# CHAPTER I
# INTRODUCTION

The Primary objectives of wound dressings are to cover the wounds to accelerate wound healing and create better healing conditions without making any harmful to the wounds. Early 1960's, conventional dressings were made from fabric materials such as gauze and were considered to be only and passive products which led wounds to drying out. At the time, medical professionals believed that keeping a wound dry was better for the healing process.

The study of Dr. George D. Winter in 1962 initiated the concept of moist wound healing which is the most optimally and effectively condition for wound healing that epithelialization (the skin's ability to generate new cells) occurred twice as fast in moist wounds as in dry ones (Winter GD., 1962). This paved the way for development of wound dressing from traditional material to be more advanced and more functional wound dressings. In an ideal condition, a desirable wound dressing should (a) help accelerate wound healing process, (b) be easy to replace without pain, (c) create and keep moist environment, (d) absorb wound fluids and exudates effectively, (e) protect the wound from secondary infections, (f) be biocompatible, (g) enable oxygen to penetrate through, (h) reduce the wound surface necrosis, and also be (i) sterilize (Purna SK *et al.*,2000 and Kannon GA *et al.*,1995). Based on the types of wounds and modes of wound healings, various types and forms of materials are developed for use as wound dressing (Purna SK *et al.*,2000 and Kannon GA *et al.*,1995). Among of all wound dressings, hydrogel sheets get the great attention in this area because of their unique properties which can meet the essential requirements of ideal wound dressings including: pain relief, absorb and prevent loss of body fluids, barrier for bacteria, easy replacement, transparency for allow the observation of healing process, oxygen permeability, allow the application of drugs without dressing replacement and so on (Ademar B. *et al.*, 2001).

Hydrogels being used as a basic material for the preparation of wound dressings were invented in 1989 by Rosiak *et al.* and become increasingly important materials for pharmaceutical and biomedical applications (Staudt-Bickel *et al,*. 1994). Hence a hydrogel having good strength and good absorptivity property is

expected to be better as a dressing material. 2-Acrylamido-2-Methylpropane Sulfonic Acid (AMPS) has received attention in the last few years due to their excellent properties of hydrophilicity, high swelling capacity, stability over a broad pH range, resistance to hydrolysis, ionic character, lack of toxicity and biocompatibility (Y. Murali Mohan, *et al.,* 2005) these superabsorbent polymeric materials are used for many applications such as drug carriers, artificial organs and also wound dressings. However, some properties of AMPS hydrogel wound dressing did not satisfy the ideal dressing requirements, i.e. less dimensional stability and low strength.

In order to improve mechanical properties of polymer hydrogels and to make them strong, small-scale particles such as chitin whiskers are commonly used as reinforcing agents (Morin A. *et al.,* 2002). It is known that the mechanical properties of composites are related to the aspect ratio of the fillers particles. Based on this, chitin whiskers having a wide range of aspect ratio from 10-120, depend on types of sources. Chitin whiskers can be prepared by acid hydrolysis of chitin from shrimp shells (Sriupayi J. *et al.,* 2005), crab shells (Nair KG. *et al.,* 2003), squid pens (Paillet M. *et al.,* 2001), and tubes of *Riftia pachyptila* tubeworms (Morin A. *et al.,* 2002).

Ultraviolet and Gamma irradiation is recognized as a very suitable tool for the formation of hydrogels. Gamma radiation process has various advantages such as easy process control, possibility of joining hydrogel formation and sterilization in one step, no necessity to add any initiators which possibly harmful and difficult to remove (Lilian C. *et al,.* 2003). But for Ultraviolet radiation process may represent an option against high-energy radiation that it is a non-invasive technique and crosslinking process is much faster (Mirzan T. Razzak *et al.,* 2001).

In view of the above, the present study attempts to prepare hydrogel wound dressings of 2-Acrylamido-2-methylpropane sulfonic acid sodium salt (AMPS-$Na^+$) and Chitin whiskers reinforced AMPS-$Na^+$ hydrogels by using Gamma and Ultraviolet radiation methods and investigated their properties in terms of gel fraction, swelling ratio, water vapor transmission rate, mechanical behaviors, toxicity, and the effect of chitin whiskers on these properties and also the release of chitin oligomers from reinforced hydrogel.