

CHAPTER I

INTRODUCTION



Natural rubber production in the world was 66.6 million tons in 1998, with 71% being produced in Thailand, Indonesia and Malaysia. Thailand is the largest producer of natural rubber in 1998^[1]. The major exported rubber products are rubber tires and rubber gloves. Data from the Rubber Research Institute Department of Agriculture^[2] showed that Thailand exported 88.61% of total production in 1998.

Regardless of large consumption of natural rubber, the most important problem of natural rubber is that it cannot be naturally degraded after used in environment. Gloves when they are expired, they are non-recycled garbage. Expired tires are usually eliminated by burning, which can cause air pollution. Producing controlled degradable natural rubber is one of the best methods to reduce garbage of natural rubber. In addition, it may be an alternative to value-added rubber products that may be developed for some application, which only need a short lifetime such as soil cover sheet used in agriculture.

This research aims to control degradation of natural rubber by incorporating microparticles containing oxidation catalyst, which is active to ultraviolet light. The microparticles were prepared by complex coacervation of gelatin and gum arabic, which are natural water – soluble polymers. Titanium dioxide is a non-toxic inorganic compound cannot only act as UV – protecting agent but also behave as oxidation catalyst. This characteristic is in fact beneficial to this research. Under dried condition, titanium dioxide might be able to scatter the UV light for some extent and help stabilizing the natural rubber. In presence of water and oxygen, titanium dioxide encapsulated in water-soluble polymers should be released out due to the swelling of microparticles. The released titanium dioxide should then acted as oxidation catalyst and accelerated the degradation. To determine the feasibility of using this approach to control natural rubber

degradation, viscosity–average molecular weight of unvulcanized natural rubber as well as mechanical properties of vulcanized natural rubber incorporated with titanium dioxide were investigated. Chemical composition of degraded natural rubber was characterized by FT-IR and ATR-IR.

1.1 Objectives

1. To study the preparation of natural rubber sheet comprised of microparticles containing titanium dioxide.
2. To study the degradation of natural rubber comprised of microparticles containing titanium dioxide under ultraviolet light.

1.2 Scopes of the research

1. To do literature survey.
2. To study degradation of natural rubber comprised of titanium dioxide powder by following viscosity - average molecular weight using solution viscometry method after exposure to UV light under accelerated condition.
3. To prepare microparticles containing titanium dioxide and to analyze the morphology of microparticles by scanning electron microscopy (SEM).
4. To prepare natural rubber sheet comprised of microparticles.
5. To determine viscosity - average molecular weight of rubber sheets after exposure to UV light under accelerated condition and sunlight by solution viscometry method.
6. To determine mechanical properties of vulcanized rubber sheets containing titanium dioxide microparticles according to ASTM method.
7. To summarize the result.