UNIVERSITI TEKNOLOGI MARA

STUDY ON THE PREPARATION OF PLGA-BASED MICROPARTICLES

FAUZIAH BINTI ISMAIL

Dissertation submitted in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (Hons)

Faculty of Pharmacy

October 2007

ACKNOWLEDGEMENT

Thanks to Allah the Almighty for His blessing for me in completing this thesis. Without His blessing, I would not be able to face all the obstacles and submit this thesis on the desired time.

A lot of thanks to my enthusiastic supervisor; Dr Javad Khadeem Sameni for all his courage, guidance and knowledge he gave to me during the research session.

Thank you to En. Hisham from Microwave Technology Centre (MTC) in Faculty of Electrical Engineering for helping and guiding me in completing my analysis using scanning electron microscope (SEM).

I also want to dedicate this appreciation to my research colleagues; Kamalunissa Mohd Alwai and Nur Ain Rosli for helping me in completing the preparation of all my samples needed for my research analysis.

Not forgotten, million of thanks to my beloved parent and to my lovely big family for all their supports and encouragement they gave to me throughout the period of finishing my research.

Last but not least, thank you to all post-graduate students from Pharmaceutical Research Analysis Laboratory for all their helps, especially to Mr Syed Abdul Illah Alyahya and to all my coursemate.

TABLE OF CONTENTS

ABSTRACT

The purpose of the research is to study the preparation of drug delivery system using biodegradable polymer. The advantage of biodegradable polymer over other drug delivery system is that they are absorbable by the body thus leaving no trace. The material used in preparing the microparticulate system was PLGA or poly (lactic-co-glycolic) acid. PLGA-based microparticle was prepared using emulsion solvent extraction technique. The technique involves two different phases; organic phase and aqueous phase. The organic phase contains of dichloromethane (as solvent) and PLGA (a polymer). Meanwhile, aqueous phase contains distilled water and polyvinyl alcohol (as a stabilizing agent). In the study, we were focusing on the different parameters that affect the formation of microparticles. Three different parameters were considered; homogenizing speed, stabilizer concentration and temperature. The samples were prepared and analyzed using optical microscope, particle size analyzers and scanning electron microscope. It was determined that the particles size and size distribution were strongly correlated to the following parameters; homogenizing speed, stabilizer concentration and temperature. Surface morphology was strongly affected by temperature. The others two parameters doesn't significantly influence the surface morphology of microparticles.

CHAPTER 1

Introduction

1.1. Background of the study

In recent years, the controlled release drug from polymeric devices had been extensively studied. The controlled drug delivery applications include sustained delivery over days/weeks/months or years (Brazel *et al.*, 2001). Microparticulate system was also being explored in designing the controlled release drug. This system offers an extended of drug release in formulation of various types of drug and have various advantages compared to conventional dosage forms (Faisant *et al.*, 2003).

Ideally, controlled drug delivery system provides release pattern that result in optimal drug concentration-time profiled at the site of action in human body and thus improved therapeutics effects (Fernandez *et al.*, 2004). Furthermore, controlled drug delivery system could also reduce the need for frequent administrations thus increase patients' compliance. Therefore, microparticulate system is widely used in controlling the drug release rate over a prolonged period of time (controlled release) and in ensuring complete erosion to avoid the removal of empty remnants (Lagarce *et al.*, 2006).