CHAPTER I

INTRODUCTION

1.1 Introduction

Recently, recycling of waste materials is of growing importance for all the industries in the world. For rubber products, the automotive and transportation industries are the biggest consumers of new rubber. Rubber waste is usually generated from both products of the manufacturing process and post-consumer (retired) products, mainly consisting of scrap tires. On the basis of energy balance, material recycling of the rubber waste may be preferable to any other recycling techniques. However, material recycling in the form of crumb and reclaimed rubber only accounted for about 11% of the total scrap tires in 1998 [1].

The economic recycling of used tires is a great challenge. The aim of this research was to increase the value to tire waste and to promote natural resources preservation. Most process involved some forms of devulcanization in breaking the sulfur bonds that would help vulcanized rubber hold its shape, a characteristic that maily prevents recyclers from melting tires down and remolding them into new products.

Incorporation of scrap rubber into thermoplastic elastomeric (TPE) materials is an appealing alternative to existing applications. Thermoplastic elastomers are a new family of materials, incorporating the advantages of both thermoplastics and elastomers. Applications of thermoplastic elastomers are expanding into many major areas, such as automobile parts, agricultural pipes, flooring and matting, ect. Although the use of rubber in TPEs, especially virgin rubber, has been documented for years, the transformation of crosslinked rubber into a TPE has remained a challenging problem, in spite of its attractive potential.

1.2 Objective

This study focused on developing TPE materials from PP and reclaimed tire rubber. The effect of weight percent of RTR, compatibilizer, virgin natural rubber and ethylene propylene diene contents on mechanical and rheological properties of the blends was investigated.

1.3 Scope of the Research

Reclaimed tire rubber (RTR) and polypropylene (PP) were mixed at ratio of 20/80 to 80/20 (RTR/PP) by using an internal mixer. Dynamic vulcanization of blend was performed by using a sulphur crosslinking agent. In addition, a compatibilizer was applied. The recipes used for dynamic vulcanization are given in Table 3.1 in section 3.2.1. Various mechanical property tests were performed in accordance with ASTM D 256 and ASTM D412 for each blend. Furthermore, the difference between unvulcanized and vulcanized RTR was recognized through a solvent swelling study. The phase structure of the RTR/PP blends at various compositions was then assessed by mechanical and rheological properties, and scanning electron microscopy (SEM) images.