

CHAPTER I

INTRODUCTION



The Purpose of the Investigation

Methyl methacrylate-Butadiene-Styrene (MBS) terpolymers are widely used as impact modifier in rigid PVC compounds. MBS-modified PVC compounds now account for over one billion pounds worldwide in the area of packaging: film, sheet, and bottles; building and construction: pipe, conduit window glazing, and profiles; injection molded industrial housings; sign and credit-card stock; thermoformable sheet; and others [1].

The preliminary survey of natural rubber and its applications revealed from the Rubber Research Institute of Thailand reported that in 1996, Thailand produced 1,970,300 tons of natural rubber and exported 1,762,990 tons or 89.48% of total production, the remaining 10.52% was used in the country. In present, Thailand is the world largest producers of natural rubber and the biggest exporter of natural rubber latex [2].

Unlike the synthesized rubbers, natural rubber cannot be used as raw material of MBS. Therefore, the objective of this research is to produce impact modifier from natural rubber similar to MBS and to replace the synthesized rubber by improving the quality of natural rubber. Graft copolymerization is a selected method for a modification of the natural rubber, the grafted natural rubber can be used as an impact modifier in rigid PVC [3, 4, 5]. The graft copolymer of methyl methacrylate and styrene onto natural rubber (Methyl methacrylate-Isoprene-Styrene terpolymers, MIS) can be used to substitute the MBS (Methyl methacrylate-Butadiene-Styrene terpolymers).

In this research, the grafted natural rubber was prepared by emulsion polymerization at various emulsifier concentrations, initiator concentrations, and reaction temperature, which affected the properties of the grafted natural rubber. The blends of grafted natural rubber product and PVC was also studied.

Objective

1. To prepare the graft copolymer of methyl methacrylate and styrene onto natural rubber latex. Effects of such influential parameters as the concentrations of methyl methacrylate and styrene monomers, emulsifier concentration, initiator concentration, and reaction temperature were studied.
2. To characterize the properties of the grafted natural rubber.
3. To prepare the blends of the grafted natural rubber product and PVC and to investigate the mechanical properties of the blends as an impact modifier for PVC.

Scope of the Investigation

For the preparation of grafted natural rubber, the appropriate graft copolymerization conditions were studied. The suitable blend ratio of grafted natural rubber and PVC, which yielded the good mechanical properties was determined. The experimental procedures can be carried out as follows ;

1. Literature survey and in-depth study of this research work.
2. Preparing the graft copolymer of methyl methacrylate and styrene onto natural rubber by means of emulsion polymerization via changing the following parameters so as to attain the appropriate reaction condition :

- a) The optimum concentrations of methyl methacrylate and styrene, emulsifier, and initiator.
 - b) The effect of reaction temperature.
3. Studying the effect of parameters on the degree of monomer conversion, grafting efficiency, graft ratio, and copolymer composition.
 4. The blends of grafted natural rubber product and PVC were prepared. The properties such as tensile strength, Izod impact strength, and hardness were investigated.
 5. Summarizing the results.



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