**TITREON**
ANALYTICAL
Peptide Identity, Purity and Safety Analytics

**Titreon Analytical**
Analytical Chemistry | Mass Spectrometry | Microbiology
Quality system aligned to ISO/IEC 17025:2017
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# Certificate of Analysis

FULL QUALITY CONTROL PANEL · PEPTIDE ANALYTICAL REPORT

CERTIFICATE NO.
**COA-2026-5784**
Issued 06/13/2026 · Page 1 of 4

| CLIENT | PREPARED FOR |
|---|---|
| **PeptaraLabs** | PeptaraLabs.io |

Client reference: on file
Distribution: client confidential

**SAMPLE & ACCESSION** — ACC-2026-6037

| ANALYTE / IDENTITY | CAS NUMBER | LOT NUMBER |
|---|---|---|
| MOTS-c | 1627580-64-6 | MTS-260414-A |
| **LABELED CONTENT** | **SAMPLE MATRIX** | **APPEARANCE** |
| 40 mg | Lyophilized | Conforms |
| **MANUFACTURED** | **RETEST / EXPIRY** | **STORAGE** |
| 04/14/2026 | 04/2028 | -20 C, dark |
| **DATE RECEIVED** | **DATE ANALYZED** | **DISPOSITION** |
| 06/11/2026 | 06/13/2026 | RELEASED |

SAMPLE PHOTOGRAPH — AS RECEIVED



MOTS-c · 40 mg · Lyophilized

PEPTARALABS

| PEPTIDE PURITY | IDENTITY | NET PEPTIDE CONTENT | BACTERIAL ENDOTOXIN | DISPOSITION |
|---|---|---|---|---|
| 99.02% ✓ PASS | MOTS-c ✓ PASS | 40.60 REPORTED | ≤0.05 ✓ PASS | RELEASED |
| Spec ≥ 95.0% | HPLC-RTM + LC-MS | mg measured · label 40 mg | EU/mL · limit NMT 5 EU/mL | Full QC Panel complete |

## 1 RELEASE STATEMENT

Authorized Disposition

The submitted MOTS-c sample was evaluated under the Full Quality Control Panel covering identity, purity, net peptide content, composition, sterility, bacterial endotoxin, elemental impurities, and targeted adulterant screening. Identity was confirmed by HPLC retention-time matching with an LC-MS [M+2H]2+ ion at m/z 1088.31 deconvoluting to a neutral mass of 2174.6 Da. Chromatographic purity of 99.02 percent comfortably exceeded the not less than 95.0 percent release criterion. Sterility returned No Growth, bacterial endotoxin was well within the applicable limit, and arsenic, cadmium, chromium, mercury, and lead were each Not Detected, with fentanyl Not Detected at the screening cutoff. On the basis that all tested attributes meet their respective specifications, the laboratory supports a disposition of RELEASED for the material as received.

| IDENTITY | PURITY | NET CONTENT | MOISTURE | STERILITY | ENDOTOXIN | HEAVY METALS |
|---|---|---|---|---|---|---|
| Confirmed | 99.02% | 40.60 mg | 4.50% w/w | No Growth | ≤0.05 EU/mL | Not Detected |
| ✓ PASS | ✓ PASS | ✓ PASS | ✓ PASS | ✓ PASS | ✓ PASS | ✓ PASS |

## 2 PURITY, QUANTITATION & IDENTITY

HPLC / HPLC-RTM

| ANALYTE | SPECIFICATION | RESULT | UNIT | STATUS |
|---|---|---|---|---|
| **Peptide Purity (HPLC)** | ≥ 95.0% | **99.02** | % | ✓ PASS |
| **Net Peptide Content** | Report only | **40.60** | mg | REPORTED |
| **Identity (HPLC-RTM)** | MOTS-c | **Confirmed** | — | ✓ PASS |
| **Fentanyl Screen** | Immunoassay, 50 ng/mL | **Not Detected** | — | ✓ PASS |

**Interpretation.** The measured chromatographic purity of 99.02 percent exceeds the not less than 95.0 percent release criterion, indicating a homogeneous principal peak with a low related-substance burden. Net peptide content of 40.60 mg is the measured mass recovered from the unit and is reported against a nominal 40 mg label claim, confirming the vial delivers at least the labeled mass of active peptide.

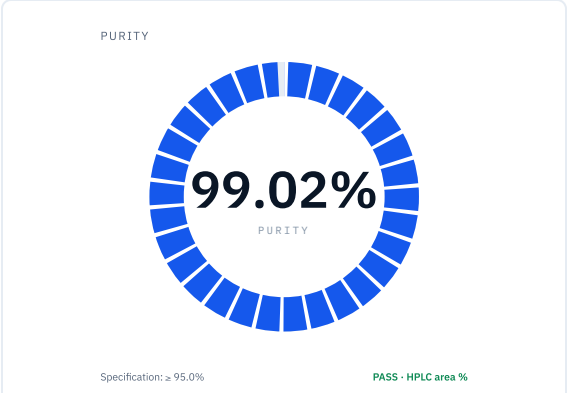



**Figure 1.** Purity composition of the released dedicated unit by HPLC area normalization. Target peptide 99.02%, total related substances 0.98%.

## 3 REPRESENTATIVE CHROMATOGRAM

Reversed-phase HPLC-UV

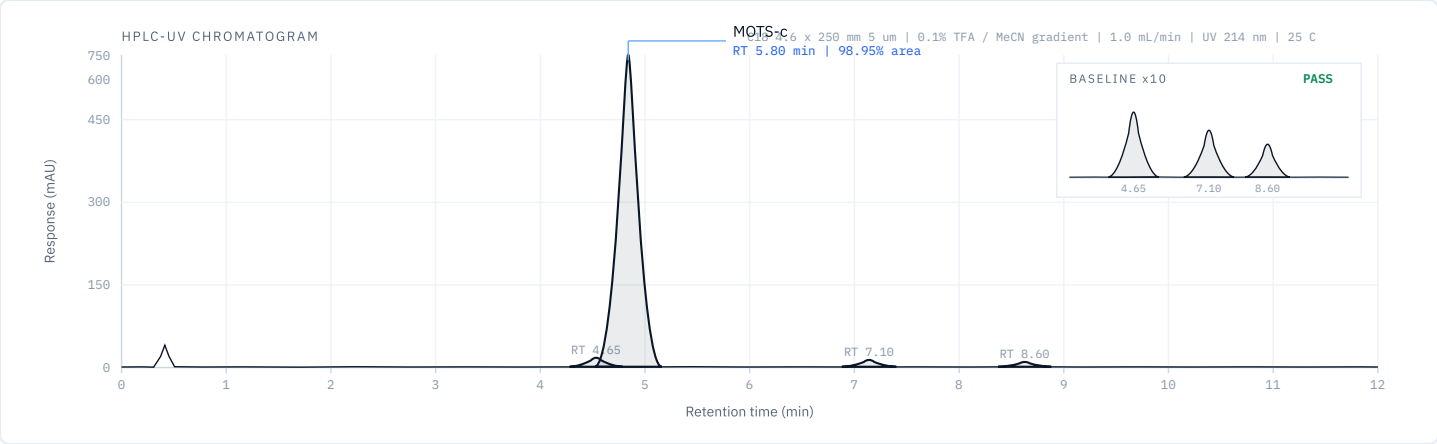



**Figure 2.** Representative reversed-phase HPLC-UV chromatogram (Conformity unit V1, 98.95% main-peak area, near the batch mean of 98.99%). Trace related substances are shown magnified 10x in the inset. A sharp, symmetric principal peak with a low related-substance burden is consistent with high chromatographic purity.

| PEAK | RT (MIN) | AREA (MAU·S) | AREA % | PLATES (N) | TAILING |
|---|---|---|---|---|---|
| **MOTS-c (principal)** | 5.80 | 4,947,500 | **98.95** | 9,210 | 1.05 |
| **Related substance 1 (RRT 0.80)** | 4.65 | 23,500 | 0.47 | 6,940 | 1.11 |
| **Related substance 2 (RRT 1.22)** | 7.10 | 17,000 | 0.34 | 6,580 | 1.09 |
| **Related substance 3 (RRT 1.48)** | 8.60 | 12,000 | 0.24 | 6,210 | 1.13 |
| **Total** | | **5,000,000** | **100.00** | | |

## 4 MASS CONFIRMATION

LC-MS, ESI positive




**Figure 3.** LC-MS mass confirmation (electrospray positive mode). Base peak [M+2H]2+ at m/z 1088.31 with the [M+3H]3+ and [M+4H]4+ ions deconvoluting to a neutral mass of 2174.6 Da, matching the theoretical mass of MOTS-c and confirming identity.

## 5 CONFORMITY TESTING

3 units · HPLC

| SAMPLE | PURITY | NPC (MG) | IDENTITY | RESULT |
|---|---|---|---|---|
| **V0 (dedicated)** | 99.02% | 40.60 | Confirmed | ✓ PASS |
| **V1** | 98.95% | 40.40 | Confirmed | ✓ PASS |
| **V2** | 98.99% | 40.90 | Confirmed | ✓ PASS |
| **Mean** | **98.99%** | **40.63** | – | – |
| **Std Dev** | **0.035%** | **0.2517** | – | – |

**Interpretation.** Across three independently tested units the purity standard deviation was 0.035 percent and content standard deviation 0.2517 mg, a low dispersion consistent with a homogeneous, well-controlled batch.




**Figure 4.** Purity conformity across tested units with mean and plus or minus 3 SD control band (SD 0.035%).

## 6 COMPOSITION, MOISTURE & COUNTERION

KF · IC · USP <467>

| PARAMETER | METHOD | SPECIFICATION | RESULT | STATUS |
|---|---|---|---|---|
| **Net Peptide Content** | HPLC / AAA | Report only | **40.60 mg** | REPORTED |
| **Water (Karl Fischer)** | USP <921> | NMT 8.0% w/w | **4.50%** | ✓ PASS |
| **Counterion (acetate)** | Ion chromatography | Report only | **7.60% w/w** | REPORTED |
| **Residual Solvents (TFA)** | USP <467> | Not Detected | **Not Detected** | ✓ PASS |
| **Gross Fill Weight** | Gravimetric | Report only | **47.21 mg** | REPORTED |

**Interpretation.** Karl Fischer titration returned 4.50 percent residual water and the acetate counterion accounts for 7.60 percent by weight, both typical for a freeze-dried peptide salt. The 47.21 mg gross fill reconciles peptide, counterion, water, and trace related substances.

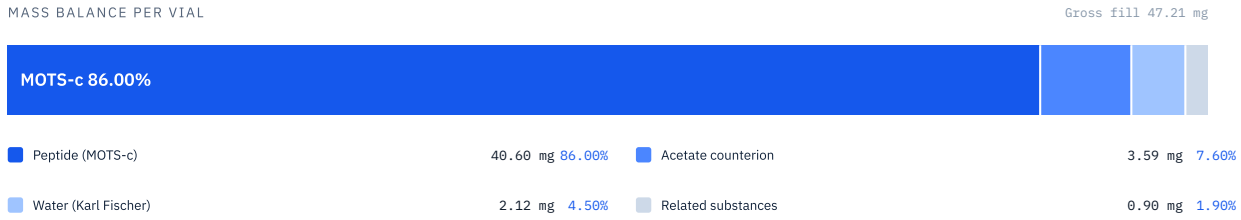



**Figure 5.** Mass balance of the lyophilized cake. Net peptide exceeds the 40 mg label claim; the balance is acetate counterion and residual water, both normal for a freeze-dried peptide salt.

## 7 SAFETY & CONTAMINATION CONTROLS

ICP-MS · USP <71> · <85>

| TEST | METHOD | SPECIFICATION | RESULT | STATUS |
|---|---|---|---|---|
| **Arsenic (As)** | ICP-MS | NMT 1.5 ppm | **Not Detected** | ✓ PASS |
| **Cadmium (Cd)** | ICP-MS | NMT 0.5 ppm | **Not Detected** | ✓ PASS |
| **Chromium (Cr)** | ICP-MS | NMT 10 ppm | **Not Detected** | ✓ PASS |
| **Mercury (Hg)** | ICP-MS | NMT 1.5 ppm | **Not Detected** | ✓ PASS |
| **Lead (Pb)** | ICP-MS | NMT 1 ppm | **Not Detected** | ✓ PASS |
| **Sterility** | USP <71> | No Growth | **No Growth** | ✓ PASS |
| **Bioburden** | USP <61> | < 10 CFU/mL | **< 1 CFU/mL** | ✓ PASS |
| **Bacterial Endotoxin** | USP <85> | NMT 5 EU/mL | **≤0.05 EU/mL** | ✓ PASS |

**Interpretation.** By ICP-MS, arsenic, cadmium, chromium, mercury, and lead were each Not Detected below their specification thresholds. Sterility by membrane filtration returned No Growth with bioburden below the reporting limit, and bacterial endotoxin was at or below 0.05 EU/mL, approximately one percent of the 5 EU/mL limit, indicating a substantial margin of compliance.

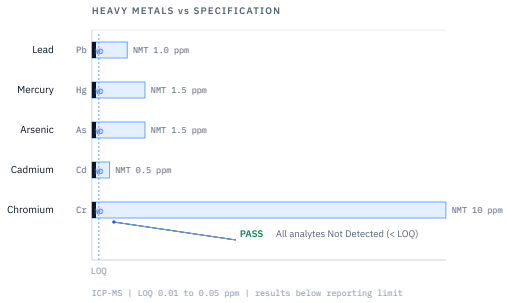



**Figure 6.** Elemental impurity headroom by ICP-MS. All regulated elements Not Detected, well below specification.




**Figure 7.** Bacterial endotoxin safety margin (USP <85>). Result at or below 0.05 EU/mL against the NMT 5 EU/mL pass limit.

## 8 FOR THE RECIPIENT

Plain-language summary

- ✓ **Purity 99.02 percent.** Almost everything in the vial is MOTS-c. Only 0.98 percent is trace related substances, comfortably past the 95 percent release bar.
- ✓ **You get at least the labeled amount.** Measured net peptide content is 40.60 mg, at or above the 40 mg on the label, so the vial delivers a full labeled dose of active peptide.
- ✓ **It is genuinely MOTS-c.** HPLC retention time plus an LC-MS [M+2H]2+ ion at m/z 1088.31 deconvoluting to a neutral mass of 2174.6 Da confirm the identity, so this is not a substitute or a mislabel.
- ✓ **Injectable-grade safety checks pass.** Sterility shows No Growth and bacterial endotoxin is at or below 0.05 EU/mL, roughly one percent of the limit.
- ✓ **Screened for contamination.** Arsenic, cadmium, chromium, mercury, and lead were Not Detected, and the fentanyl adulterant screen was Not Detected.
- ✓ **Water and salt are normal.** The small amounts of water (4.50 percent) and acetate (7.60 percent) are expected for a freeze-dried peptide and are already accounted for in the net peptide figure.

**Purity (HPLC)**
Percent of the main peptide peak relative to all detected peaks.

**Net peptide content**
Measured mass of actual peptide, separate from water and salt.

**NMT**
Not more than; an upper acceptance limit.

**Not Detected**
Below the method limit of quantitation (LOQ).

**EU/mL**
Endotoxin units per milliliter, a measure of bacterial toxin.

**RRT**
Relative retention time; an impurity position versus the main peak.

**Counterion**
The salt partner of the peptide.

**w/w**
By weight, as a percent of total mass.

**USP <71> / <85>**
Standard chapters for sterility and bacterial endotoxin.

**Karl Fischer**
Titration method for measuring residual water (USP <921>).

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**Storage.** Store the sealed lyophilized vial at -20 C, protected from light. Reconstituted solution is stable at 2 to 8 C; use within 30 days. **Reconstitution.** Add bacteriostatic or sterile water down the vial wall, swirl gently, do not shake. **Handling.** Research use only; not for human or veterinary use.

## 9 ANALYTICAL METHODS & NOTES

Method principles

**HPLC Purity and Net Peptide Content**
Reversed-phase HPLC with UV detection separates the principal peptide from related substances; purity is percent main-peak area and content is quantified against a calibrated reference. Acceptance: not less than the stated release limit.

**LC-MS Mass Confirmation**
Electrospray positive-mode mass spectrometry resolves the molecular ion and isotope or charge-state signature of the analyte.

**Counterion by Ion Chromatography**
Ion chromatography determines the counterion content by weight, characterizing the peptide salt form.

**Heavy Metals by ICP-MS**
Inductively coupled plasma mass spectrometry quantifies elemental impurities against per-element limits, with results below detection reported as Not Detected.

**Bioburden by USP <61>**
Total aerobic microbial and yeast or mold counts establish microbial load prior to release.

**Identity by HPLC Retention-Time Matching**
Sample retention time is compared to a qualified reference standard under identical conditions; identity is confirmed on co-elution within the established window.

**Water Content by Karl Fischer**
Coulometric Karl Fischer titration per USP <921> quantifies residual moisture in the lyophilized cake. Acceptance: not more than 8.0 percent w/w.

**Residual Solvents**
Headspace GC per USP <467> screens process solvents; trifluoroacetic acid is assessed against a not-detected threshold.

**Sterility by USP <71>**
Membrane filtration sterility test; No Growth is reported when no microbial recovery is observed across the incubation period.

**Bacterial Endotoxin by USP <85>**
Kinetic bacterial endotoxin test; acceptance is not more than 5 EU/mL per client specification.

DocuSigned by:
DS FC
01111100 00101100 00010101 10101111

**Finn C.**
Laboratory Director
Date of authorization: 06/12/2026

DocuSigned by:
DS BC
11111011 10110110 00000100 01011011

**Brennan C.**
Quality Assurance
Reviewed against acceptance criteria: 06/13/2026

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