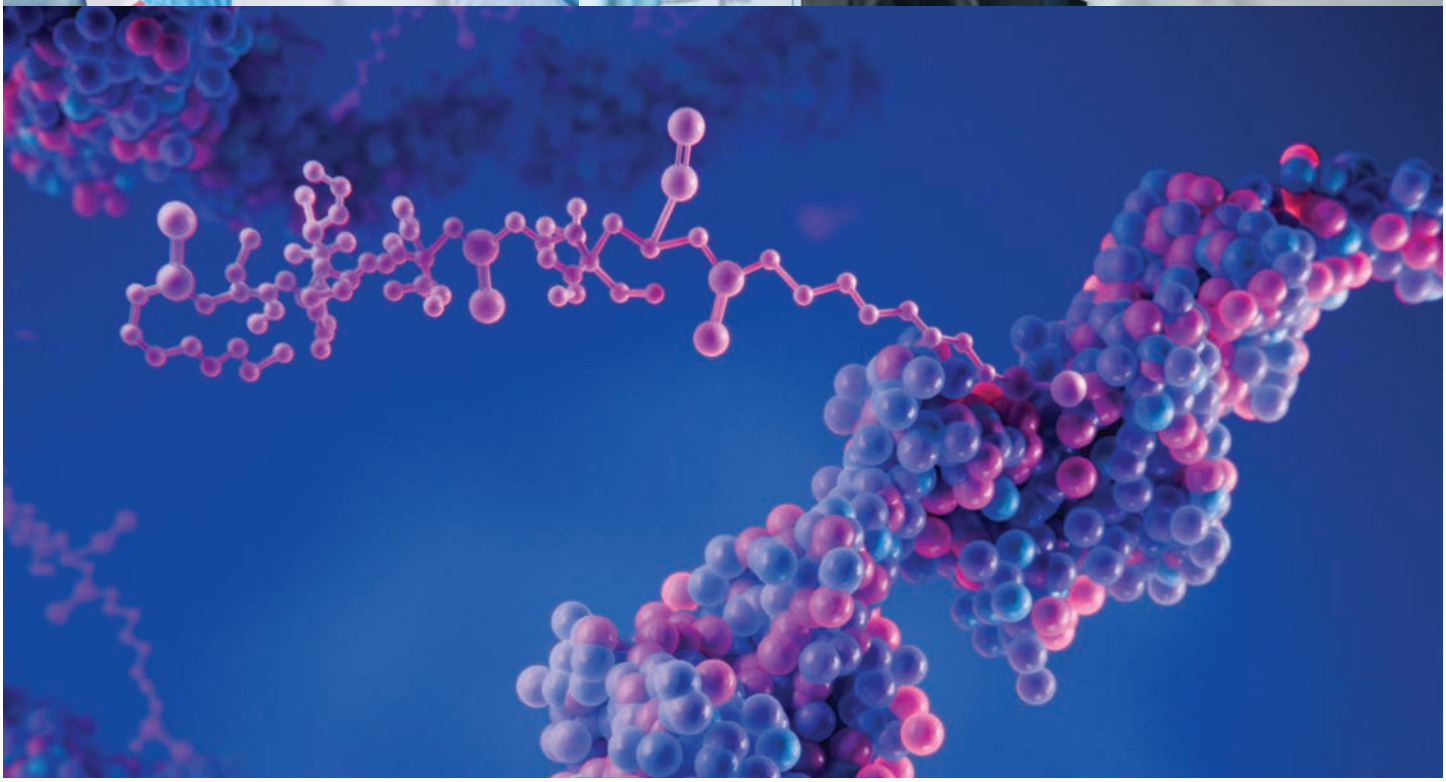
Agilent

Trusted Answers

Powering Success from Discovery to Market

Your end-to-end solutions partner for therapeutic peptide development



Solutions for routine analysis to complex scientific research

Complete workflows for therapeutic peptides

Therapeutic peptide development depends on precision, efficiency, and uncompromising quality. Agilent offers comprehensive end-to-end characterization workflows, advanced tools, global support, enterprise services, and flexible financing to simplify and accelerate your path to therapeutic success. With Agilent as your partner, the quality of your peptide will never be in question.

Solutions for routine analysis to complex scientific research

Explore how Agilent can help bridge every gap in your therapeutic peptide development

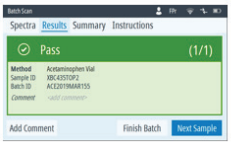
- Raw material identification
- Peptide purity analysis
- Peptide impurity profile analysis
- Amino acid composition analysis
- Sequence confirmation and isomer characterization
- Quantitative analysis
- Stability and degradation analysis
- Host cell protein analysis
- Residual solvent analysis
- Elemental impurity analysis
- Preparative-scale purification solutions
- Integrated solutions for ease of adoption, support, and maintenance

Raw Material Identification

Verifying your raw or starting materials is critical for quality and compliance in drug development. Agilent provides flexible solutions for both lab and warehouse environments:

- Lab-based applications: Fourier transform infrared (FTIR) spectroscopy or high-performance liquid chromatography (HPLC)
- Warehouse-based applications: Handheld Raman spectroscopy

Warehouse-based workflow

Sample	Detection	Analysis
		
Raw material container	Vaya handheld Raman spectrometer	Results

Benefits of handheld Raman spectrometers

- Handheld devices enable in situ testing, reducing the delay in sending samples to a central lab.
- Highly specific Raman spectra allow you to differentiate between amino acids, their protected versus unprotected forms, as well as solvents, reagents, and excipients.
- Cross contamination is minimal, helping you avoid potential errors down the line that can affect time to market.

Vaya Raman raw material identity verification system

Uniquely able to analyze raw materials through sealed, opaque containers, the Agilent Vaya handheld Raman spectrometer enables efficient warehouse-based identification or differentiation of biopharmaceutical materials such as fluorenylmethoxycarbonyl (Fmoc)-protected amino acids used in peptide synthesis.

- **Minimal cross contamination:** Real-time, point-and-shoot technology enables you to perform nondestructive analysis through sealed containers without opening packaging.
- **Time savings:** Rapid analysis through opaque containers eliminates the need for sample preparation and reduces your testing time.
- **Full compliance:** Batch identification and method development with audit trail, method validation, and system checks keep you compliant with cGMP requirements.
- **Ease of use:** Automatic calibration, intuitive controls, and clear pass/fail analysis make the system accessible for users of any skill level with minimal training.
- **Simple workflow:** Dedicated raw material ID workflow gives you clear instructions and advice on method specificity and model robustness.

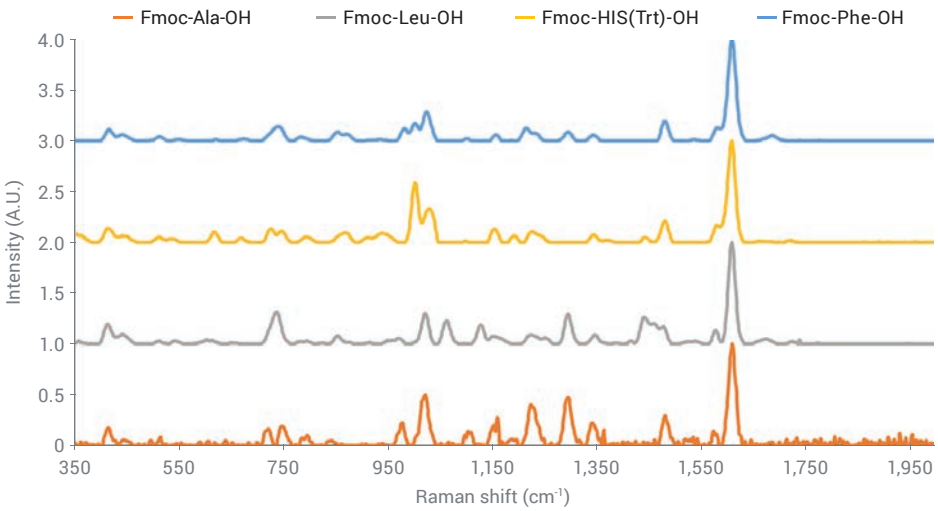
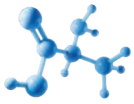


Figure 1. Raman spectra of Fmoc-protected amino acids collected through white plastic and glass containers.

Learn more in our application note: Verification of Raw Materials for Synthetic Peptide Production.

Peptide Purity Analysis

Analyzing the purity profile of your synthetic peptides is critical to confirm that your peptide meets specifications for identity and concentration. Agilent offers reversed-phase liquid chromatography with UV detection (LC/UV) and mass spectrometry (LC/MS) workflows to support your analysis.

Sample	Separation		Detection	Analysis
				
Peptide	Altura Peptide Plus column	UHPLC: 1290 Infinity III bio LC	MS: InfinityLab Pro iQ Plus	OpenLab CDS software

Benefits of reversed-phase LC/UV

- Quantitative analysis confirms the purity of your increasingly complex peptide therapeutics.
- Most peptides contain chromophores that absorb UV light, allowing for sensitive detection even at low concentrations.
- LC separation power enables resolution of closely related impurities, ensuring greater accuracy of purity results.

InfinityLab Pro iQ Plus

The Agilent InfinityLab Pro iQ Plus is a high-sensitivity single quadrupole mass spectrometer ideally suited for routine QA/QC purity analysis during the development of GLP-1 drugs such as tirzepatide.

- **High efficiency:** Streamlined workflow enables comprehensive orthogonal detection with UV and MS, and monitoring of low-level peptide impurities to enhance product characterization.
- **Flexibility to ionize diverse samples:** Extensive upgradeable ion source options let you choose the ideal match for your specific application.
- **Enhanced identification:** High sensitivity and a wide mass range enable you to detect low-abundance impurities, ensuring peace-of-mind product quality.
- **Accessible for all skill levels:** User-friendly instrument intelligence means high-quality data is accessible for any operator, without extensive training.

OpenLab CDS software

Agilent OpenLab CDS with MS Spectral Deconvolution add-on offers a fully automated workflow for peptide analysis, generating reports without manual intervention.

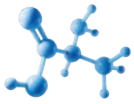
- **Maintain data integrity:** Seamless integration with OpenLab CDS means you don't need third-party applications to preserve data integrity.
- **Flexible workflows:** Supports control and data analysis for Agilent LC, GC, GC/MS, and LC/MS systems as well as non-Agilent LCs and GCs.
- **Enhance security and efficiency:** Work securely from anywhere with client/server architecture and remote access capabilities that enable centralized operations.
- **Ease of use:** Minimize training needs and potential errors with an intuitive user interface that's simple to navigate for both beginners and experts.
- **Save time:** Faster data processing helps you quickly confirm molecular weight from a dataset, speeding time to result.

Figure 2. Data review for tirzepatide after seven days of storage at 5 °C and pH 7. The total ion chromatogram shows peaks corresponding to tirzepatide and its related impurity products. The mass spectrum at 7.89 minutes confirms the elution of tirzepatide, with the presence of +3, +4, and +5 charge states.

Learn more in our application note: Impurity Profiling of Tirzepatide Under Stress Conditions.

Peptide Impurity Profile Analysis

Impurity profiles detail the nature, identity, and quantity of all nontarget components in your sample to assess the safety, stability, and consistency of your peptide drugs. Agilent offers peptide impurity profiling analysis using LC/MS and 2D-LC/MS workflows.

Sample	Separation		Detection	Analysis
				
Peptide	Altura Peptide Plus column	UHPLC: 1290 Infinity III bio LC or 2D-LC: 1290 Infinity III bio 2D-LC	MS: 6230B LC/TOF or InfinityLab Pro iQ	MassHunter or OpenLab CDS software

Benefits of 2D-LC/MS

- Compared to 1D methods, 2D-LC/MS offers enhanced separation, sensitivity, and structural insight, and enables you to detect trace-level impurities.
- Combined with high-resolution columns, 2D-LC/MS provides rapid impurity analysis with enhanced chromatographic resolution.

Altura Peptide Plus column

Our superficially porous, reversed-phase Agilent Altura Peptide Plus columns are designed to help you achieve high-resolution separations for accurate peptide impurity profiling. Key advantages include:

- **Greater confidence in results:** Ultra Inert technology ensures that Altura columns produce symmetrical peak shape and high sample recovery for metal-sensitive analytes.
- **Lower equipment cost:** Get UHPLC performance on any 400 bar HPLC instrument with 4.6 and 2.1 mm id columns.
- **Resolve degradation impurities:** With its charged-surface C18 chemistry, the Altura Peptide Plus stationary phase offers unique selectivity and excellent resolution of common deamidation impurities.
- **Enhanced detection:** Increase MS sensitivity using formic acid mobile phases.

1290 Infinity III bio 2D-LC

Developed with biocompatible materials, the Agilent 1290 Infinity III bio 2D-LC is highly suitable for biomolecule analysis.

- **Advanced separations:** Comprehensive and multiple heart cutting 2D-LC are ideal for challenging separations and analyzing complex, multicompound samples.
- **Application versatility:** High-resolution sampling with MS compatibility offers powerful analysis for biopharma, pharma, and chemical industry applications.
- **Seamless transition to 2D-LC:** Easy start service and user-friendly software streamline method setup, data analysis, and onboarding to simplify transition to 2D-LC workflows.

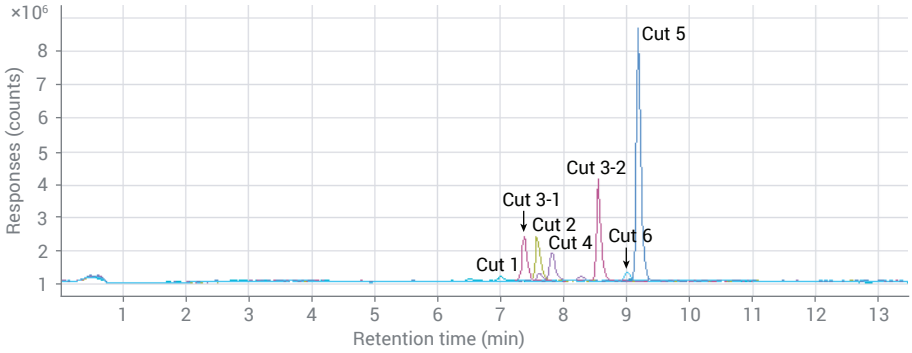


Figure 3. Total ion chromatogram showing analysis of semaglutide impurities caused by thermal degradation.

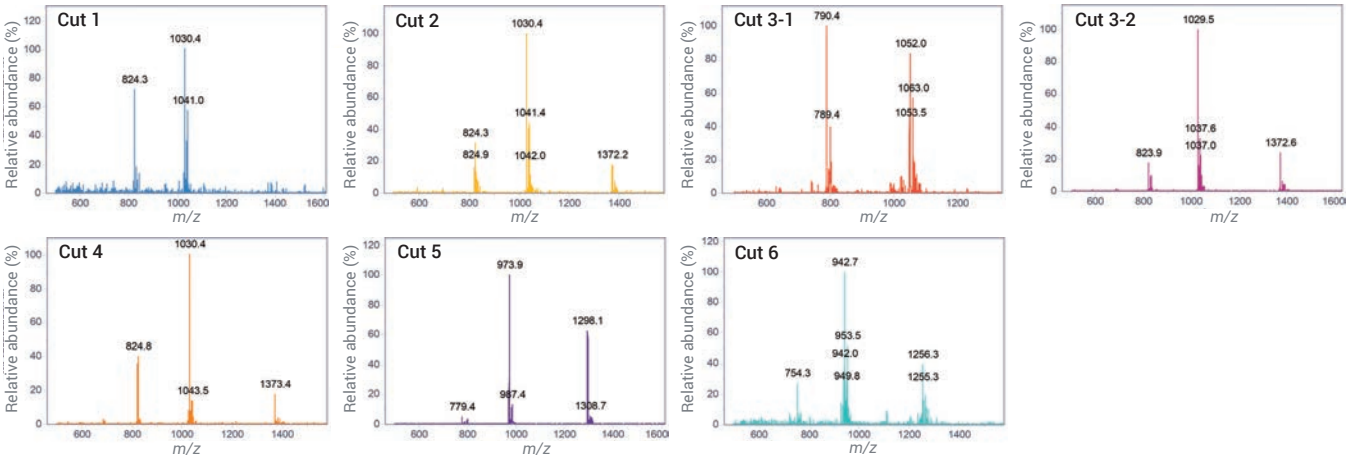


Figure 4. Mass spectra of semaglutide thermal degradation impurities.

Learn more in our application note: Confirmation of Peptide-Related Impurity Intact Mass.

Amino Acid Composition Analysis

In synthetic peptide production, it's common to have impurities like unintended insertions, deletions, or substitutions of amino acids in the final product. Your ability to confirm the peptide sequence or its amino acid composition is crucial, and our LC-based workflows and superficially porous particle (SPP) columns for amino acid analysis can help.

Sample preparation	Separation and detection		Analysis
			
Derivatization reagents	AdvanceBio Amino Acid Analysis column	UHPLC: 1290 Infinity III bio LC or 2D-LC	OpenLab CDS software

Benefits of SPP columns

- A solid core and porous outer shell reduce band broadening while improving mass transfer—giving you sharper peaks and better resolution of closely eluting amino acids.
- High efficiency and operation at higher flow rates without sacrificing resolution shortens run times for high-throughput workflows like peptide synthesis and QC.
- Minimal backpressure lets you use SPP columns on lower-cost, standard HPLC systems.

AdvanceBio Amino Acid Analysis

Agilent AdvanceBio Amino Acid Analysis SPP columns and Infinity bio LC systems enable rapid, high-resolution chromatographic separation, and quantification of amino acid composition in peptides like GLP-1 analogs.

- **Reliable results:** High-resolution separations with Poroshell particle morphology provide accurate impurity profiling to support regulatory compliance.
- **Reduce costs:** Robust, high-pH resistant, durable column chemistry lengthens column lifetimes for increased uptime and cost savings.
- **Flexible use:** With 2.7 µm diameter particles, the SPP column is compatible with HPLC and UHPLC systems.
- **Peace-of-mind quality:** Batch testing SPP columns with amino acid standards ensures quality for consistent results.
- **Eliminate sample degradation:** Automate sample derivatization with the autosampler in the Agilent LC stack to avoid manual errors and delays between sample preparation and analysis where degradation often occurs.

Composition test of semaglutide and liraglutide

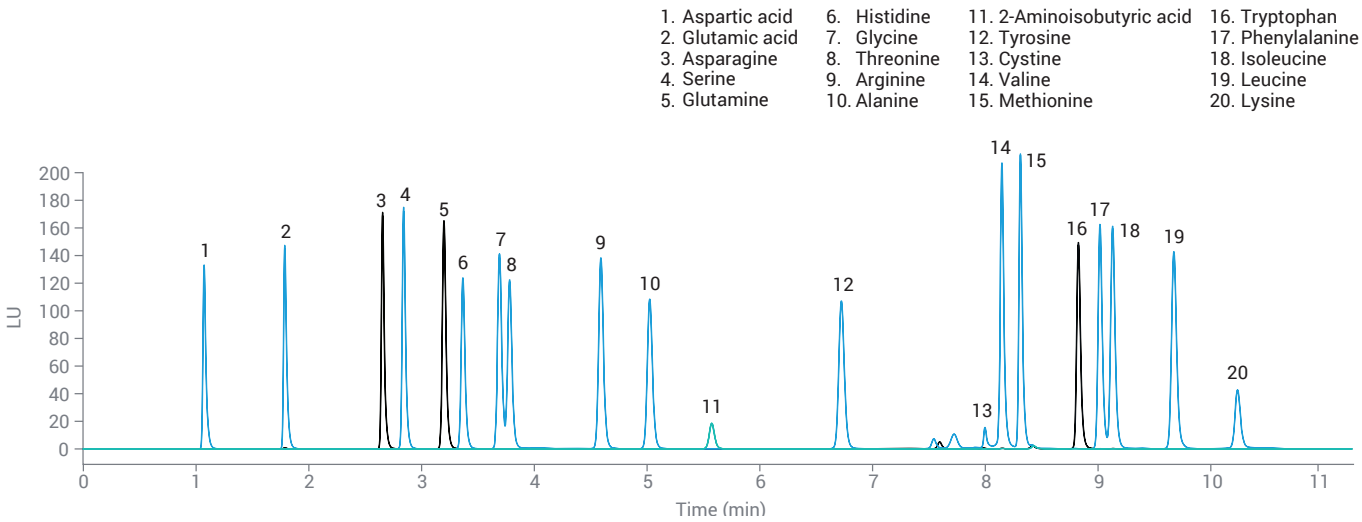


Figure 5. Fluorescence detector profile of 100 µM standard solution of 20 amino acids.

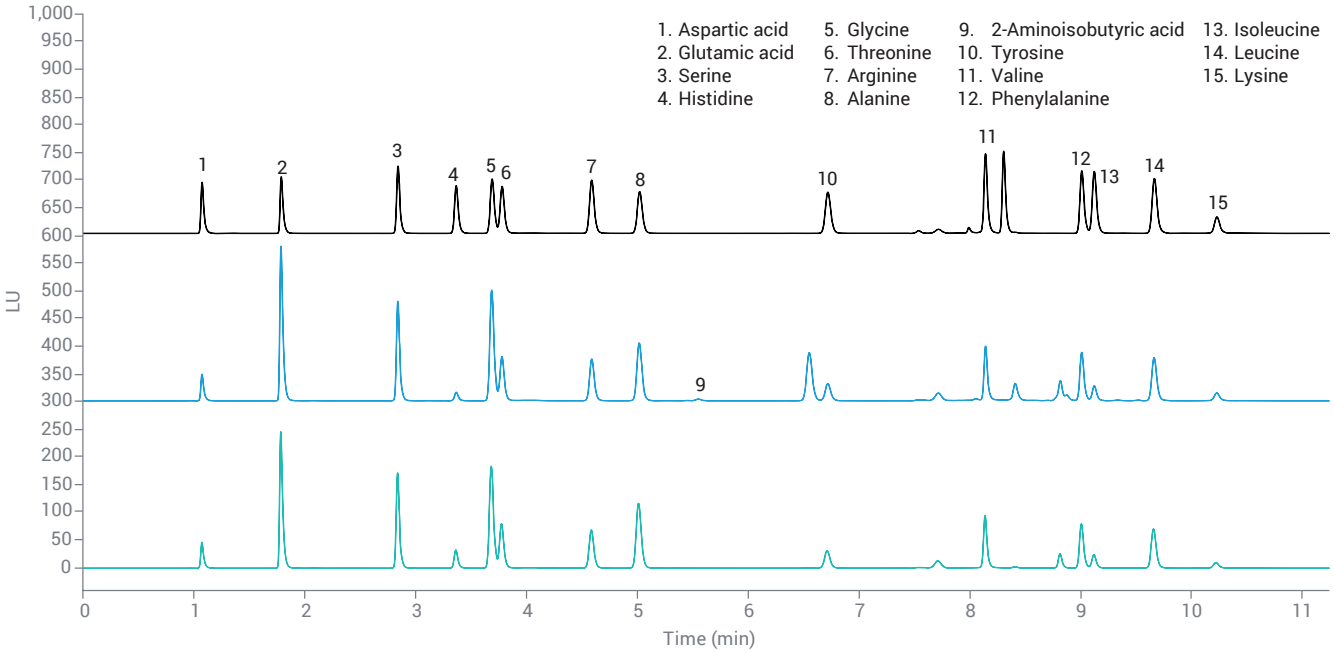
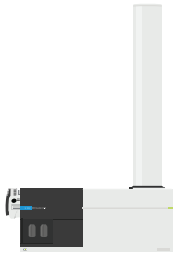


Figure 6. Fluorescence detector profile of hydrolyzed semaglutide and liraglutide solutions derivatized with OPA using the Agilent AdvanceBio Amino Acid Analysis column. Black = amino acid standard, 100 µM, blue = semaglutide, green = liraglutide.

Learn more in our application note: Amino Acid Composition Test of Semaglutide and Liraglutide.

Sequence Confirmation and Isomer Characterization

As your peptide structures become more complex, confidently confirming sequence integrity and identifying isomeric forms is critical. We offer workflows for fast, in-depth characterization of peptide sequences, modifications, and impurities using electron capture dissociation (ECD) as well as peptide isomer analysis using ion mobility mass spectrometry (IM-MS).

Sample	Separation		Detection	Analysis
				
Vial	Altura Peptide Plus or Altura ZORBAX Eclipse Plus C18 column	UHPLC: 1290 Infinity III bio LC	MS: 6545XT AdvanceBio Q-TOF with ExD cell or 6560C Q-TOF	MassHunter BioConfirm software and ExDViewer software

Benefits of ECD

- Preserves your fragile post-translational modifications during fragmentation (unlike collision-induced dissociation).
- Distinguishes between isomeric amino acids and degradation products.
- Effectively identifies deamidation products and disulfide bond mapping.
- Supports QC, regulatory compliance, and formulation stability studies in your therapeutic peptide development.

6545XT AdvanceBio LC/Q-TOF with ExD cell

Offering a promising solution for problematic amino acid isomer differentiation, ECD can produce amino acid side-chain fragments that directly inform molecular structure in ways that traditional collision-based fragmentation can't. The Agilent 6545XT AdvanceBio LC/Q-TOF can be equipped with an Agilent ExD cell for ECD identification of isomeric forms.

- **Deeper insight:** ECD capability on the 6545XT system fragments proteins from the top down, enabling advanced characterization of peptide and protein structures.
- **Accurate isomer differentiation:** Because it generates side-chain fragments, ECD can help distinguish isobaric residues that traditional methods might miss.
- **Nondestructive detection:** Fragment intact proteins with ECD while preserving fragile modifications like glycosylation and phosphorylation.

Sequence analysis with noncanonical amino acids

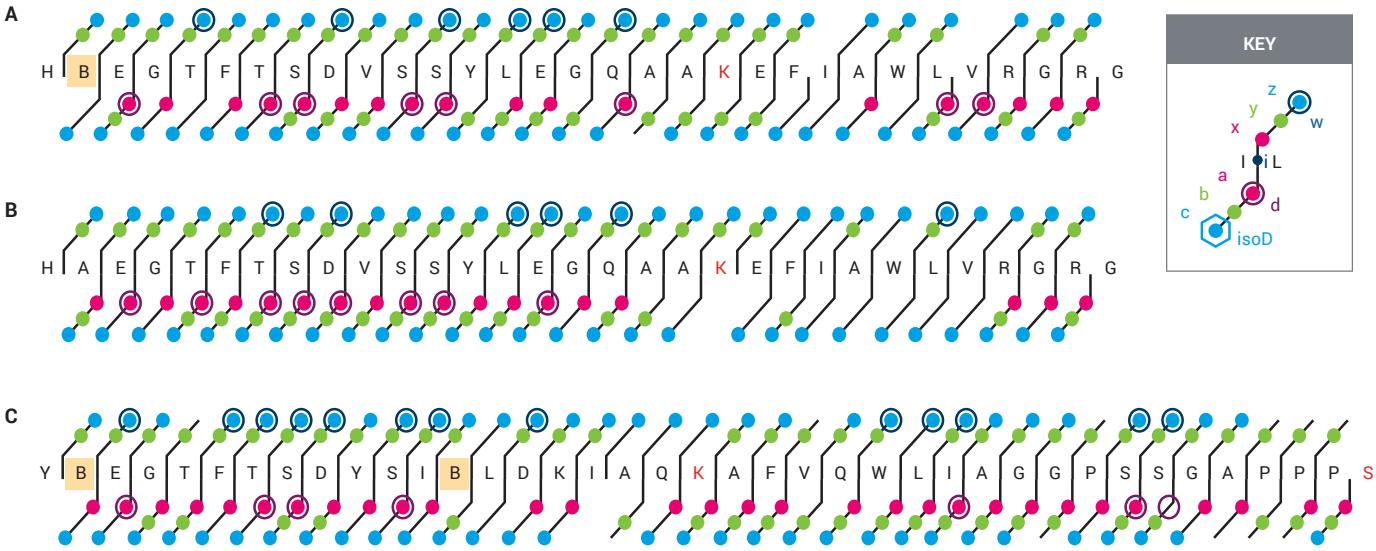


Figure 7. Sequence coverage maps for (A) semaglutide, (B) liraglutide, and (C) tirzepatide. The nonstandard B amino acid is highlighted in yellow, while the modified lysine is indicated in red text. Several complimentary c/z and b/y-type ions were identified.

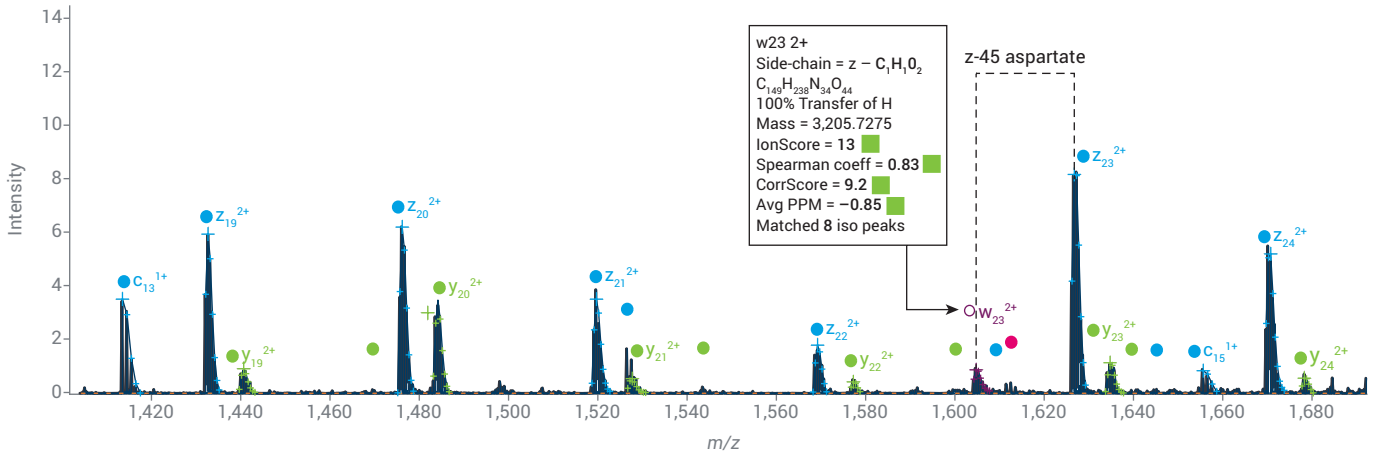
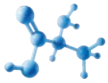


Figure 8. Representative fragmentation spectrum from liraglutide showing the automatically annotated fragment evidence for isomeric amino acids such as aspartate and isoaspartate. Aspartate is identified by the loss of a CHO_2 group from the Z_{23} 2+ ion.

Learn more in our application note: Comprehensive Characterization of Multiple GLP-1 Analogs.

Quantitative Analysis

You need fast, confident quantitation to keep pace with growing demand and regulatory pressure. Our ultrasensitive LC/MS workflow can help you accurately measure low-abundance GLP-1 analogs in plasma—supporting scalable method development, QC transfer, and global compliance.

Sample	Sample preparation	Separation		Detection	Analysis
					
Peptide	AssayMAP Bravo protein sample prep platform	Altura Peptide Plus or Altura ZORBAX Eclipse Plus C18 column	UHPLC: 1290 Infinity III bio LC	MS: 6495D LC/TQ	MassHunter Quantitative Analysis software

Benefits of LC/MS

- Exceptional sensitivity enables detection of your low-abundance peptide targets.
- High selectivity using MRM transitions gives you reliable results.
- Robust quantitation across dynamic ranges.
- Faster turnaround with efficient throughput supports your routine workflows.

6495D triple quadrupole LC/MS

Designed for research and testing labs investigating large batches of samples, the ultrahigh-performance Agilent 6495D triple quadrupole LC/MS (LC/TQ) system provides accurate and repeatable low-level quantitation of GLP-1 agonists such as tirzepatide.

- **Tackle challenging analytes:** Innovative iFunnel technology provides ppq-level sensitivity to quantitate even your most challenging peptides in heavy matrices.
- **Enhance precision:** Sub-millisecond dwell times ensure consistent quantitation without sacrificing robustness or reproducibility.
- **Nonstop routine analysis:** Built-in instrument intelligence—including AI-based SWARM tuning, VacShield, early maintenance feedback dashboard, scheduled tune, and intelligent reflex—ensure peak performance for demanding routine analysis.
- **Meet sustainability goals:** Reduce power consumption and heat dissipation by 50% with a cost-saving, energy-efficient optional oil-free dry pump.

MassHunter Quantitative Analysis software

Powering analysis for a wide range of biopharma applications, Agilent MassHunter Quantitative Analysis software is the industry-leading mass spectrometry software.

- **Maintain data integrity:** Securely acquire, process, report, and store data using technical controls for compliance with FDA 21 CFR Part 11, EU Annex 11, GAMP 5, ISO/IEC 17025, and EPA 40 CFR Part 160 guidelines.
- **Customize your workflows:** Quant-My-Way features a user-configurable quant interface specific for your target workflow.
- **Boost productivity:** Intelligent reflex workflows—including automatic reinjection for carryover, saturation, fast screening, suspect screening confirmation, and iterative MS/MS—enable continuous data acquisition so you can focus on results.

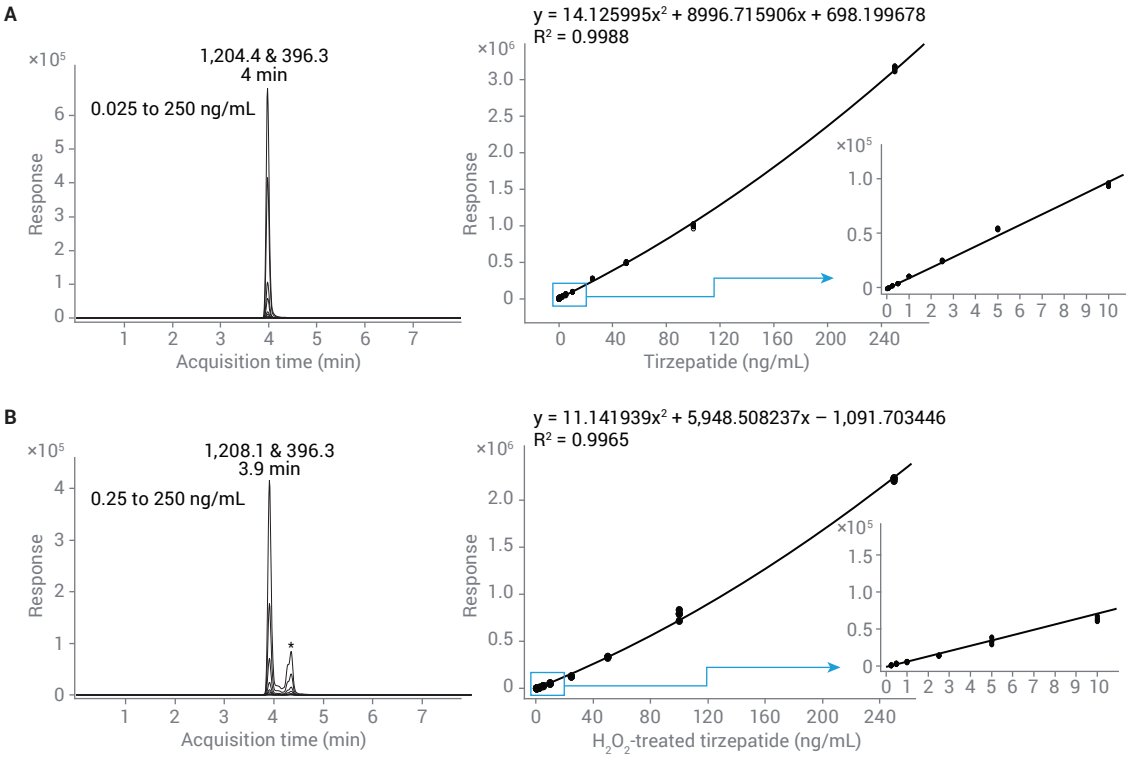
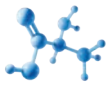


Figure 9. Quantitative performance of (A) unmodified/native and (B) tryptophan mono-oxidized tirzepatide (n = 4). (Left) Overlays of MRM chromatograms for a range of concentrations. An asterisk (*) marks the unknown peak. (Right) Standard curves for each form of tirzepatide, including insets of the curve at lower concentration levels.

Learn more in our application note: Quantification of Glucagon-Like Peptide-1 Agonist Tirzepatide.

Stability and Degradation Analysis

As therapeutic peptides become more complex, you need precise, high-resolution tools to detect and characterize degradation products to ensure accuracy. Agilent LC/Q-TOF and InfinityLab LC workflows can help you monitor molecular changes and support regulatory compliance across development and QC.

Sample	Separation		Detection	Analysis
				
Peptide	Altura Peptide Plus column	UHPLC: 1290 Infinity III bio LC	MS: InfinityLab Pro iQ Plus or 6545XT AdvanceBio Q-TOF	OpenLab CDS or MassHunter BioConfirm software

Benefits of LC/Q-TOF

- High-resolution separation helps you detect low-level degradation products.
- Precise mass accuracy enables you to confirm subtle molecular changes.
- Comprehensive characterization of both impurities and post-translational modifications in a single run.
- Flexible workflows enable broad stability profiling.
- Supports time-course studies so you can track degradation over time.

6545XT AdvanceBio LC/Q-TOF

Whether you need to access the most information at the intact protein level, automatically confirm a sequence through peptide mapping, or confidently understand PTMs, the Agilent 6545XT AdvanceBio LC/Q-TOF system lets you tackle multiple workflows with one system.

- **Get going fast:** Quick-start methods with Agilent AdvanceBio LC columns let you start running intact protein and peptide workflows fast.
- **Simplify analysis:** Automated data workflow featuring Agilent MassHunter BioConfirm software helps you characterize both major and minor protein variations.
- **Effortless optimization:** SWARM autotune adapts and optimizes the instrument to your needs with no manual adjustments.

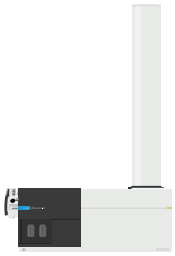
MassHunter BioConfirm software

Agilent MassHunter BioConfirm software enables routine characterization of biomolecules through easy-to-use workflows for intact protein analysis, peptide mapping, and routine glycan profiling.

- **Ensure data compliance:** Supports secure data handling aligned with FDA and global regulatory standards.
- **Fast time to results:** Quickly set up workflows for routine characterization and analysis of degradation products.
- **Simplify intact peptide analysis:** Rapidly deconvolutes mass spectra to help you track molecular weight shifts and post-translational modifications over time.
- **Accessible for nonexperts:** Walk Up interface allows lab staff without LC/MS expertise to perform routine stability testing.

Host Cell Protein Analysis

Our workflows provide automated sample preparation with excellent reproducibility for high-confidence host cell protein identification.

Sample	Sample preparation	Separation		Detection	Analysis
					
Peptide	AssayMAP Bravo protein sample prep platform	Altura Peptide Plus column	UHPLC: 1290 Infinity III bio LC	MS: 6230B TOF LC/MS or 6545XT AdvanceBio LC/Q-TOF	MassHunter with BioConfirm software

Benefits of automated sample preparation

- Accelerates sample preparation and frees up your resources for data analysis.
- Improves consistency with reduced variability across batches and operators.
- Boosts throughput by processing more samples in less time—helping you meet tight deadlines.
- Delivers more reliable results even when using limited sample volumes.
- Supports regulatory compliance by minimizing your manual steps, reducing risks and errors.

AssayMAP Bravo protein sample prep platform

Automate sample preparation for your validated protocols with the Agilent AssayMAP Bravo protein sample preparation platform.

- **Boost efficiency:** High-throughput capability enables you to process up to 96 samples simultaneously.
- **Greater reproducibility:** Automated sample preparation reduces variability and enhances your workflow consistency.
- **Maximize recovery:** Achieve maximum recovery of target analytes even from limited sample volumes.
- **Save time:** Optimized protocols shorten your preparation time and enable faster data generation.

Residual Solvent Analysis

You need fast, reliable testing to ensure your peptide formulations meet regulatory standards. Agilent offers the most comprehensive portfolio of flexible and reliable GC and GC/MS solutions for separating, identifying, and quantifying all the relevant residual solvents outlined by USP <467>.

Sample	Calibration	Separation and detection			Analysis
					
Vial	USP <467>	J&W DB-624 or J&W DB-WAX columns	GC: 8697 headspace sampler and 8890 GC or 8850 GC	or MS: 8697 HS or GC/MSD	OpenLab CDS software

Benefits of GC

- Excellent resolution of volatile organic compounds in complex peptide formulations results in more accurate identification.
- High sensitivity and reproducibility for trace-level solvent quantitation help you stay aligned with regulatory compliance.
- Flexible scalability supports routine testing and method transfer across labs.
- Robust performance provides more reliable results across diverse sample matrices.

8890 GC

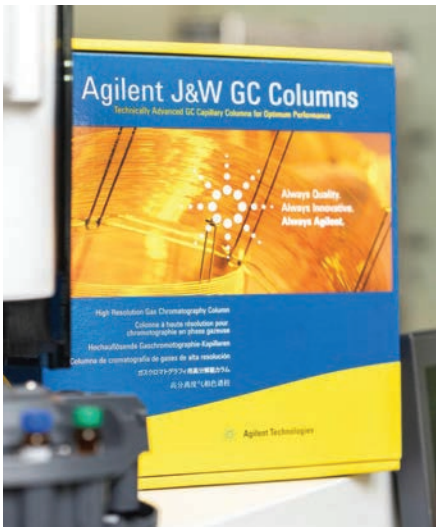
When fast, accurate results are critical and instrument uptime is a must, the intelligent, high-performance Agilent 8890 GC consistently exceeds expectations.

- **Maximize uptime:** Built-in intelligence autonomously monitors system health, sends alerts of potential issues before they affect performance and guides you through resolution.
- **Flexible configuration:** Tailor system capabilities to your specific application and analysis demands.
- **Work from anywhere:** Browser interface lets you connect from inside or outside the lab to monitor your smart GC system, check system logs, and perform diagnostic tests.
- **Simple interface:** Update active methods, check status, and start maintenance routines from the system's touch screen interface.

8850 GC

The intelligent Agilent 8850 GC is the smallest, fastest, high-performance benchtop GC on the market.

- **Shorter turnaround times:** Small, precisely designed air-bath oven facilitates fast temperature ramps up to 300 °C/min and rapid cooldown for fast, high-throughput analysis.
- **Reduce energy consumption:** Using 45% less power than other GC systems, the 8850 GC lowers energy costs and helps your lab meet sustainability goals.
- **Save bench space:** At half the size of traditional systems, you can have two 8850 GCs running different methods simultaneously without sacrificing bench space or performance.

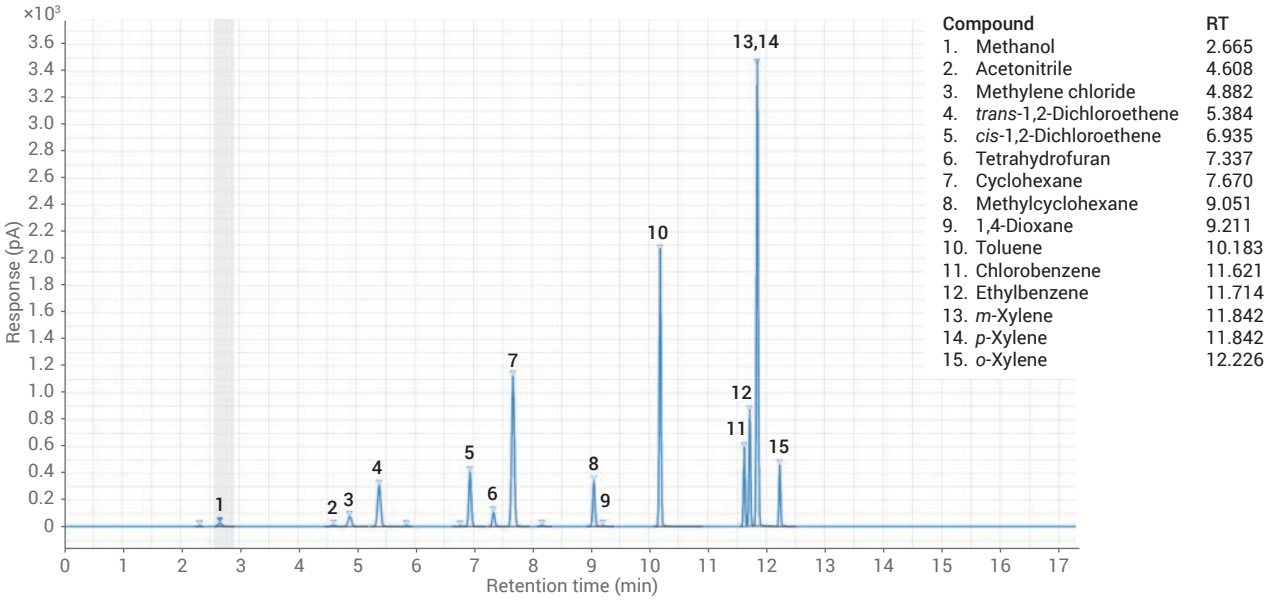


8697 headspace sampler

Combining the latest instrument intelligence with advanced hardware features, the Agilent 8697 headspace sampler and 8697 headspace sampler-XL Tray are laboratory workhorses that streamline your residual solvent workflow.

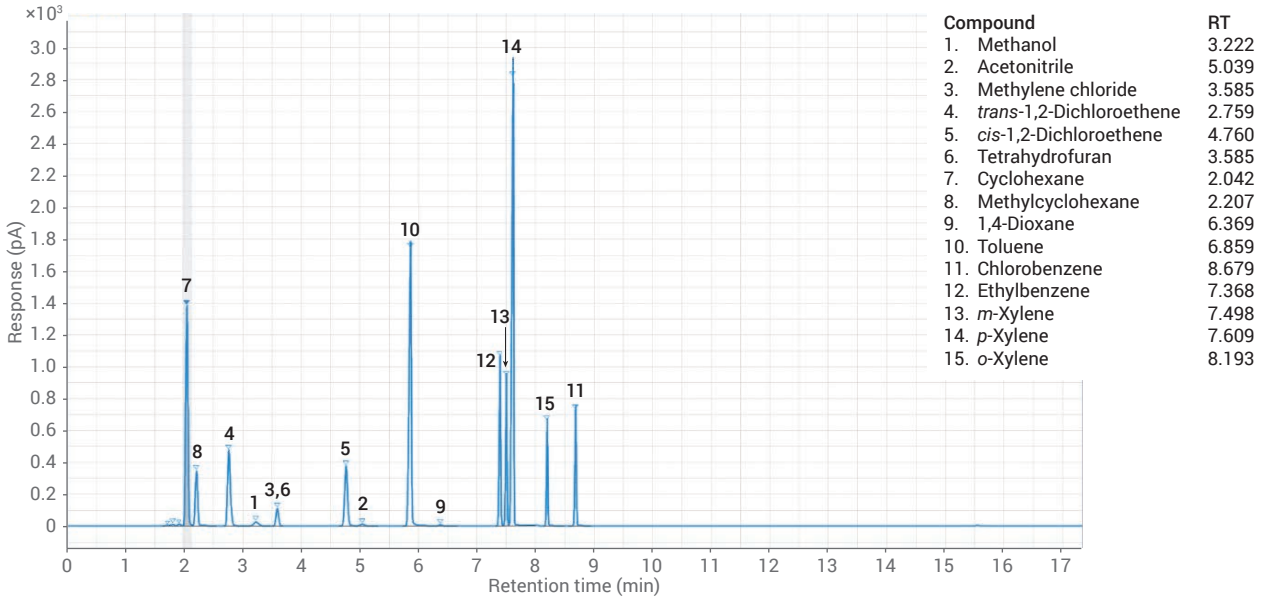
- **Reduce data variability:** Microchannel-based electronic power control module with atmospheric compensation and valve-based sampling help minimize carryover and variability.
- **Minimize method development:** Transfer residual solvent methods like USP <467> with minimal adjustment.
- **Easy to use:** Direct integration with Agilent GCs guides you through automatic leak checks, guided troubleshooting, downloadable system logs, retention time and resolution charting, and consumable tracking.
- **Flexible vial options:** Run 48 vials on two removable racks or 120 vials on five removable racks (-XL tray) and use 10, 20, or 22 mL vials with no limitations on running mixed vial sizes.

Analysis of USP method <467> residual solvents



Compound	RT
1. Methanol	2.665
2. Acetonitrile	4.608
3. Methylene chloride	4.882
4. *trans*-1,2-Dichloroethene	5.384
5. *cis*-1,2-Dichloroethene	6.935
6. Tetrahydrofuran	7.337
7. Cyclohexane	7.670
8. Methylcyclohexane	9.051
9. 1,4-Dioxane	9.211
10. Toluene	10.183
11. Chlorobenzene	11.621
12. Ethylbenzene	11.714
13. *m*-Xylene	11.842
14. *p*-Xylene	11.842
15. *o*-Xylene	12.226

Figure 10. Chromatogram showing the USP residual solvents class 2A standard solution resolved on an Agilent J&W DB-Select 624 UI for 467 GC column.



Compound	RT
1. Methanol	3.222
2. Acetonitrile	5.039
3. Methylene chloride	3.585
4. *trans*-1,2-Dichloroethene	2.759
5. *cis*-1,2-Dichloroethene	4.760
6. Tetrahydrofuran	3.585
7. Cyclohexane	2.042
8. Methylcyclohexane	2.207
9. 1,4-Dioxane	6.369
10. Toluene	6.859
11. Chlorobenzene	8.679
12. Ethylbenzene	7.368
13. *m*-Xylene	7.498
14. *p*-Xylene	7.609
15. *o*-Xylene	8.193

Figure 11. Chromatogram showing the USP residual solvents class 2A standard solution resolved on an Agilent J&W HP-INNOWax column.

Learn more in our application note: Analysis of USP Method <467> Residual Solvents.

Elemental Impurity Analysis

Monitoring elemental impurities in pharmaceutical ingredients is crucial for ensuring patient safety. Agilent's ICP-MS workflow supports current regulatory requirements, offering high-sensitivity analysis of trace-level process-related impurities in your therapeutic peptides.

Sample	Sample preparation	Calibration	Detection	Analysis
				
Vial	I-AS autosampler or SPS 4 high-speed autosampler	USP standard elemental impurities kit	MS: 7850 ICP-MS	ICP-MS MassHunter software

Benefits of ICP-MS

- Validated workflows help you stay compliant with regulatory guidelines.
- High sensitivity enables tracking of trace-level elements across complex peptide matrices.
- Supports routine testing across labs and development stages.

7850 ICP-MS

Designed for high-throughput elemental impurity testing in pharmaceutical workflows, the Agilent 7850 ICP-MS combines sensitivity, robustness, and automation to meet the demands of therapeutic peptide development.

- **Ensure compliance:** Supports regulatory requirements for elemental impurity testing in pharmaceutical workflows, including USP <232>/<233> and ICH Q3D(R2)/Q2(R1) guidelines.
- **Less sample preparation:** Minimal dilution and preparation requirements for high-matrix peptide samples reduces the time and complexity of routine analysis.
- **Reliable results:** Reduce the downtime associated with remeasurement and manual review using smart features that ensure accurate, high-throughput impurity profiling.

ICP-MS MassHunter software

Streamlining your elemental impurity analysis, the intelligent tools available with MassHunter software simplify method setup, data review, and compliance management.

- **Simplify data quality assessment:** Built-in tools like IntelliQuant help you quickly identify and resolve issues in complex peptide matrices.
- **Time-saving workflows:** Preset methods and automated calibration workflows reduce setup time and simplify method development.
- **Maintain data integrity:** Integrated technical controls support regulatory compliance with global standards like 21 CFR Part 11 and EU Annex 11, ensuring secure, traceable, and audit-ready data handling.

Preparative-Scale Purification Solutions

As peptide development grows more complex, you need purification tools that deliver scalable performance. Agilent has the most comprehensive portfolio of high-performance instrumentation, columns, software, and services that ensure highest purity and maximum recovery—no matter what scale of LC purification you're working at.

Sample	Separation and detection			Analysis
				
Vial	PLRP-S for biomolecules preparative HPLC columns	LC: 1290 Infinity II preparative LC system	or MS: 1290 Infinity II preparative LC/MSD system	Purification software with OpenLab CDS

Benefits of preparative LC/MSD

- Combines purification and detection to streamline your workflows.
- Improves selectivity with mass-based fraction collection.
- Reduces sample handling with direct transfer to downstream analysis.
- Enhances confidence in compound identity with real-time mass confirmation.
- Supports impurity isolation for your characterization and stability studies.

Reversed-phase preparative columns

An ideal choice for ion-pair reversed-phase purification of synthetic peptides, Agilent PLRP-S for biomolecules HPLC columns offer excellent reproducibility.

- **Lower consumable costs:** With outstanding chemical and physical stability, the PLRP-S stationary phase extends column lifetimes.
- **High-speed purification:** Large pore sizes improve your mass transfer with fast, high-resolution separations.
- **Flexible use:** Full compatibility with our LC systems, including the Agilent 1290 Infinity III Series systems, lets you do preparative-scale work on multiple platforms.

1290 Infinity II preparative LC/MSD system

Couple PLRP-S preparative HPLC columns with the Agilent 1290 Infinity II preparative LC for precise, efficient compound isolation.

- **Improve quality:** Ideal for oligos and peptides, precise mass-based fraction collection with a range up to 3000 *m/z* improves the quality of your compounds and reduces risk of reanalysis.
- **High-throughput purification:** Rapidly purify and characterize targets ranging from µg to g scale in complex mixtures.
- **Customize your configuration:** Maximize performance with a flexible configuration that meets your workflow needs, and a lab-friendly footprint that conserves valuable bench space.

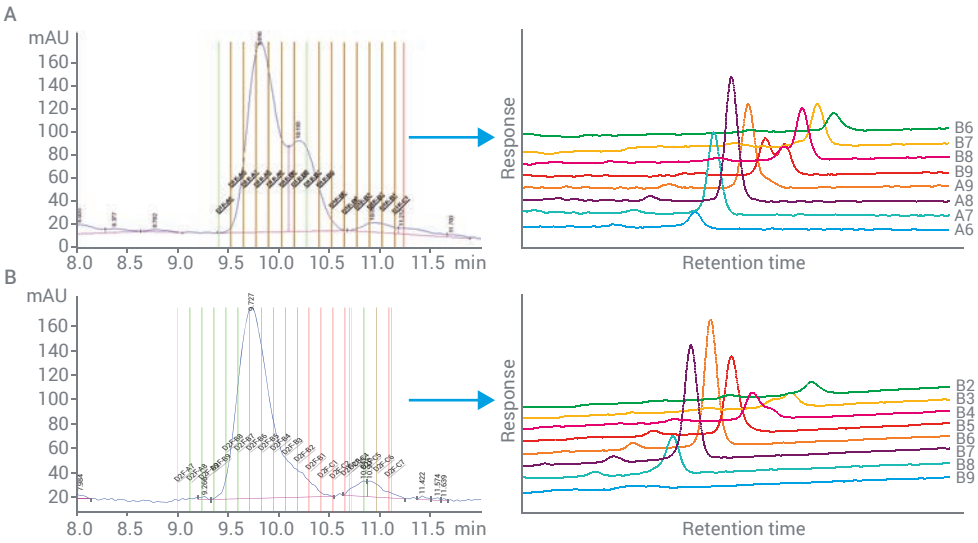


Figure 12. Peptides 1A and 1B on an Agilent PLRP-S 300 Å column showing fraction reanalysis (right).

Learn more in our application note: Optimizing Analysis and Purification of a Synthetic Peptide.

Integrated Solutions for Ease of Adoption, Support, and Maintenance

Laboratory management services

To support your workflows and enhance your operational efficiency now and in the future, Agilent CrossLab services provide expert, enterprise-wide instrument support—regardless of manufacturer—to ensure that all your assets are covered.

Our lab management services include:

- Instrument training and method services
- Compliance services
- Maintenance and repair
- Lab and instrument relocation services
- Enterprise services

Learn more

Alternative financial solutions

Obtain the equipment you need to enhance your capabilities today so your lab can grow into tomorrow with Agilent's alternative financial options. Our team collaborates with you to create an easy, flexible, and customized plan that preserves cash flow while providing your lab with a technological advantage. Our alternative financial options include:

- Financial lease
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