INVESTIGATION ON THE THERMAL STABILITY AND THERMAL BEHAVIOUR OF PEO/ENR-25/LiClO$_4$ BLENDS

SITI RAHMAH BINTI RAMLAN

BACHELOR OF SCIENCE (Hons) CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

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TABLE OF CONTENTS

Page

ABSTRACT

INVESTIGATION ON THE THERMAL STABILITY AND THERMAL BEHAVIOUR OF PEO/ENR-25/LiClO$_4$ BLENDS

Thermal behaviour of poly(ethelyle oxide) (PEO), a semicrystalline polymer and an amorphous epoxidized natural rubber with 25 mol % epoxidation level (ENR-25) doped with lithium perchlorate (LiClO$_4$) at salt concentration (Y) = 0.02, 0.05, 0.07, 0.10, 0.12, 0.15 and 0.20 were studied by differential scanning calometry (DSC). Two glass transition temperatures (T_g), corresponding to the neat constituents were observed. It shows the immiscibility of the two constituents in the blends. Melting temperature (T_m) and equivalently the rate of crystallization of the blend decrease with increasing amount of salt. The slowing down of the rate of crystallization is greater for neat PEO and for blends with higher PEO content, thus, conforming the higher solvating power of PEO towards the Li salt as compared to ENR-25.

CHAPTER 1

INTRODUCTION

Polymer is a macromolecule builds up from numerous smaller molecules called monomers, linked together by covalent bond. Polymers in which the repeating units are identical or similar are called homopolymers. On the other hand, if the repeating units are of different monomers, then copolymer results. Poly(ethylene) (PE), poly(vinyl chloride) (PVC), polystyrene and poly(ethylene oxide) (PEO) are examples of homopolymers.

Polymers can be divided into three main groups namely thermoplastic, thermoset and elastomer. A thermoplastic is a polymer that softens when heated but returns to its original condition when cooled to room temperature. They are mainly additional polymers. The macromolecular chains of thermoplastic associate with one another through van der Waals forces, dipole-dipole interactions or hydrogen bonding depending on the molecular structure of the monomers. For example, hydrogen bonds form between the macromolecular chains of poly(urethene) (PU) due to the presence of the amine groups. An elastomer like rubber, possesses the property of deformation and elastic recovery which means it has the ability to be stretched and elongated under stress but partially or completely recovers to its original shape when