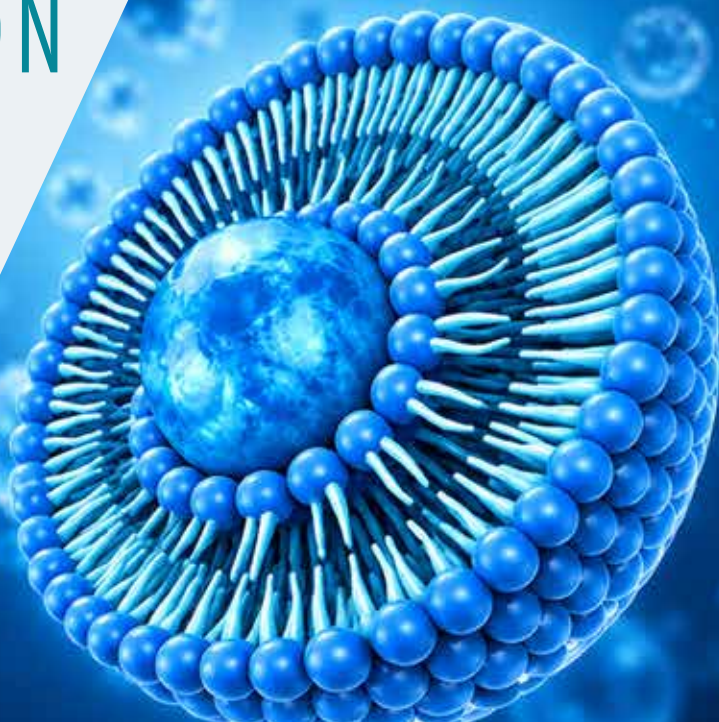


From
Formulation
to **Evidence.**

PHYSICOCHEMICAL CHARACTERISATION

Driving Quality. Ensuring Performance.
Delivering Confidence.

A Comprehensive overview of analytical techniques
and physicochemical evaluations to ensure
the quality, safety, stability and performance of
liposomal formulations.



- Particle Size & Distribution
- Zeta Potential
- Encapsulation Efficiency
- Thermal & Structural Analysis
- Morphology
- Stability Studies
- In-vitro Release
- Regulatory Compliance

MANUFACTURED IN FACILITIES CERTIFIED BY



How We Prove Your Liposome Works

A guide to the science that proves your liposomal formulation is real, stable, and effective.



Your active is truly inside

Not just mixed — scientifically confirmed inside the lipid bilayer



Your batch is always consistent

Uniform particles mean every dose behaves identically



You get the paperwork

Regulatory-ready certificates and stability reports included

Inside This Brochure

- | | | |
|--------|--|---|
| 01 | What we test & why it matters | > |
| 01 (a) | Physico-Structure — EE, Particle Size, PDI & Zeta Potential Data | > |
| 01 (b) | Chemico-Structure — FTIR, EDX & SEM/TEM confirmation | > |
| 01 (c) | Thermal Stability & Integrity — DSC, TGA & Shelf-life | > |
| 02 | Our 4-step process from sample to Dossier | > |
| 03 | Common problems & our solution | > |
| 04 | Practical Support | > |

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What We Test & Why It Matters

3 things we confirm about every Liposome and what each one means for your product's performance.

01 (a)

Is your active actually inside? — PHYSICO-STRUCTURE



Encapsulation
Efficiency

≥70%

What this means for your product: More than 70% of your active ingredient is encapsulated inside the liposome. Higher encapsulation = higher delivered dose.



Particle Size

<300 nm

What this means for your product: At this nanoscale size, liposomes pass through biological barriers far more easily than standard formulations. Smaller particles = better cellular uptake = greater absorption.



Poly Dispersity
Index (PDI)

<0.3

What this means for your product: A low PDI means every particle in every batch is close to the same size. Consistent particles = consistent product performance.



Zeta Potential

<-30 mV

What this means for your product: A strong negative charge keeps particles from agglomerating together in the bottle. Stable particles = longer shelf life for your product.

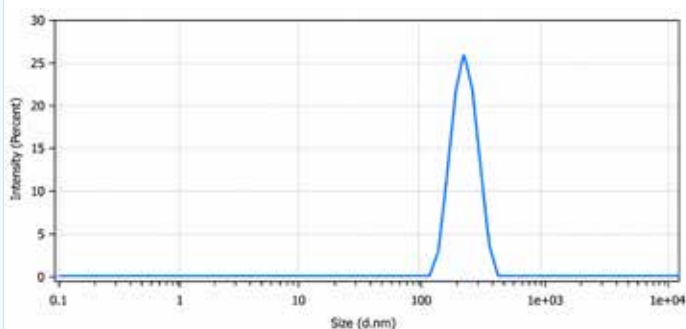
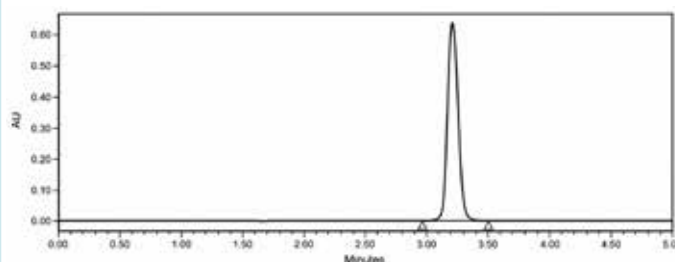
Instrument Evidence

Every specification above is backed by real analytical data from LipoEdge™ production batches.

01

Encapsulation Efficiency — High-Performance Liquid Chromatography (HPLC) Chromatogram

A single peak confirms the presence of the active ingredient inside the liposome.



02

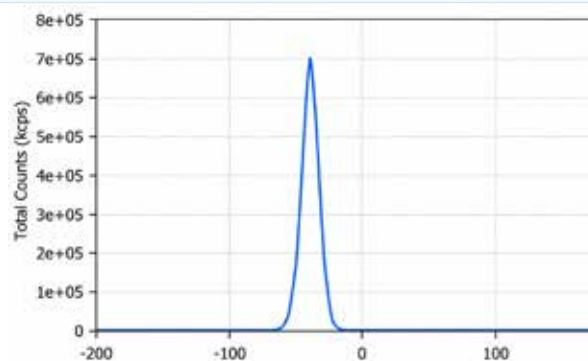
Particle Size Distribution — Dynamic Light Scattering (DLS)

The intensity-weighted size distribution shows the dominant population centred in the nanometre range, consistent with well-formed unilamellar vesicles.

03

Zeta Potential Distribution — Dynamic Light Scattering (DLS)

A sharp, symmetrical distribution centred at -36.65 mV demonstrates strong surface charge uniformity.



01 (b)

Is the structure chemically confirmed? **CHEMICO-STRUCTURE**



Fourier-Transform
Infrared Spectroscopy
(FTIR)

Molecular Fingerprint

What this means for your product: We scan for the unique chemical signature of your active inside the liposome. This proves you're selling a true liposomal product — not a simple powder mix.



Energy-Dispersive X-Ray
Spectroscopy
(EDX)

Surface Scan

What this means for your product: We check that no active ingredient is sitting on the outside of the particle. Clean surfaces = proven encapsulation.



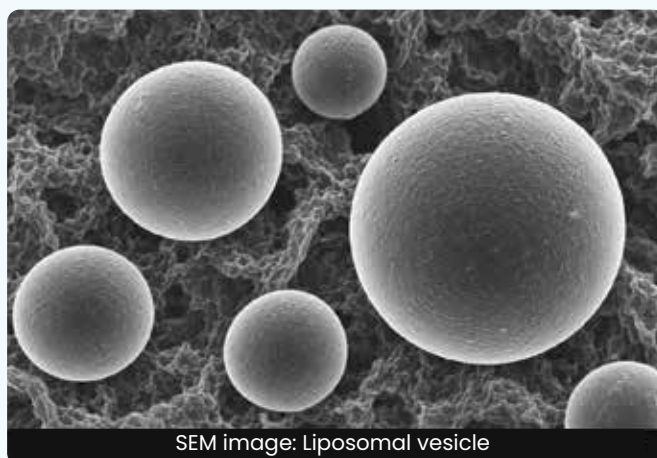
Scanning Electron
Microscope (SEM) /
Transmission Electron
Microscope (TEM)

Microscopic Proof

What this means for your product: High-resolution images show your liposomes are spherical and smooth — consistent with proper vesicle formation.

Microscopic Proof – SEM Imaging

SEM confirms smooth, spherical vesicles — the definitive structural signature of a correctly formed liposome with an intact lipid bilayer. Non-spherical or rough surfaces indicate a formulation defect requiring process adjustment.



SEM image: Liposomal vesicle

01 (c)

Will it hold up on the shelf? — THERMAL STABILITY & INTEGRITY

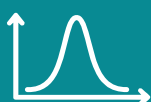
We put our liposomes through real-world and accelerated testing to ensure they remain stable, intact, and effective throughout their shelf life.



Stability Testing

6–36 Months

What this means for your product: We expose formulations to heat and humidity, conditions it will face in real supply chains. You get data proving your product stays stable across its claimed shelf life.



Differential Scanning Calorimetry (DSC)

Encapsulation Proof

What this means for your product: A thermal scan that provides the thermodynamic proof of encapsulation—showing the active is genuinely inside the liposome, not just mixed with it.



Thermogravimetric Analysis (TGA)

Heat Resistance

What this means for your product: We push the formulation to its thermal limits to confirm it won't break down under extreme conditions in transit or storage.

Our 4-Step Process From Sample To Dossier

Every LipoEdge™ product goes through this validated pipeline before you receive your certificate.

01



Nanoparticle Screening

- ✓ Particle size checked
- ✓ PDI uniformity verified
- ✓ Surface charge measured
- ✓ Encapsulation % confirmed

→ Your sample is tested for basic physical performance before any further work.



02



Chemical Confirmation

- ✓ FTIR molecular fingerprint
- ✓ EDX surface scan
- ✓ SEM/TEM visual imaging

→ We prove chemically and visually that your active is inside — not on the surface.



03



Shelf-Life Validation

- ✓ DSC thermal encapsulation proof
- ✓ TGA high-heat resistance
- ✓ Real-time & accelerated stability check

→ Your formulation is stress-tested under conditions it will face in the real world.



04



Dossier & Reporting

- ✓ Validation certificates issued
- ✓ Stability reports compiled
- ✓ Troubleshooting data included
- ✓ Regulatory-ready package delivered

→ You receive a complete documentation package ready for regulatory submission.



Common Problems & Our Solution

Four formulation failures we diagnose and fix.



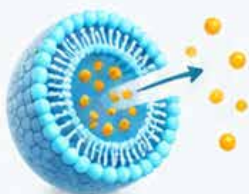
Particle agglomeration
under microscope



PROBLEM:
Particles are agglomerating together



OUR FIX:
Low surface charge lets particles stick. We optimise the zeta potential until repulsion keeps them separated — ensuring a stable, free-flowing product.



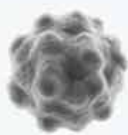
Active ingredient
leakage



PROBLEM:
The active isn't staying inside



OUR FIX:
EDAX and HPLC reveal if actives are leaking out. We adjust the lipid-to-active ratio until encapsulation efficiency exceeds our 70% minimum threshold.



Non-spherical



Spherical



PROBLEM:
The particle shape is non-spherical



OUR FIX:
SEM/TEM images show non-spherical or rough-surfaced particles and no bilayer. We adjust the manufacturing process until the particles return to the correct smooth, round form with a lipid bilayer.



Heat / Storage stress



PROBLEM:
Product breaks down on heating or storage



OUR FIX:
DSC catches physical mixing artefacts by measuring the T_m . TGA shows where mass loss begins. We redesign the formulation to withstand real-world storage conditions.

Practical Support

YOUR CHARACTERISATION QUESTION	OUR SUPPORT
 Is your active actually encapsulated?	EE% by HPLC • EDX surface scan • FTIR confirmation
 Are particles the right size and uniform?	Particle size by DLS • PDI uniformity
 Is the surface charge adequate for stability?	Zeta potential measurement
 Is the molecular structure confirmed?	FTIR fingerprint • SEM/TEM imaging
 Will it hold up on the shelf?	DSC encapsulation proof • TGA heat resistance • Real-time & Accelerated Stability
 Need to compare formulations?	Side-by-side physicochemical screening & performance comparison
 Need help with inconsistent results?	Methodology troubleshooting • Protocol optimisation

Your Next Step



Test an Existing Formulation

Send us your sample. We run the full characterisation suite.



Develop a New Product

We build and validate your liposomal formulation end-to-end.



Talk to Our Team

Discuss your formulation testing requirements with our scientists.



Let's Validate Your Formulation

Talk to our team about your liposomal product. We'll handle the science. You'll get the proof.



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LIPOSOMAL
SCIENCE
FOR A HEALTHIER
TOMORROW

Manufactured in
Facilities Certified By

