

# Two Different Liposomal Formulations with Bioactive Natural Extract Prepared and Characterised for Various Applications

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## Introduction

Liposomes are vesicular structures composed of lipid bilayers that have gained significant attention in pharmaceutical and cosmetic research due to their unique properties and potential applications. Liposomal formulations can encapsulate bioactive natural extracts, enhancing their stability, bioavailability and controlled release properties. This article aims to explore two distinct liposomal formulations with bioactive natural extracts, their preparation methods, and their characterization for various applications. Liposomal Formulation A incorporates a bioactive natural extract known for its antioxidant properties. The formulation consists of a lipid bilayer encapsulating the bioactive extract within its aqueous core. The preparation involves a lipid film hydration technique followed by extrusion through a filter of defined pore size to obtain liposomes of desired size and uniformity. The size and distribution of the liposomes are characterized using Dynamic Light Scattering (DLS) or Nanoparticle Tracking Analysis (NTA) [1].

## Description

To ensure the quality and stability of Liposomal Formulation A, various characterization techniques are employed. The encapsulation efficiency of the bioactive natural extract is determined using High-Performance Liquid Chromatography (HPLC) or UV-Vis spectroscopy. The morphology and size of the liposomes are examined through Transmission Electron Microscopy (TEM), which provides detailed information about the shape and structure of the liposomes. The encapsulation efficiency of the bioactive natural extract in Liposomal Formulation B is quantified using HPLC or spectrophotometric methods. The stability of the formulation is evaluated through long-term storage studies, analyzing changes in size, encapsulation efficiency, and physical appearance [2]. Additionally, zeta potential measurements are performed to assess the surface charge of the liposomes, which influences their stability and interaction with biological systems.

Additionally, stability studies are conducted under different storage conditions, including temperature and pH variations, to assess the robustness of the formulation. The release kinetics of the bioactive natural extract from the liposomes are evaluated using dialysis or Franz diffusion cells, providing insights into the controlled release profile of the formulation. Liposomal Formulation A with the bioactive natural extract finds applications in various fields, including pharmaceuticals, nutraceuticals, and cosmeceuticals. In the pharmaceutical domain, it can be utilized for targeted drug delivery, enhancing the therapeutic efficacy of drugs while minimizing their side effects. The liposomal formulation can protect the bioactive natural extract from degradation, ensuring its sustained release at the target site [3].

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In nutraceuticals, Liposomal formulation offers improved bioavailability of the bioactive natural extract, facilitating its absorption in the gastrointestinal tract. This enhances the efficacy of the extract in promoting health and well-being. Furthermore, in cosmeceuticals, the liposomal formulation provides enhanced skin penetration of the bioactive natural extract, leading to improved skin rejuvenation and antioxidant effects [4]. Liposomal Formulation B incorporates a different bioactive natural extract known for its anti-inflammatory properties. Similar to Formulation A, it employs the lipid film hydration method, followed by sonication or extrusion to achieve uniform liposomes encapsulating the extract. The size and polydispersity index of the liposomes are characterized using DLS or NTA. Liposomal Formulation B with the anti-inflammatory bioactive natural extract exhibits diverse applications in the fields of dermatology wound healing and inflammation-related disorders. In dermatology, the liposomal formulation can be employed in topical formulations for the treatment of skin diseases such as psoriasis and eczema. The liposomes improve the skin penetration of the extract, facilitating its anti-inflammatory effects [5].

## Conclusion

The development of liposomal formulations incorporating bioactive natural extracts opens up promising avenues for various applications in pharmaceuticals, nutraceuticals, and cosmeceuticals. Liposomal Formulation A and B, characterized for their respective bioactive natural extracts, demonstrate enhanced stability, improved bioavailability, and controlled release properties. These formulations offer immense potential in targeted drug delivery, nutraceutical absorption, and cosmeceutical applications. Further research and optimization of these formulations will contribute to their commercialization and broader utilization in the future. Liposomal formulations have gained significant attention in recent years due to their ability to enhance the delivery and bioavailability of bioactive compounds. These lipid-based nano carriers offer several advantages, including protection of the encapsulated compound, controlled release, and improved solubility. In this article, we will explore two distinct liposomal formulations loaded with bioactive natural extracts, which have been prepared and characterized for various applications. The chosen natural extracts possess potential health benefits, making them ideal candidates for encapsulation in liposomes. The aim of this study is to investigate the physicochemical properties, stability, and performance of these liposomal formulations, highlighting their potential applications in the fields of pharmaceuticals, cosmetics, and nutraceuticals.

## Acknowledgement

Not applicable.

## Conflict of Interest

None.

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