

**MODIFICATION OF STYRENE BUTADIENE RUBBER
(SBR)/NATURAL RUBBER (NR) SYSTEM USING
OIL TACKIFIER FOR PRESSURE
SENSITIVE ADHESIVE**

AMIRAH BINTI WAHID

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Polymer Technology
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

MAY 2008

ACKNOWLEDGEMENTS

ALHAMDULILLAH, in the name of Allah S.W.T the most gracious who has given me strength, ability and patience to complete this final project. All perfect praise belongs to Allah S.W.T lord of universe. May this blessing belong of my family and companion. I am grateful to offer my deepest appreciation to my supervisor Assoc. Prof. Dr. Rahmah Mohamed who had generously supplied ideas, guidance, advice, comments and time spared throughout the final project. Many ideas in this project were the result of brainstorming session with her.

I sincerely acknowledge all the laboratories assistant in Polymer Technology for helping me to carry the testing.

Also not forgotten, very special thank to my family especially who emotional strength, free flowing love and caring concern have support me throughout. Also all Polymer Technology lecturers and my classmates for their understanding and moral support in the completing of the final project. May God bless all of you.

Amirah binti Wahid

TABLE OF CONTENTS

| | Page |
|--|-------------|
| ACKNOWLEDGEMENTS | iii |
| LIST OF TABLES | vi |
| LIST OF FIGURES | viii |
| LIST OF ABBREVIATIONS | ix |
| ABSTRACT | x |
| ABSTRAK | xi |
| | |
| CHAPTER 1 INTRODUCTION | |
| 1.1 Introduction | 1 |
| 1.2 Objectives of study | 3 |
| | |
| CHAPTER 2 LITERATURE REVIEW | |
| 2.1 Adhesive | 4 |
| 2.1.1 Types of Adhesives | 5 |
| 2.1.1.1 Physically hardening adhesives | 5 |
| 2.1.1.2 Chemically curing adhesives | 7 |
| 2.2 Pressure Sensitive Adhesive | 8 |
| 2.3 Natural Rubber Adhesives | 9 |
| 2.4 Styrene Butadiene Rubber (SBR) | 9 |
| 2.5 Natural Rubber (SMRL type) | 10 |
| 2.6 Epoxidised Natural Rubber (ENR) | 10 |
| 2.7 Expanded Polystyrene (EPS) | 11 |
| 2.7.1 Solubility Polystyrene | 12 |
| 2.8 Epoxidised Soy Oil (ESO) | 13 |
| 2.9 Role of other Components | 14 |
| 2.9.1 Tackifiers | 14 |
| 2.9.2 Phenolic Resin | 15 |
| 2.9.3 Surfactants | 16 |
| | |
| CHAPTER 3 METHODOLOGY | |
| 3.1 Materials | 17 |
| 3.1.1 Styrene Butadiene Rubber (SBR) | 17 |
| 3.1.2 Natural Rubber (SMRL type) | 17 |
| 3.1.3 Epoxidised Natural Rubber (ENR) | 17 |
| 3.1.4 Expanded Polystyrene (EPS) | 18 |
| 3.1.5 Epoxidised Soy Oil (ESO) | 18 |
| 3.1.6 Toluene | 18 |
| 3.1.7 Styrene Solution | 18 |
| 3.2 Method | 19 |

ABSTRACT

MODIFICATION OF STYRENE BUTADIENE RUBBER (SBR)/NATURAL RUBBER (NR) SYSTEM USING OIL TACKIFIER FOR PRESSURE SENSITIVE ADHESIVE

Pressure Sensitive Adhesive (PSA) tape is where surfaces can be adhered to tenaciously upon application only with a light finger pressure. Strength of the bond is influenced by the contact pressure. This PSA is ease of application and have ability to be removed cleanly from surfaces on which they are applied. It's actually composed of a rubbery tape elastomer combined with a liquid or solid resin tackifier component. In this study EPS was used together with SBR and incorporation with NR also aid from ESO to make a new formulation of PSA. Two formulations were created because used the different type of NR which are SBR/ENR EPS and SBR/SMRL EPS adhesives. The combination of SBR is to improved the compatibility between EPS and NR but due to the separation layer of the mixing, then SMRL also ENR was used to overcome this problem. By using these type of rubber also indirectly improved the tackiness of the adhesives. ESO was using in order to make the bonding of the adhesives onto substrate more strength. However the highest of incorporation ESO (6%) will give decreases in shear strength value.

CHAPTER 1

INTRODUCTION

1.1 Introduction

An adhesive is defined as a substance that is capable of holding material together by surface attachment. This is general definition and includes terms such as glue, mucilage, cement and paste. Various descriptive are applied to the term adhesive to indicate certain characteristics. This may indicate physical form such as liquid or tape adhesive (Cagle, 1968).

Adhesive is one of the oldest joining techniques, but adhesive technology progressed very little until the twentieth century. Records show those adhesives were used over three thousand years ago.

More than 2,300,000 tonnes of adhesives are produced and used in Europe each year and this volume is on the increase. Adhesive manufacturers offer more than 250,000 different products for the most diverse applications and these products are customized for virtually every purpose. This is important, because each adhesive must satisfy different requirements. Depending on the application, an adhesive may have to withstand extremely low temperatures or heats of several hundred degrees it may have to be highly elastic or extremely stable depend on substrate to be bonded.

Latest, Expanded Polystyrene (EPS) had been blended with Methyl Metacrylate (MMA) solvent to form new polymer blend system PSMMA