Chapter 1

Introduction
INTRODUCTION

Prof. A.D Bangham of the United Kingdom demonstrated the preparation of liposomes, with entrapped solutes, for the first time in 1965. The idea of using liposomes for drug delivery has been around since the early 1970s. Liposomes are microscopic spheres made from fatty materials, predominantly phospholipids. Because of their similarity to phospholipid domains of cell membranes and an ability to carry drug substances, liposomes can be used to protect active ingredients and to provide time-release properties in medical treatment. Liposomes are made of molecules with hydrophilic and hydrophobic ends that form hollow spheres. They can encapsulate water-soluble ingredients in their inner water space, and oil-soluble ingredients in their phospholipid membranes. Liposomes are made up of one or more concentric lipid bilayers, and range in size from 50 nanometers to several micrometers in diameter.

The goals are to protect the body from unwanted side effects of various drugs and when made to be targeted to specific tissue, to achieve desired concentrations of these drugs at a target site. Despite much research, one hurdle has been to find ways to prevent the body from breaking down liposomes while they are still in the bloodstream and before they reach a site. Conventional liposomes are limited in effectiveness because of their rapid uptake by macrophage cells of the immune system, predominantly in the liver and spleen. With regard to the short in vivo half-life of conventional liposomes, Researchers at a number of industries have overcome this obstacle by designing liposomes that are nonreactive, sterically stabilized (by using polymers) attached to prevent the liposomes from sticking to each other and to blood cells or vascular walls. ‘Stealth’ liposomes appear to be invisible to the immune system and have shown encouraging results in therapy. Thus, coating liposomal vesicles with hydrophilic polymers reduces uptake by the liver. As a result, coated liposomes remain in circulation longer than conventional liposomes. Also, by incorporating targeting ligands on the surface of the liposomes, it is possible to direct them to certain organs.

[1] Liposomal Drug delivery of Zidovudine and it’s Evaluation
1.1 AIM OF THE WORK:

The proposed research is concerned with the study of the role of polymers in controlling the interfacial interactions of liposomes, drug transport kinetics across the liposomal gels and the quantification of stabilization introduced by polymers. The aim of this study is to investigate the effects of experimental conditions on the interaction of liposomes at the solid-liquid interface, drug release from conventional (at different conditions like temperature, pH, and salt) and polymer-coated liposomes, as well as their physical and chemical stability.

The research work is focused on the following studies:

- To study the interactions between the drug and the polymer selected for the formulation
- Formulation of Conventional liposomes, Liposomal Gels
- To study the effect of the different ratios of PC and Cholesterol on the formulation
- To study the Impact of stirring speed and hydration time on the formulation of liposomes
- To characterize the formulated liposomes
- To study the morphology of the liposomes
- To study the effect of temperature, pH and salt on the liposomal size
- Analysis of the formulated liposomes by DSC
- To determine the particle size of the formulated liposomes
- To determine the zeta potential of the formulated liposomes
- To determine the percentage drug entrapment with in the formulated liposomes
- To study the effect of ratios of PC and cholesterol on drug entrapment
- Invitro release analysis of the formulated liposomes
- To study the effect of temperature, pH, Stirring speed, Particle size,
- Salt concentration on the drug release from formulated liposomes
- Stability analysis of the formulated liposomes
- Invivo testing of the liposomal gel on rabbit model