TITREON
ANALYTICAL
Peptide & Compound Identity, Purity and Safety Analytics

Titreon Analytical
Analytical Chemistry | Mass Spectrometry | Microbiology
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Certificate of Analysis

FULL QUALITY CONTROL PANEL · COMPOUND ANALYTICAL REPORT

CERTIFICATE NO.
COA-2026-9502
Issued 09/11/2026 · Page 1 of 4

CLIENT	PREPARED FOR
PeptaraLabs	PeptaraLabs.io

Client reference: on file
Distribution: client confidential

SAMPLE & ACCESSION — ACC-2026-9602

ANALYTE / IDENTITY	CAS NUMBER	LOT NUMBER
NAD+	53-84-9	NAD-20260619-04
LABELED CONTENT	**SAMPLE MATRIX**	**APPEARANCE**
1000 mg	Lyophilized	Conforms / White Cake
MANUFACTURED	**RETEST / EXPIRY**	**STORAGE**
06/19/2026	06/2028	-20 C, dark
DATE RECEIVED	**DATE ANALYZED**	**DISPOSITION**
08/28/2026	09/10/2026	RELEASED

SAMPLE PHOTOGRAPH — AS RECEIVED

Photographic documentation withheld
at the client's request.

Identity and integrity confirmed by the analytical methods herein

CHROMATOGRAPHIC PURITY	IDENTITY	NET CONTENT	BACTERIAL ENDOTOXIN	DISPOSITION
95.84% ✓ PASS	NAD+ ✓ PASS	1012.17 REPORTED	1.83 ✓ PASS	RELEASED
Spec ≥ 95.0%	HPLC-RTM + LC-MS	mg measured · label 1000 mg	EU/mL · limit NMT 5	Full QC Panel complete

1 RELEASE STATEMENT

Authorized Disposition

The submitted NAD+ (beta-nicotinamide adenine dinucleotide) sample was evaluated under the Full Quality Control Panel covering identity, purity, net content, composition, sterility, bacterial endotoxin, elemental impurities, and targeted adulterant screening. Identity was confirmed by HPLC retention-time matching with a corroborating LC-MS base peak at m/z 664.12 [M+H]+, and chromatographic purity of 95.84 percent exceeded the not less than 95.0 percent release criterion. Sterility returned No Growth, bacterial endotoxin measured 1.83 EU/mL against the not more than 5 EU/mL limit, and arsenic, cadmium, chromium, mercury, and lead were each within their per-element specifications, 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.

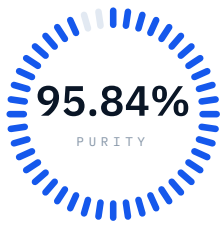
IDENTITY	PURITY	NET CONTENT	MOISTURE	STERILITY	ENDOTOXIN	HEAVY METALS
Confirmed	95.84%	1012.17 mg	2.4% w/w	No Growth	1.83 EU/mL	Conforms
✓ PASS	✓ PASS	✓ PASS	✓ PASS	✓ PASS	✓ PASS	✓ PASS

2 PURITY, QUANTITATION & IDENTITY

HPLC / HPLC-RTM

ANALYTE	SPECIFICATION	RESULT	UNIT	STATUS
Chromatographic Purity (HPLC)	≥ 95.0%	**95.84**	%	✓ PASS
Net Content	Report only	**1012.17**	mg	REPORTED
Identity (HPLC-RTM)	NAD+	**Confirmed**	—	✓ PASS
Adulterant / Fentanyl Screen	Immunoassay, 50 ng/mL	**Not Detected**	—	✓ PASS

Interpretation. The measured chromatographic purity of 95.84 percent exceeds the not less than 95.0 percent release criterion. The related-substance profile is dominated by nicotinamide and alpha-NAD, the expected hydrolysis and anomerization products of the dinucleotide. Net content of 1012.17 mg is the measured mass recovered from the unit and is reported against a nominal 1000 mg label claim, confirming the vial delivers at least the labeled mass of active compound.



Specification ≥ 95.0% **PASS**
HPLC area %

Figure 1. Purity composition of the released dedicated unit by HPLC area normalization. Target compound 95.84%, total related substances 4.16%.

Not for use in diagnosing, treating, or curing any disease. Research purposes only.

3 REPRESENTATIVE CHROMATOGRAM

Reversed-phase HPLC-UV

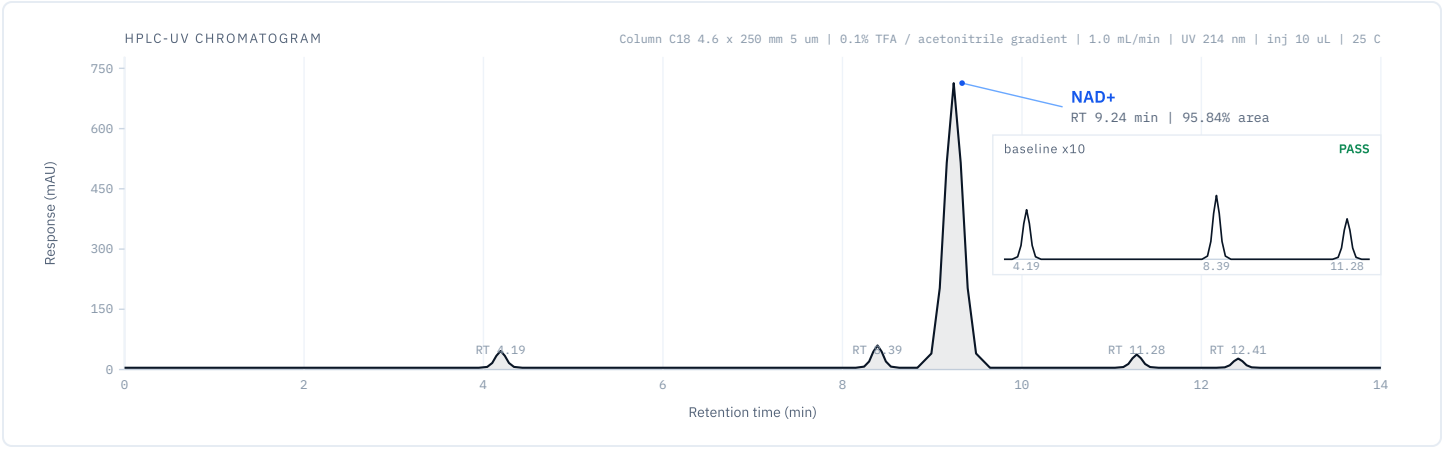


Figure 2. Representative reversed-phase HPLC-UV chromatogram (Conformity unit V1, near the batch mean). Trace related substances are shown magnified 10x in the inset. A sharp, symmetric principal peak with a low related-substance burden is consistent with high chromatographic purity.

PEAK	RT (MIN)	AREA (MAU·S)	AREA %	PLATES (N)	TAILING
NAD+ (principal)	9.24	4,792,000	**95.84**	8,600	1.05
Nicotinamide (RRT 0.45)	4.190	56,000	1.12	7,200	1.10
alpha-NAD (RRT 0.91)	8.390	86,500	1.73	6,900	1.12
ADP-ribose (RRT 1.22)	11.280	36,500	0.73	6,600	1.14
Unknown degradant (RRT 1.35)	12.410	14,000	0.28	6,400	1.11
Unresolved / baseline	—	15,000	0.30	—	—
Total		**5,000,000**	**100.00**		

4 MASS CONFIRMATION

LC-MS, ESI positive

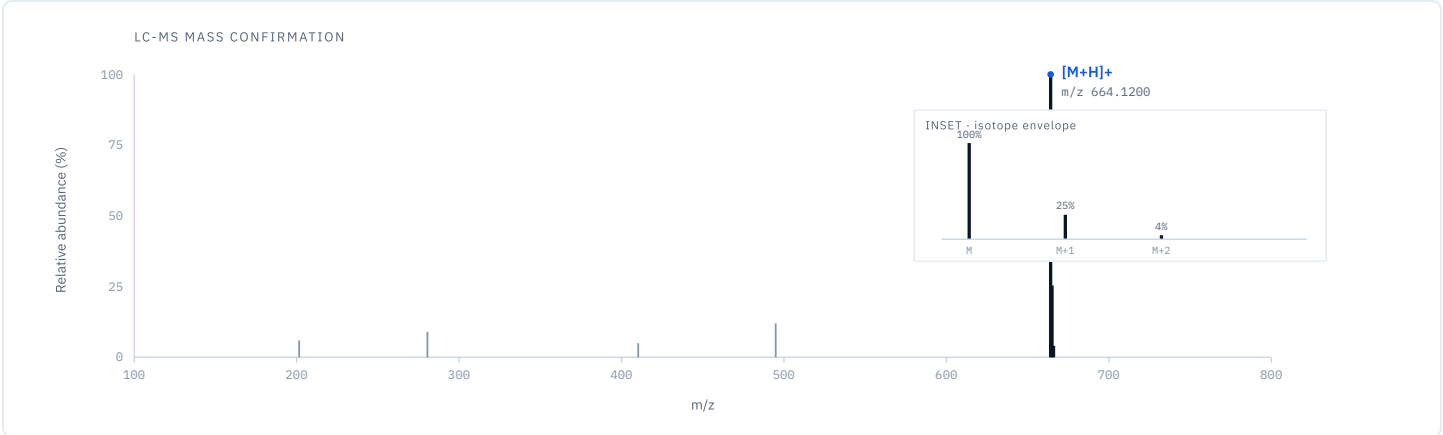


Figure 3. LC-MS mass confirmation (electrospray positive mode). Base peak [M+H]+ at m/z 664.1200 matches NAD+ (C21H27N7O14P2, MW 663.43 Da); the isotopic envelope [M+1] (25.4%) and [M+2] (4.1%) confirms identity.

5 CONFORMITY TESTING

3 units · HPLC

SAMPLE	PURITY	NC (MG)	IDENTITY	RESULT
V0 (dedicated)	95.84%	1012.5	Confirmed	✓ PASS
V1	95.72%	1008.2	Confirmed	✓ PASS
V2	96.01%	1015.8	Confirmed	✓ PASS
Mean	**95.86%**	**1012.17**	—	—
Std Dev	**0.150%**	**3.81**	—	—

Interpretation. Across three independently tested units the purity standard deviation was 0.15 percent and net content standard deviation 3.81 mg, a low dispersion consistent with a homogeneous, well-controlled batch.

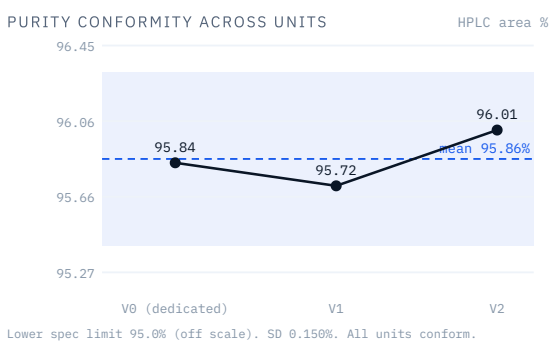


Figure 4. Purity conformity across tested units with mean and plus or minus 3 SD control

6 COMPOSITION, MOISTURE & COUNTERION

KF · IC · USP <467>

PARAMETER	METHOD	SPECIFICATION	RESULT	STATUS
Net Content	HPLC / AAA	Report only	**1012.17 mg**	REPORTED
Water (Karl Fischer)	USP <921>	NMT 8.0% w/w	**2.4%**	✓ PASS
Counterion	Ion chromatography	Report only	**None (free acid)**	REPORTED
Residual Solvents	USP <467>	Not Detected	**Not Detected**	✓ PASS
Gross Fill Weight	Gravimetric	Report only	**1820 mg**	REPORTED

Interpretation. Karl Fischer titration returned 2.4 percent residual water and NAD+ is presented as the inner zwitterion with no added counterion. The 1820 mg gross fill reconciles active compound, residual water, related substances, and lyophilization excipient fill.

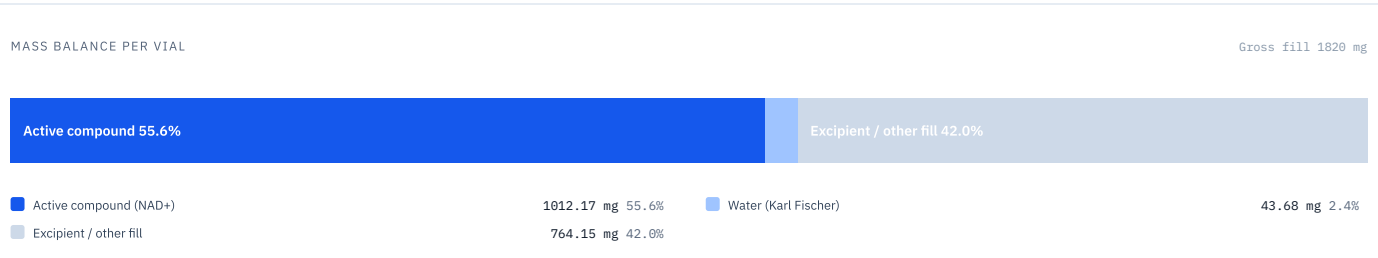


Figure 5. Mass balance of the lyophilized cake. Active compound is reported against the 1000 mg label claim; the balance is residual water and lyophilization excipient fill.

7 SAFETY & CONTAMINATION CONTROLS

ICP-MS · USP <71> · <85>

TEST	METHOD	SPECIFICATION	RESULT	STATUS
Arsenic (As)	ICP-MS	NMT 1.5 ppm	**0.521 ppm**	✓ PASS
Cadmium (Cd)	ICP-MS	NMT 0.5 ppm	**0.038 ppm**	✓ PASS
Chromium (Cr)	ICP-MS	NMT 10 ppm	**3.124 ppm**	✓ PASS
Mercury (Hg)	ICP-MS	NMT 1.5 ppm	**0.417 ppm**	✓ PASS
Lead (Pb)	ICP-MS	NMT 1 ppm	**0.189 ppm**	✓ PASS
Sterility	USP <71>	No Growth	**No Growth**	✓ PASS
Bioburden	USP <61>	Report / Low	**< 10 CFU/g**	✓ PASS
Bacterial Endotoxin	USP <85>	NMT 5 EU/mL	**1.83 EU/mL**	✓ PASS

Interpretation. By ICP-MS, arsenic, cadmium, chromium, mercury, and lead were each measured below their specification thresholds. Sterility by membrane filtration returned No Growth with bioburden below the reporting limit, and bacterial endotoxin measured 1.83 EU/mL, within the not more than 5 EU/mL release limit.

Figure 6. Elemental impurity headroom by ICP-MS. All regulated elements measured below specification.

Figure 7. Bacterial endotoxin safety margin (USP <85>). Result 1.83 EU/mL against the NMT 5 EU/mL pass limit.

8 FOR THE RECIPIENT

Plain-language summary

- ✓ **Purity 95.84 percent.** The main peak is NAD+, past the 95 percent release bar; the rest is trace nicotinamide and alpha-NAD.
- ✓ **You get at least the labeled amount.** Measured net content is 1012.17 mg, at or above the 1000 mg on the label.
- ✓ **It is genuinely NAD+.** HPLC retention time plus an LC-MS base peak at m/z 664.12 confirm the identity, so this is not a substitute or a mislabel.
- ✓ **Sterility and endotoxin within specification.** Sterility shows No Growth and bacterial endotoxin is 1.83 EU/mL, within the not more than 5 EU/mL limit.
- ✓ **Screened for contamination.** Arsenic, cadmium, chromium, mercury, and lead were all below limits, and the fentanyl adulterant screen was Not Detected.
- ✓ **Water is low.** Residual water is 2.4 percent, expected for a freeze-dried preparation and already accounted for in the net content figure.

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

Net content
Measured mass of the actual compound, 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 compound.

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>).

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 2 mL 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 Content
Reversed-phase HPLC with UV detection separates the principal compound 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 salt form.

Heavy Metals by ICP-MS
Inductively coupled plasma mass spectrometry quantifies elemental impurities against per-element limits.

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 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:
01100000 01110010 10111001 01100101
DS FC

Finn C.
Laboratory Director
Date of authorization: 09/11/2026

DocuSigned by:
00100111 11100100 00001100 01100111
DS BC

Brennan C.
Quality Assurance
Reviewed against acceptance criteria: 09/11/2026

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