

Chapter 3. Formulation and Evaluation of Microbeads

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Abstract:-

Microbeads are tiny, spherical polymeric particles that are used extensively in the biomedical, cosmetic, and pharmaceutical industries. They range in size from 1 μm to 1000 μm . They are an effective carrier system for targeted and regulated drug delivery because of their special physicochemical characteristics, which include high surface area, biocompatibility, and the capacity to encapsulate both hydrophilic and hydrophobic medications. To obtain the necessary drug release profiles and stability, a variety of natural and synthetic polymers, including alginate, chitosan, gelatin, pectin, and xanthan gum, are used in the manufacturing of microbeads. The type of medication, polymer, and intended release properties all influence the method choice. To guarantee optimal performance, the prepared microbeads are assessed for swelling index, drug entrapment efficiency, surface morphology (using SEM), particle size distribution, and in-vitro drug release behavior. With benefits including longer therapeutic action, fewer doses, and better patient compliance, microbeads have found use in parenteral, topical, and oral drug delivery systems. The formulation strategies, characterisation methods, medicinal uses, and most current developments in microbead technology are all covered in detail in this chapter. Additionally, it highlights how synthetic microbeads affect the environment and the necessity of sustainable materials and regulatory oversight to guarantee both environmental safety and therapeutic efficacy.

Keywords:- Ionotropic, Gelation, Polyelectrolyte, Cross linking, Polyanion

Introduction

Microbeads:-

Microbeads are nearly spherical in shape and range in diameter from 0.5 to 1000 μm . The solid and free-flowing particulate carriers that contain dispersed medication particles in crystalline or solution form allow for treatment with various active agents with a variety of release profiles or a sustained release with few side effects. Moreover, the microbeads continue to work in physiological conditions. Additionally, they can be altered to incorporate drugs and administer them locally at high concentrations, guaranteeing that therapeutic dosages are reached at the intended location and minimizing adverse effects by keeping systemic quantities low.

The microbeads are made by combining a number of polymers in a certain ratio, such as binding agents like gelatin and chondroitin, cationic polymers like chitosan, and anionic polymers like sodium alginate.