

CHAPTER I

Introduction

1.1 The Purpose of the Investigation

Livelihood of many people and several economics in the developing world depends on the natural rubber (NR) and its derivatives. The reason for this is a renewable resource, whereas its synthetic counterparts are mostly manufactured from non-renewable oil-based resources.[1]

Many engineering applications of natural rubber take advantage of its elasticity. Natural rubber has excellent resistance to fatigue, is highly resilient, has low creep and low heat build-up, bond efficiently to metals, is inexpensive and easy to manufacture, and has a wider range of operating temperature than most other elastomers.[2] Since natural rubber is non-polar, its vulcanizates have little resistance to swelling in non-polar solvents. When in contact with mineral oils, and gasoline, the volume of natural rubber increases hundred percent.

The properties of NR should be modified to suit different applications if it is to remain competitive in the market. Various chemical modifications have been attempted to modify its properties and extend its use. One such modification is the graft copolymerization of a second monomer. Even though, grafting could be carried out in solution and in solid rubber, latex modification has proved to be the most economical.[3] Several monomers have been copolymerized with NR, but only the product with methyl methacrylate, called Heveaplus MG, have been produced and used commercially. The main advantages of Heveaplus MG lie in an ability to produce self-reinforced vulcanizates and in adhesive applications.

1.2 Objectives

The objectives of this research work were as follows:

- 1.) To determine a suitable condition for the preparation of methyl methacrylate grafted natural rubber.
- 2.) To study the effects of various reaction parameters on %conversion, %grafting efficiency, and %grafted natural rubber:
 - a.) The effect of initiator concentration.
 - b.) The effect of reaction temperature.
 - c.) The effect of monomer concentration.
 - d.) The effect of reaction time.
- 3.) To determine a suitable type of redox initiator for graft copolymerization of methyl methacrylate onto natural rubber.

1.3 Scope of the Investigation

In this research, the necessary procedures to carry out the successful research are as follows:

- 1.) Literature survey and in-depth of this research work.
- 2.) Preparing the graft copolymer of methyl methacrylate onto natural rubber using three redox initiator systems via emulsion polymerization, as to select the suitable and appropriate reaction condition.
- 3.) Studying the effects of reaction parameters on degree of monomer conversion, grafting efficiency, and grafted natural rubber.
- 4.) Characterizing the grafted natural rubber.
- 5.) Summarizing the results.