CHAPTER I

INTRODUCTION

The ABS polymers are a family of opaque thermoplastic resins formed by copolymerizing acrylonitrile-butadiene-styrene (ABS) monomers. The ABS resins offer a diversity in unique combinations of mechanical properties. In particular they offer a wide range of impact resistance and good chemical resistance [1]. ABS polymers are widely used as construction materials. The main consumers are the automotive industry, the data technology and telecommunications areas and producers of refrigeration equipment, toys, sports articles, and semi-finished articles.

Natural rubber, cis-polyisoprene, has an attractive range of physical properties and the backbone unsaturation makes it readily chemically modifiable to yield an even more diverse range. Modification of natural rubber (NR) in the original latex form has some obvious advantages.The preliminary survey of natural rubber and its applications by the Rubber Research Institute of Thailand reported that in 1995, Thailand produced 1,784,400 tons of natural rubber and exported 1,635,500 tons or 91.59 % of total production. Of the present, Thailand is the first of the world producers and of natural rubber exporters in the world [2].

Unlike synthetic rubber, natural rubber is not usable as raw material for thermoplastic ABS. The objective of this research is to produce thermoplastic ABS from natural rubber and to replace the synthetic rubber by improving the quality of natural rubber. Graft copolymerization is the preferred method for modification of the natural rubber, the grafted natural rubber can be used as raw material for the thermoplastic ABS type [3,4,5,6]. The copolymer of styrene and acrylonitrile onto natural rubber (acrylonitrile isoprene styrene copolymer) can be used to substitute the ABS (acrylonitrile-butadiene-styrene copolymer).

Ruijinirun, C., [25] studied graft copolymerization of styrene and acrylonitrile onto natural rubber. The effect of emulsifier concentration, monomer content and temperature were studied. From results, the temperature had affected to the ratio of acrylonitrile and styrene monomer in the copolymer that grafted on the natural rubber molecule. Above 50 °C, the acrylonitrile content decreased because it has low normal boiling point (77 °C), it vaporizes easily, thus the acrylonitrile content in aqueous phase decreases with increases temperature. In this study, the grafted natural rubber was carried out under pressure and temperature at above 50 °C, the increase of pressure caused the increase of acrylonitrile content in aqueous phase. Besides the effect of initiator concentration and the blends of grafted natural rubber and SAN (styrene-acrylonitrile copolymer) were also studied.

Objectives

1. To graft the copolymer of styrene and acrylonitrile onto natural rubber latex. The effect of such influential parameters as initiator concentration, reaction temperature and pressure were studied.

2. To characterize the properties of the grafted natural rubber.

3. To prepare the blends of the grafted natural rubber and SAN. The mechanical properties of the blends were investigated.

Future Plan

For the preparation of grafted natural rubber by emulsion graft copolymerization , the appropriate condition such as initiator concentration, reaction temperature and pressure were studied. The grafted natural rubber was blended with SAN resin in various ratio to found suitable blend ratio which yielded the good mechanical properties. The necessary procedure may be as follows :

1. Literature survey and in-depth study of this research work.

2. Preparing the graft copolymer of acrylonitrile and styrene onto natural rubber by means of emulsion polymerization by changing the following parameters so as to attain the appropriate reaction condition :

a) The optimum concentration of initiator.

b) The effect of reaction temperature and pressure.

3. Studying the effect of parameters on the degree of monmer conversion, grafting efficiency and copolymer composition.

4. Preparing the blends of grafted natural rubber and SAN resin by changing the ratio of two component in the composition.

5. Testing mechanical properties such as tensile strength, notch impact strength, hardness and heat distortion temperature.

6. Summarizing the results.