

CERTIFICATE OF ANALYSIS

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PRODUCT IDENTIFICATION

Product Name	Thymosin Alpha-1 Analytical Standard
Catalog No. (SKU)	TA5
Lot / Batch No.	ZBV-TA5-20260513
Quantity per Vial	5 mg
Manufacture Date	2026-05-13
Analysis Date	2026-05-18
Expiration Date	2028-05-18
Physical Appearance	White to off-white lyophilized powder
Material Form	Lyophilized solid

MOLECULAR CHARACTERIZATION

Chemical Name / Synonyms	Thymosin Alpha-1 Analytical Standard
Molecular Formula	Peptide conjugate (empirical formula on file)
Molecular Weight (Calc.)	See COA
Primary Structure	Structure assigned by LC-MS/MS peptide mapping and comparison to qualified in-house reference standard.
CAS Registry No.	Assigned per internal reference catalog

SUMMARY OF ANALYTICAL RESULTS

Analytical Test	Specification	Result	Method Reference
HPLC Purity (area %)	>= 98.0%	99.2%	In-house HPLC / USP <621>
Identity Confirmation (MS)	Consistent with reference	Conforms	ESI-MS / LC-MS
Water Content (Karl Fischer)	<= 5.0%	2.85%	USP <921> Method Ic
Acetate / Counter-ion	Report value	8.46%	Ion Chromatography
Appearance	White to off-white powder	Conforms	Visual inspection

Qualified as an in-vitro analytical reference standard only. Not for human, veterinary, diagnostic, or therapeutic use.

HPLC PURITY ASSAY - CHROMATOGRAPHIC CONDITIONS

Column	C18 reversed-phase, 4.6 x 250 mm, 5 um, 300 A pore size
Mobile Phase	A: 0.1% TFA/H2O; B: 0.1% TFA/ACN; linear gradient 5-65% B over 45 min
Flow Rate	1.0 mL/min
Detection	UV 214 nm with in-line ESI-MS identity check
Main Peak RT	17.78 min

Main Peak Area	99.2%
Total Related Substances	0.80%
System Suitability	N >= 2000 plates; tailing factor <= 1.5 (USP <621>)

MASS SPECTROMETRY IDENTITY CONFIRMATION

Ionization Mode	ESI-Positive
Theoretical Mass	See COA
Observed Mass (M+H)+	See COA
Mass Delta	+/- 0.06 Da
MS/MS Fragmentation	Major b/y series consistent with assigned structure
Identity Conclusion	Conforms - observed mass within method tolerance

SUPPLEMENTAL QUALITY ATTRIBUTES

Test Parameter	Acceptance Criteria	Result	Technique
Bacterial Endotoxin	<= 0.25 EU/mg	< 0.10 EU/mg (kinetic chromogenic LAL)	USP <85> LAL
Heavy Metals (screen)	<= 10 ppm	< 5 ppm combined (ICP-MS screen)	ICP-MS
Residual Solvents	ICH Q3C compliant	Complies with ICH Q3C (GC headspace)	GC Headspace
Related Substances	Single impurity <= 0.5%	Conforms	HPLC
Peptide Content (UV)	Report value	98.6%	UV 214 nm

STORAGE & HANDLING

Lyophilized / Unopened Solid	Lyophilized thymosin alpha-1 (thymalfasin) between 2 and 8 deg C. (ZADAXIN label)
After Reconstitution (Analytical Solution)	Use reconstituted solution immediately. Discard unused solution. Do not store for later analytical sessions.
Handling	Keep the sealed vial at 2-8 deg C. Equilibrate the sealed vial briefly before opening if needed to limit condensation. Do not shake.
Stability Note	Unopened lyophilized solid: 2-8 deg C through labeled expiration. After reconstitution: immediate use only.

RESEARCH USE ONLY — REGULATORY NOTICE

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