

High-Load Purification of Tirzepatide Using YMC-Triart Prep C8-XP

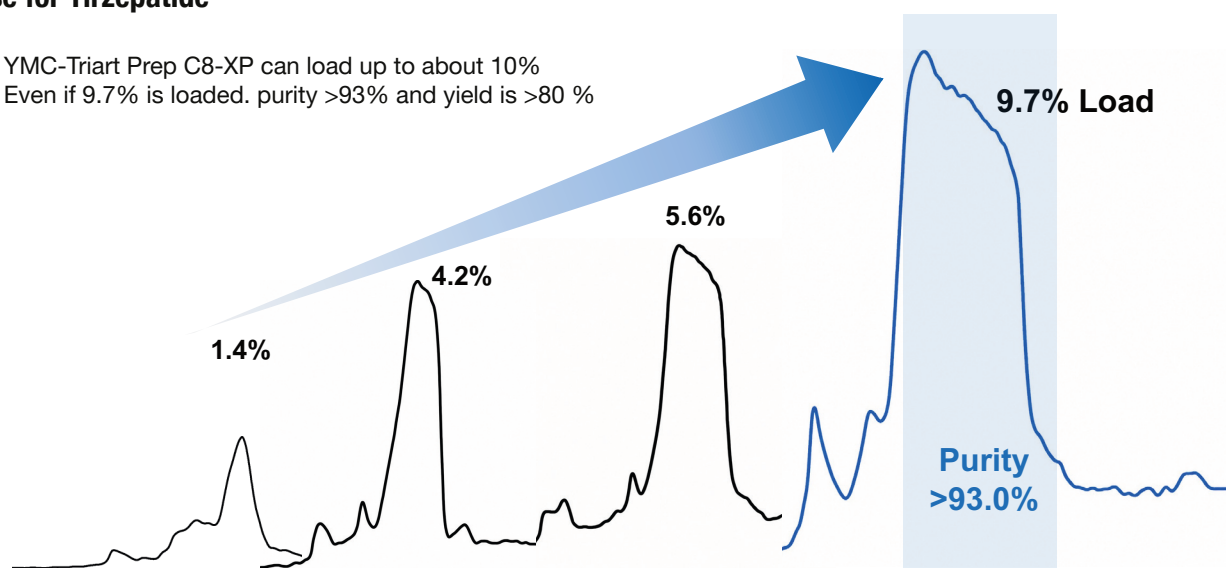
A Comparative Evaluation of Increasing Resin Loadings

The rapid growth of GLP-1 receptor agonists has created an increasing demand for highly efficient downstream purification processes. As manufacturing volumes continue to expand, maximising productivity while consistently maintaining product quality has become one of the primary objectives in process development. Modern peptide purification increasingly requires stationary phases that combine high chromatographic resolution with high loading capacity. While excellent resolution enables high product purity, high resin utilisation is essential for improving process productivity and reducing manufacturing costs.

YMC-Triart Prep C8-XP was developed to address both requirements. Its optimised C8 ligand chemistry maintains chromatographic selectivity even at elevated resin loadings, providing the flexibility to support both high-throughput multi-step purification processes and high-purity single-step purification strategies.

Case for Tirzepatide

- YMC-Triart Prep C8-XP can load up to about 10%
- Even if 9.7% is loaded, purity >93% and yield is >80 %



In this study, Tirzepatide was purified at progressively increasing resin loadings. Even at resin loadings approaching 10% (g peptide/g resin), YMC-Triart Prep C8-XP maintained product purities above 93% while achieving recoveries exceeding 80%, demonstrating its suitability for productivity-driven GLP-1 manufacturing.

Depending on the purification strategy, different resin loadings may be preferred. Higher loadings of around 9.7% maximise throughput and process productivity while accepting some loss in purity, making this approach particularly well suited for multi-step purification processes. YMC-Triart Prep C8-XP supports high loading conditions, allowing manufacturers to increase throughput and select operating conditions that best match their process objectives while maintaining excellent chromatographic performance.

Why Higher Resin Loading Matters

Increasing resin loading directly improves process productivity by enabling more product to be purified in each chromatographic cycle. Higher resin utilization provides several important process advantages:

- Higher peptide throughput per purification cycle
- Fewer purification cycles for the same production volume
- Lower solvent consumption
- Lower cost per gram of purified peptide
- Improved manufacturing efficiency

For large-scale GLP-1 production, these improvements can substantially reduce manufacturing costs while increasing overall plant productivity.

Enabling High-Productivity GLP-1 Manufacturing

The results presented in this study demonstrate that YMC-Triart Prep C8-XP is ideally suited for the purification of GLP-1 receptor agonists under high-load conditions. Using Tirzepatide as a representative GLP-1 therapeutic, the stationary phase maintained excellent purification performance at resin loadings approaching 10%, while consistently delivering product purities above 93% and recoveries exceeding 80%. Although higher loading produced the expected changes in chromatographic behavior, the critical separation remained sufficiently robust to maintain the desired product quality. This combination of high loading capacity, maintained purity, and excellent recovery enables significantly higher process productivity without compromising purification performance.

As demand for GLP-1 therapeutics continues to grow, manufacturers require purification processes that maximise throughput while ensuring consistent product quality. YMC-Triart Prep C8-XP provides an effective solution by enabling substantially higher resin utilization, reducing purification cycles, and lowering manufacturing costs for large-scale peptide production.

Resin loadings up to approximately 10%

Maintains excellent chromatographic performance even under aggressive loading conditions.

Flexible purification strategy

Supports both maximum productivity at high resin loading and high-purity single-step purification.

Higher manufacturing productivity

Increases peptide throughput while reducing purification cycles and manufacturing costs.

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representative for
a sample**