

CHAPTER I

INTRODUCTION

1.1 The Purpose of the Investigation

The blending of two or more polymers has considerable importance in recent years because the blends usually give rise to properties that cannot be attained from individual component. Thermoplastic elastomer from blends of natural rubber (NR) and poly(methyl methacrylate) (PMMA) seem to be very attractive for the fabrication of automobile components. These materials combine the excellent processability characteristics of poly(methyl methacrylate) (PMMA) and the elastic properties of natural rubber (NR) but NR/PMMA blends have a very sharp interface and poor physical and chemical interactions across the phase boundaries [1]. A compatibilization in polymer blend is important in order to obtain good interfacial adhesion and to reduce the interfacial tension between the components is necessary. The compatibility can be improved by addition of suitable block or graft copolymer.

In this research, an attempt was made to prepare graft copolymer of styrene and glycidyl methacrylate onto natural rubber by emulsion polymerization using redox initiator, cumene hydroperoxide (CHPO) and tetraethylene pentamine (TEPA). A graft copolymer was used as a compatibilizer in natural rubber and poly(methyl methacrylate) blends. The mechanical properties and morphology of the blends were also investigated.

1.2 Objectives

The objectives of this research are as follows :

1. To prepare the graft copolymer of styrene and glycidyl methacrylate onto natural rubber. Effects of initiator concentration, reaction temperature, monomer concentration, and reaction time were studied.
2. To characterize the properties of the grafted natural rubber.
3. To prepare the STR5L/poly(methyl methacrylate) (PMMA)/grafted natural rubber (NR-g-St/GMA) blends.
4. To investigate the mechanical properties and morphology of STR5L/poly(methyl methacrylate) (PMMA)/grafted natural rubber (NR-g-St/GMA) blends.

1.3 Scope of the Investigation

For the preparation of grafted natural rubber, the appropriate graft copolymerization conditions were studied. The suitable of grafted natural rubber content in STR5L/PMMA blend, which yielded the good mechanical properties were determined. The necessary procedures to carry out are as follows:

1. Literature survey and in-depth study of this research work.
2. Preparation of the graft copolymer of styrene and glycidyl methacrylate onto natural rubber by emulsion polymerization and selection the suitable reaction condition.
3. Study of the effect of parameters on the degree of monomer conversion, grafting efficiency, and percentage grafted natural rubber.
4. Characterization of the grafted natural rubber.

5. Preparation of the polymer blends of STR5L/poly(methyl methacrylate) (PMMA)/grafted natural rubber (NR-g-St/GMA) by a two roll-mill and sheet made with a compression molding machine.

6. Investigation of the mechanical properties such as tensile strength, tear strength, hardness and impact energy.

7. Summarization of the results.



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย