FOR RESEARCH USE ONLY

NAD+ 500 MG

28-Day Stability Study

A reconstituted-solution stability profile measuring purity (HPLC-UV / LC-MS) and pH across five timepoints over 28 days, interpreted against LuvionBio's internal stability grading framework.

TEST ARTICLE NAD+ 500 MG	MS IDENTITY NAD+
LOT NUMBER LBL-0625-10NJ5-1031	ACCESSION # 2507140020
TESTING LABORATORY Freedom Diagnostics (USA)	STUDY WINDOW 28 Days · 5 Timepoints
METHODS HPLC-UV · LC-MS/MS · pH	DOCUMENT v1.0

01 · EXECUTIVE SUMMARY

Exceptional purity stability *across 28 days.*

Over a 28-day reconstituted-solution window, the NAD+ 500 MG lot held its purity essentially flat and its pH within a narrow band — placing both measures inside the High-Grade tier of LuvionBio's internal framework.

PURITY DRIFT (DAY 1 → 28)	PURITY SPREAD (MAX–MIN)	PH VARIATION (TOTAL)	STABILITY TIER
0.10%	0.13%	0.07	High-Grade
99.92% → 99.82%	99.81% – 99.94%	5.59 – 5.66	Purity & pH

Across all five timepoints, purity remained above 99.8% and never moved more than 0.13% from peak to trough. Solution pH stayed within 0.07 units across the full 28 days. Both the purity drift and the pH excursion sit comfortably under the High-Grade limits defined in Section 03.

BOTTOM LINE

The NAD+ 500 MG lot demonstrated High-Grade stability on both measured parameters, with a 0.10% purity shift and 0.07-unit pH variation over 28 days — a well-controlled degradation profile consistent with disciplined synthesis, lyophilization, and fill.

02 · WHY THIS STUDY MATTERS

Stability is what purity at $t = 0$ can't tell you.

A single certificate-of-analysis purity number describes the molecule at one moment, in the bottle, before anything has happened to it. It is a necessary check — but it is not a complete one. Once a lyophilized peptide is reconstituted into solution and stored, a second set of questions opens up.

In solution, a synthesized peptide is exposed to hydrolysis, oxidation, aggregation, deamidation, and pH drift. Reconstitution medium, fill consistency, residual moisture, lyophilization quality, and handling all influence how the material behaves over time. None of this is visible in a one-point purity reading.

> **PLAIN LANGUAGE**
>
> A purity number tells you what is in the vial on day one. A **time-course stability study** tells you whether what is in the vial *stays* what it was — across reconstitution and storage, measured repeatedly, on the same instrument, against a defined grading framework.

What a 28-day reconstituted profile adds. It records how the material behaves after reconstitution and through storage, captured repeatedly on the same methods, so that buyers see a degradation trajectory rather than a single point. For NAD+ — a molecule with known sensitivity in aqueous solution — that trajectory is a particularly meaningful quality signal.

Why LuvionBio commissioned this work. LuvionBio submitted a representative lot for independent purity (HPLC-UV / LC-MS) and pH measurement across five timepoints over 28 days. The result is a documented degradation profile rather than a single snapshot — a more demanding signal of manufacturing and stabilization quality.

03 · INTERPRETATION FRAMEWORK

An internal stability *grading framework*.

The framework below is used internally by LuvionBio to describe how tightly a test article holds its purity and pH over the study window. Purity is evaluated on percent drift; pH on absolute change — each measured both per week and as a total excursion across 28 days.

High-Grade

Purity Δ ≤ 0.5%/wk · ≤ 2.5% total
pH Δ ≤ 0.2/wk · ≤ 0.4 total

Minimal change across the window. Indicates a well-controlled, stable preparation with tight run-to-run consistency.

Acceptable

Purity Δ 0.5–1.5%/wk · ≈2.5–7.5% total
pH Δ 0.2–0.4/wk · 0.5–0.8 total

Measurable but bounded change. Within usable range for research material; greater variability than the High-Grade tier.

Sub-Optimal

Purity Δ > 1.5%/wk · > 7.5% total
pH Δ > 0.4/wk · > 0.8 total

Change large enough to warrant investigation of synthesis, lyophilization, or handling before release.

IMPORTANT FRAMING

This framework is an internal comparative review tool used by LuvionBio. It is **not** a regulatory stability standard, an industry benchmark, or a certified release specification. It is presented here to make the interpretation of the results in this report transparent and reviewable.

04A · RESULTS · PURITY

Purity across *28 days*.

HPLC-UV with LC-MS identity confirmation, measured at five timepoints over the study window.

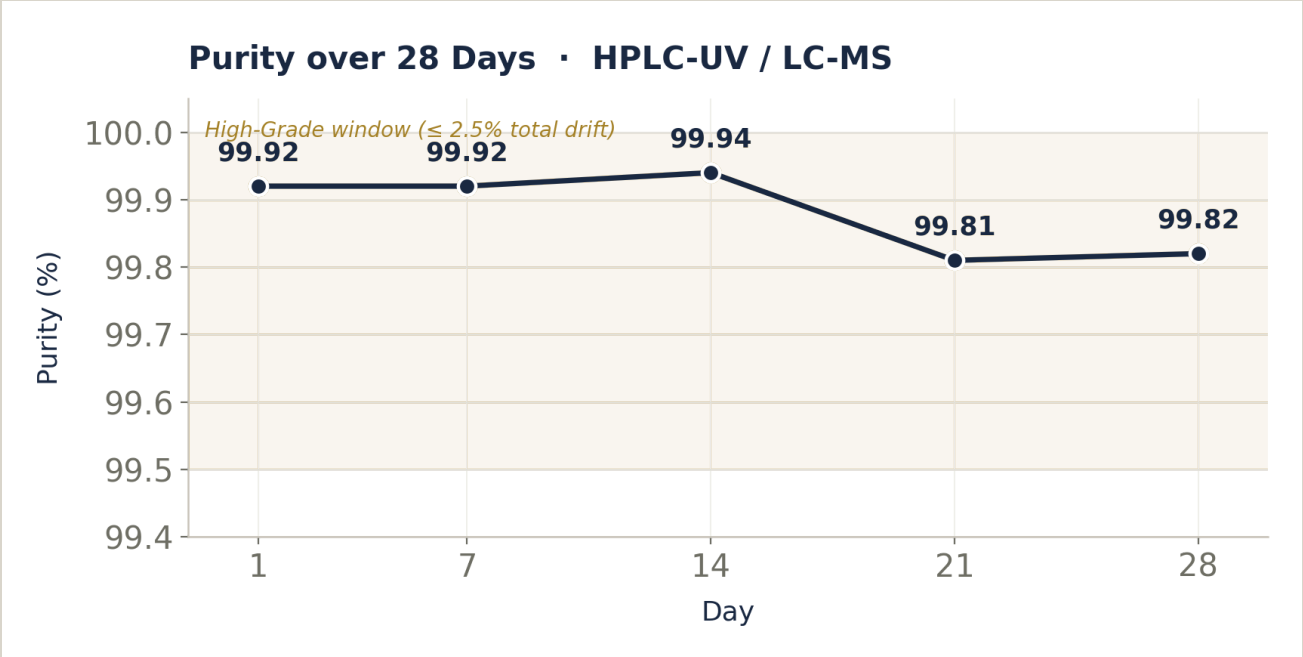

Figure 1 · Purity by timepoint. HPLC-UV / LC-MS, single lot.

Timepoint	Day 1	Day 7	Day 14	Day 21	Day 28
Purity	99.92%	99.92%	99.94%	99.81%	99.82%

TAKEAWAY · PURITY

Purity held between 99.81% and 99.94% across the full window, a total drift of 0.10% from Day 1 to Day 28 (peak-to-trough spread 0.13%). That is roughly 0.025% per week — an order of magnitude inside the High-Grade limit of 0.5% per week.

04B · RESULTS · PH

pH across *28 days*.

Solution pH measured at the same five timepoints, reconstituted in bacteriostatic water.

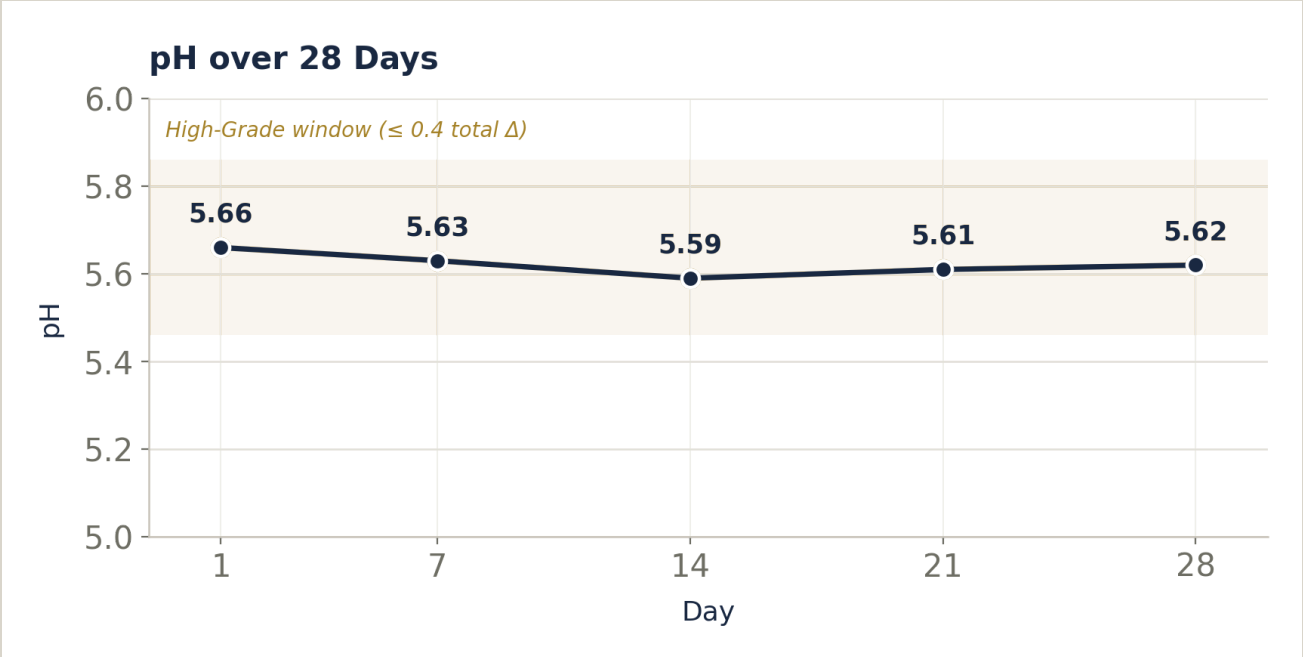

Figure 2 · pH by timepoint. Reconstituted solution, single lot.

Timepoint	Day 1	Day 7	Day 14	Day 21	Day 28
pH	5.66	5.63	5.59	5.61	5.62

TAKEAWAY · pH

Solution pH moved within a 0.07-unit band (5.59–5.66) across 28 days, well inside the High-Grade limit of 0.4 total. The slight mid-study dip and recovery is consistent with normal measurement variation rather than directional drift.

05 · SUMMARY

Drift versus *framework thresholds*.

Measured change across the 28-day window, placed against the internal grading framework from Section 03.

PURITY — TOTAL DRIFT

0.10%

Limit: ≤ 2.5% · High-Grade

PH — TOTAL Δ

0.07

Limit: ≤ 0.4 · High-Grade

OVERALL TIER

High-Grade

Both parameters

Measure	Total Δ (28 d)	Per-week avg	High-Grade limit	Tier
Purity	0.10%	≈0.025%/wk	≤ 0.5%/wk · ≤ 2.5% total	**High-Grade**
pH	0.07	≈0.018/wk	≤ 0.2/wk · ≤ 0.4 total	**High-Grade**

Both measured parameters fall inside the High-Grade tier by a wide margin on both the per-week and total-excursion criteria.

06 · QUALITY POSITIONING

How LuvionBio thinks about *quality*.

Reference-framework grading, independent testing, and documented evidence — applied at the batch level, not the marketing level.

TIME-COURSE EVIDENCE

Stability is measured across multiple timepoints, not asserted from a single t=0 reading.

INDEPENDENT TESTING

Purity and pH analysis is performed by an outside laboratory and reported as found.

DEFINED FRAMEWORK

Results are interpreted against a transparent internal grading framework, disclosed in full.

MANUFACTURING DISCIPLINE

Synthesis, purification, lyophilization, and fill steps are controlled against internal specifications.

BATCH-LEVEL QC

Quality control is applied to representative lots to generate evidence reviewable by technical partners.

SCIENTIFIC ACCOUNTABILITY

Source data, testing laboratory, lot, and accession identifiers are reported so reviewers can verify independently.

> **POSITION**
>
> LuvionBio is committed to raising the floor on what counts as evidence of quality in the RUO peptide category. A documented stability profile is one piece of that commitment — and is not the last piece.

07 · SOURCE DATA & SUBSTANTIATION

The numbers, *traceable*.

TEST ARTICLE	NAD+ 500 MG
MS IDENTITY	NAD+
APPEARANCE	White lyophilized powder
LOT NUMBER	LBL-0625-10NJ5-1031
ACCESSION · SEARCH CODE	2507140020 · luvi2507140020
TESTING LABORATORY	Freedom Diagnostics (USA) · verifiable via FreedomDiagnosticsTesting.com
METHODS	HPLC-UV purity; LC-MS/MS identity; solution pH
RECONSTITUTION	500 mg lyophilized NAD+ in bacteriostatic water
TIMEPOINTS	Day 1, 7, 14, 21, 28 (28-day window)
REPORT DATE	8/18/2025 · received 7/14/2025

CLAIMS SUBSTANTIATION

CLAIM MADE IN THIS REPORT	SUPPORT	SOURCE
Purity 99.92% → 99.82% (Day 1 → Day 28); total drift 0.10%	DIRECT	COA 2507140020
pH range 5.59–5.66 across 28 days; total Δ 0.07	DIRECT	COA 2507140020
Identity confirmed as NAD+ by LC-MS	DIRECT	COA 2507140020
Both parameters fall within the High-Grade tier	INFERRED	Framework applied to COA data
Stability grading tiers (High / Acceptable / Sub-Optimal)	INFERRED	LuvionBio internal framework
Time-course stability is a stronger quality signal than t=0 purity alone	CONTEXT	General peptide manufacturing literature

How to read: Direct = read from the source COA. Inferred = LuvionBio framework applied. Context = widely held views, not specific to this study.

08 · COMPLIANCE

Research Use *Only*.

RESEARCH USE ONLY DISCLAIMER

All LuvionBio materials referenced in this report are provided strictly for laboratory research use only. They are **not** intended for human consumption, clinical use, diagnostic use, therapeutic use, veterinary use, or household use. This report is provided for informational and research-quality evaluation purposes only and does not constitute medical, clinical, or regulatory advice.

About the testing. The purity, identity, and pH data in this report were generated by Freedom Diagnostics, an independent analytical laboratory. The signed certificate of analysis is reproduced in full as the final page of this document. LuvionBio commissioned the testing and is the data owner.

About this document. Pages 1–8 are a LuvionBio-authored customer-facing summary and interpretation of the underlying certificate of analysis. The narrative, framework, and figures on those pages are LuvionBio's own and were not authored by the testing laboratory. The original signed certificate that follows is the authoritative source record and has not been modified.

The purity analysis was conducted under standard laboratory conditions and is specific to the sample(s) provided. The peptides tested are intended for research use only and are not approved for human or veterinary use, or for diagnostic, therapeutic, or clinical applications. Results should be interpreted by qualified professionals within the scope of the intended research. Accuracy may be influenced by sample integrity, handling, and other experimental variables.

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BRILLIANCE IN BIOSCIENCE

09 · ORIGINAL SOURCE DOCUMENT

Original Verifiable *Study Results*.

The signed Stability Study & Certificate of Analysis on the following page is the original source document issued by the testing laboratory.

It is reproduced here without modification. All purity, pH, and identity values summarized in this report are drawn directly from it, and it can be independently verified using the accession and search code below.

ACCESSION #	SEARCH CODE
2507140020	luvi2507140020
VERIFY VIA	LOT NUMBER
FreedomDiagnosticsTesting.com	LBL-0625-10NJ5-1031

FREEDOM DIAGNOSTICS

Proudly Owned and Operated In the USA

STABILITY STUDY & CERTIFICATE OF ANALYSIS

Verifiable Via:	FreedomDiagnosticsTesting.com	**Assession #**	2507140020
Product:	NAD+ 500MG	**Client**	LuvionBio LLC
MS Identity:	NAD+	**Search Code**	luvi2507140020
Received Date:	7/14/2025	**Lot Number**	LBL-0625-10NJ5-1031
Report Date:	8/18/2025	**Appearance**	White Lyophilized Powder

CHEMICAL ANALYSIS METHODOLOGY:

We reconstituted 500mg lyophilized NAD+ in bacteriostatic water and recorded weekly purity (HPLC-UV, MS) and pH. The data define the degradation profile and inform manufacturing/stabilization quality.

REFERANCE STANDARDS

High-Grade

Purity Δ | 0.5%/wk | 2.5% Total
pH Δ | 0.2/wk | 0.4 Total

Acceptable Grade

Purity Δ | 0.5–1.5%/wk | ≈2.5–7.5% Total
pH Δ | 0.2–0.4/wk | 0.5–0.8 Total

Sub-Optimal Grade

Purity Δ | >1.5%/wk | >7.5% Total
pH Δ | >0.4/wk | >0.8 Total

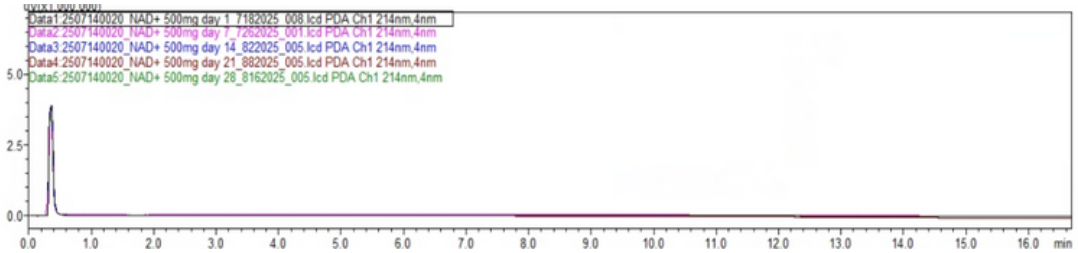
STUDY RESULTS

	Day 1	Day 7	Day 14	Day 21	Day 28
Purity	99.92%	99.92%	99.94%	99.81%	99.82%
pH	5.66	5.63	5.59	5.61	5.62

INTERPRETATION OF RESULTS

Over 28 days, the LuvionBio NAD⁺ sample showed only a 0.10% purity shift with pH variation limited to ±0.07 units, confirming exceptional stability. These results exceed reference standards and indicate manufacturing quality at the highest level.

Chromatogram |HPLC Overlay of Multiple Timepoints



Stephen Schmidt

Stephen Schmidt
Principal Chemist

COA: 2507140020

The peptide purity analysis reported here was conducted using LCMS/MS under standard laboratory conditions. This analysis is intended for informational purposes only and is specific to the sample(s) provided. The peptides tested are intended for research use only and are not approved for human or veterinary use, diagnostic, therapeutic, or clinical applications. Results should be interpreted by qualified professionals within the scope of the intended research. The accuracy and reliability of the test may be influenced by sample integrity, handling, and other experimental variables.

Contact: Admin@FreedomDiagnostics.net

Searchable Via: FreedomDiagnosticsTesting.com