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2026 Research Peptide Purity Standards

A researcher's reference for evaluating HPLC reports, reading Certificates of Analysis, and identifying vendor red flags.

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WHAT'S INSIDE

A guide to HPLC verification, CoA reading, and vendor evaluation

Why purity matters in research peptides

In published preclinical literature, the difference between a 95% and 99% pure peptide is the difference between a reproducible experiment and a contaminated one. The 4% delta is not an inert filler — it is residual synthesis byproducts, truncated sequences, deletion impurities, and counter-ion salts that confound binding assays, cell-line studies, and downstream analytical work.

This guide covers what every research buyer should know before placing an order: how High-Performance Liquid Chromatography (HPLC) actually verifies purity, what the columns on a Certificate of Analysis (CoA) mean, and which vendor practices signal a sourcing problem.

HPLC — WHAT IT IS AND WHAT IT MEASURES

HPLC separates a peptide sample into its component molecules by pushing them through a column packed with silica beads. Each component exits the column at a characteristic time (retention time). A detector measures absorbance at 214 nm or 220 nm — wavelengths where the peptide bond absorbs strongly — and produces a chromatogram with peaks.

Purity (HPLC area %) is the area under the main peak divided by the total area of all peaks, expressed as a percentage. A reputable vendor reports this number to two decimal places along with the chromatogram image.

> **What you're really looking at:** A 99.2% HPLC area % means 99.2% of UV-absorbing material in the sample is your target peptide. The remaining 0.8% is impurities. Claims of 100% purity are not physically achievable in solid-phase peptide synthesis — treat them as a marketing red flag, not a quality signal.

Purity tiers in the research market

Common purity grades referenced in published methods:

- ≥**95%** — Adequate for most cell-culture and binding studies.
- ≥**98%** — Standard for quantitative in-vitro work and SAR studies.
- ≥**99%** — Required for analytical method development, reference standards, and structure-activity research where impurity profile matters.

Reading a Certificate of Analysis

A real CoA is a batch-specific document tied to a unique lot number. It should be downloadable as a PDF (not embedded in an image), dated, and signed by the analyst or QC manager. Every field below should appear on a complete report:

Compound name + sequence
Confirms which peptide and which amino-acid sequence the lot represents.

■ **Red flag if missing: Always required**

Batch / lot number
Links this CoA to a specific synthesis run. Each new batch requires a new CoA.

■ **Red flag if missing: Generic CoAs serving all batches are useless**

Identity test (Mass Spec)
LC-MS or MALDI-TOF confirming the observed molecular weight matches the theoretical MW.

■ **Red flag if missing: No MS data = no identity confirmation**

HPLC purity %
Area-under-curve of the main peak divided by total area. Reported alongside the chromatogram.

■ **Red flag if missing: A number with no chromatogram is unverifiable**

Net peptide content
Percentage of the powder that is actually peptide, vs counter-ion salts (TFA, acetate) and residual water.

■ **Red flag if missing: Often omitted to inflate apparent value**

Endotoxin (LAL assay)
Required for any application sensitive to bacterial contamination. Reported in EU/mg.

■ **Red flag if missing: Missing for any cell-based work is concerning**

Heavy metals (ICP-MS)
Residual catalyst metals (Pd, Cu, etc.) below pharmacopoeia thresholds.

■ **Red flag if missing: Often pooled or omitted entirely**

Water content (Karl Fischer)
Residual moisture in the lyophilized powder. Affects mass-based concentration in study work.

■ **Red flag if missing: Lower priority, but professional CoAs include it**

Heuristic: If the document a vendor calls a 'CoA' is a one-pager with just a purity percentage and no chromatogram, MS spectrum, or lot number, it is a marketing asset — not a Certificate of Analysis. Ask for the underlying analytical report.

Six vendor red flags

Patterns we observe across the research peptide market that consistently correlate with quality problems:

1. The same CoA serves every batch.

If you order a fresh batch six months apart and get an identical PDF, the document is decorative. Real CoAs are tied to one synthesis run.

2. 'Lab tested' with no actual report.

Vague claims ("third-party verified") without a downloadable analytical report are unverifiable. Ask which lab, which method, which lot.

3. Bulk-sourced from offshore wholesalers.

Many domestic vendors repackage powder bought in bulk from a small number of Chinese suppliers, then issue their own CoA without re-testing. Ask whether the HPLC was run on the final-packaged lot.

4. Purity claims at 100%.

Physically not possible in solid-phase synthesis. Any vendor using this number either does not understand the assay or is rounding for marketing.

5. No mass spectrometry confirmation.

Without MS, the 'identity' of the compound has not been confirmed at the molecular-weight level. HPLC alone can't tell you that peak X is your target peptide rather than a structurally similar impurity.

6. CoA missing net peptide content.

Lyophilized peptide salts can be 60-80% actual peptide by mass — the rest is counter-ion (TFA, acetate) and water. If net peptide is not disclosed, dosing calculations in published methods will be off by 20-40%.

> **The Peptide Sciences shutdown (March 2026)** displaced an estimated 18,000–35,000 monthly searches for vendor alternatives. A meaningful fraction of new vendors entering that demand vacuum show one or more of the six red flags above. Look critically at any vendor that surfaced in the last 90 days.

Beyond HPLC: the other measurements that matter

HPLC purity is the headline number, but it is not the whole story. Three additional analyses round out a usable Certificate of Analysis:

1. MASS SPECTROMETRY (IDENTITY CONFIRMATION)

LC-MS or MALDI-TOF measures the molecular weight of the compound in the sample. The observed $[M+H]^+$ ion should match the theoretical molecular weight of the target peptide to within 1 Dalton. Without MS, you have an HPLC peak at a characteristic retention time — but no confirmation that the peak is your peptide.

2. ENDOTOXIN TESTING (LAL)

The Limulus Amebocyte Lysate assay measures bacterial endotoxin contamination, reported in EU/mg (Endotoxin Units per milligram). For cell-based research, endotoxin can activate immune pathways and confound results entirely independent of the peptide. A typical research-grade target is <1.0 EU/mg.

3. NET PEPTIDE CONTENT (MASS BALANCE)

Lyophilized peptide powder is rarely pure peptide. It contains counter-ions (TFA or acetate left over from synthesis), residual moisture, and sometimes excipients. The 'net peptide content' field on a CoA tells you what fraction of the powder by mass is actually peptide. A vial labeled 10 mg with 70% net peptide content contains 7 mg of actual peptide. This matters for any mass-based concentration calculation.

> **Worked example:** A 10 mg vial of GHK-Cu with HPLC purity 99.1% and net peptide content 81% contains 10 mg × 0.81 × 0.991 = ~8.0 mg of pure GHK-Cu. The other 2 mg is counter-ion salt, residual water, and the 0.9% HPLC impurities. Reconstitution calculations in published methods assume this is being accounted for.

The 5-question vendor checklist

Before placing an order with any research peptide vendor, ask these five questions. A serious supplier answers all five with documentation, not adjectives.

1. Do you publish batch-specific Certificates of Analysis?

Look for: a per-lot PDF accessible via lot number, dated, signed, with a chromatogram. If the CoA is a generic single document or live PDF that updates, it is not batch-specific.

2. Is the HPLC report from a third-party lab, or in-house?

Both can be legitimate. In-house testing is fine if the lab has documented method validation. Third-party adds a layer of independence. Vendors that decline to say which method or which lab are the concerning case.

3. Does the analytical report include mass spectrometry confirmation?

Either LC-MS or MALDI-TOF. The CoA should show the observed $[M+H]^+$ or $[M+Na]^+$ mass and compare against theoretical molecular weight.

4. Is net peptide content (mass balance) disclosed?

If the answer is 'we test purity at 99%+' but net peptide is not provided, the vial contains 60-80% of the labeled peptide mass and the rest is counter-ion. This is not always disqualifying, but it must be disclosed.

5. What is the endotoxin level (LAL assay)?

For any cell or tissue research application, endotoxin matters. A vendor that cannot quote a LAL value in EU/mg is shipping powder that has not been tested for this contaminant.

> **Send this list verbatim to any vendor.** A reply that addresses all five with specifics (lab name, assay method, LAL value, lot number, net peptide %) takes a competent supplier under five minutes. Evasion on any single point is a signal.

Storage and stability — what literature documents

Published research on peptide stability informs the conditions under which a lyophilized or reconstituted compound retains analytical integrity. The reference ranges below summarize what appears in peer-reviewed stability studies — not dosing guidance.

State	Temp	Typical window (literature)	Notes
Lyophilized powder (sealed)	-20°C	24+ months for most sequences	Single freeze, kept dry, protected from light
Lyophilized powder (sealed)	+4°C	6-12 months	Short-term storage only
Lyophilized powder (sealed)	Room temp	2-4 weeks	Acceptable for shipping; not for storage
Reconstituted in BAC water	+4°C	4-8 weeks for stable sequences	Sequences with Met, Cys, Trp degrade faster
Reconstituted in sterile water	+4°C	1-2 weeks	No preservative — shorter window
Reconstituted, room temp	Room temp	24-72 hours	Avoid except for active use

RECONSTITUTION SOLVENTS

Bacteriostatic water (BAC water) contains 0.9% benzyl alcohol as a preservative, which extends the usable window of reconstituted material by inhibiting microbial growth. **Sterile water for injection** contains no preservative — reconstituted samples have a shorter window before microbial contamination becomes a confound.

> **Compounds with degradation-sensitive residues** (methionine — oxidation; cysteine — disulfide scrambling; tryptophan — photolysis) require additional care: aliquot once, freeze at -20°C, protect from light. Repeated freeze-thaw cycles cause measurable purity loss after 3-5 cycles for most sequences.

Industry context — and how to use this guide

The research peptide market shifted materially in March 2026 when Peptide Sciences ceased operations. Search-volume analysis suggests 18,000–35,000 monthly queries for vendor alternatives are now being routed to new and existing suppliers — many of whom have rapidly scaled distribution without proportionally scaling QC. The result is a wider quality distribution than the market saw 12 months ago.

The checklist on page 6 of this guide is the fastest single filter. Any vendor that answers all five questions with documentation is in a defensible top tier. Any vendor that evades or generalizes on more than one is a sourcing risk.

ABOUT MOG RESEARCH

MOG Research is a US-based research peptide supplier. Every lot is HPLC + mass-spec verified, with batch-specific CoAs accessible by lot number through our public CoA library. We publish net peptide content, endotoxin (LAL) data, and heavy metals screening for every product. Our position on the five questions in this guide is the same as our position with researchers we ship to: documentation, not adjectives.

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CoA library	mogresearch.com/coa
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