CHAPTER I

INTRODUCTION

Classically, pharmaceutical product stability evaluations have been separated into studies of chemical, physical and biological stability of formulations (Banker and Rhodes, eds., 1990; Lin and Lachman, 1969). A comprehensive stability study of the pharmaceutical formulation in general includes the investigations of the effect of temperature, humidity and light on the stability of the dosage form (Lin and Lachman, 1969). Although many drugs are unstable when expose to natural or artificial light, stability studies utilizing accelerated light are less well known, compared to stability studies utilizing exaggerated temperature conditions (Lin and Lachman, 1969; Ravin, Kennon and Swintosky, 1958).

Nifedipine, a potent calcium-channel blocking agent, is used for the treatment and prophylaxis of angina pectoris and treatment of hypertension (McEvoy, ed., 1989). It is sensitive to light and readily undergoes photochemical oxidation. The photo-oxidation of nifedipine leads to a remarkable diminution of its pharmacological activity (Al-Turk et al., 1988, 1989; Majeed et al., 1987).

This study deals with the photodegradation of nifedipine in Pluronic F-127 gel which seems to be valuable in the formulation of nifedipine transdermal delivery system (Gunyarat Viratyosin, 1990). Also, the methods of stabilization of nifedipine by addition of a suitable antioxidant and protection from light are included.

Objectives :

1. To study the chemical and physical photodegradations of nifedipine in Pluronic F-127 gel using sodium bisulfite.

2. To determine the reaction kinetics and order of reaction of the photodegradation of nifedipine in Pluronic F-127 gel.

3. To evaluate the degradation rate constant of nifedipine in Pluronic F-127 gel in the normal light compared with the accelerated light.

4. To evaluate the shelf-life of nifedipine in Pluronic F-127 gel in the normal light compared with the accelerated light.

5. To investigate the method of prevention or reduction of the photodegradation of nifedipine in Pluronic F-127 gel in the accelerated light by protection from light and the application of sodium bisulfite.

6. To investigate the effect of concentration of sodium bisulfite on the stability of nifedipine in Pluronic F-127 gel.

7. To investigate the suitable packaging for nifedipine in Pluronic F-127 gel.

Results obtained from this investigation should bring about the stabilized nifedipine gel using Pluronic F-127 gel as gel base, and the suitable packaging to maintain the efficacy of the drug. In addition, this investigation will be advantageous for the photostability studies of other drugs because such studies have not yet well established in Thailand.